STANDARD PLANS

LOS ANGELES COUNTY
PUBLIC WORKS
Public Service That Works

2000
EDITION

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS

HARRY W. STONE, DIRECTOR
PREFACE

The Standard Plans for Public Works Construction (1997 edition) of the American Public Works Association (Southern California Chapter) and Associated General Contractors of California (Southern California District), hereinafter called APWA, were adopted by the Los Angeles County Board of Supervisors on September 16, 1999.

This document adopts, by reference, many of the APWA and Caltrans Standard Plans. The APWA and Caltrans Standard Plans are not included in this document but those Standard Plans that are adopted by reference are listed in the respective section of the Table of Contents.

This document is intended as a supplement to the APWA Standard Plans.

The Standard Plans are to be used in conjunction with the Standard Specifications for Public Works Construction as a companion document. This latter document has been in existence since 1967 and is commonly referred to as the “Green Book”. The Standard Plans, being engineering plans, are subject to the provisions of Chapter 7, Division 3, Business and Professional Code, State of California. As such, they must be approved by a registered professional engineer to indicate his or her responsibility for them. In addition, they do not have the legal effect of a contract document or construction plan until officially adopted by the particular user agency.

This document is arranged in the same manner as the APWA Standard Plans; i.e., roadway items are included in Section 1, sewer items in Section 2, etc. To avoid confusion with the APWA Standard Plans, the Department of Public Works (DPW) Standard Plans have been numbered with a four digit prefix and a single digit suffix. The first number denotes the section in which the plan is located. The suffix is used to denote changes. All plans when originally approved will bear the suffix “O”. As they are amended, the suffix will be revised to denote the change number. When a Standard Plan is referred to on another Standard Plan, the suffix will not be given and the latest Standard Plan shall be used.

For convenience to engineers and contractors, the old numbers for the Department, the Road Department, the Flood Control District and the County Engineer standard plans are listed in the right hand margin of the Table of Contents.

Construction plan call-outs such as “Construct Driveway per 110-0” or “Construct Markers per A73A” will refer to the APWA or Caltrans Standard Plans, respectively, while a call-out such as “Construct Parkway Culvert per 3055-0” will refer to the DPW Standard Plan. The use of any other agencies’ standard plan such as the City of Los Angeles or Corps of Engineers should clearly identify that agency in the construction plan call-out.

The major change of the 2000 Edition is the conversion of units of measurement used from U.S. Standard Measures to the Metric International System on plans with dual units, the Metric International System units are first the U.S. Standard Measures are in parenthesis.
PURCHASE
OF
STANDARD PLAN MANUALS

The Department's Standard Plan Manual is available for purchase at the Cashier's Office, west side of main lobby, 900 South Fremont Avenue, Alhambra, CA 91803, (626) 458-6959.

The "Standard Plans for Public Works Construction", as promulgated by the Joint Cooperative Committee of the Southern California Chapter of the American Public Works Association and the Southern California Districts of the Associated General Contractors of California, may be purchased from the publisher, Building News, Inc., 1612 South Clementine Street, Anaheim, CA 92802, (714) 517-0970.

The "Standard Plan" Manual issued by the State of California Department of Transportation (Caltrans) may be purchased from the State of California Department of Transportation General Publication Distribution Unit, 1900 Royal Oaks Drive, Sacramento, CA 95819, (916) 445-3520.
## Section 1

### Street Improvements

The standard plan numbers designated by $^R$ and $^C$ refer to APWA/AGC and Caltrans, respectively, and are incorporated by reference.


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The standard plan numbers designated by † and ‡ refer to APWA/AGC and Caltrans, respectively, and are incorporated by reference.

Old standard plan numbers designated by (E), (R), (C), and (PW) refer to standard plans in the old Flood, Road and County Engineer Standard Plan Manuals and the Department of Public Works Standard Plan Manual.

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**SECTION 3**

**FLOOD CONTROL AND STORM DRAIN FACILITIES**

The standard plan numbers designated by † and ‡ refer to APWA/AGC and Caltrans, respectively, and are incorporated by reference.

Old standard plan numbers designated by (F), (R), (G), and (PW) refer to standard plans in the old Flood, Road and County Engineer Standard Plan Manuals and the Department of Public Works Standard Plan Manual.

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The standard plan numbers designated by † and ‡ refer to APWA/AGC and Caltrans, respectively, and are incorporated by reference.

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Old standard plan numbers designated by (F), (R), (C), and (PWA) refer to standard plans in the old Flood, Road and County Engineer Standard Plan Manuals and the Department of Public Works Standard Plan Manual.

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| 600-1    | CHAIN LINK FENCE AND GATES                            | 88-01 (R), 2-D178 (F), 2-D179 (F), 2-D180 (F), 2-D403 (F), W-23 (C) |
| 601-1    | REINFORCED CONCRETE BLOCK WALL                        | D-65 (C), 6005-0 (PWA) |
| 602-1    | STANDARD PIPE GATE FOR ACCESS ROADS                   | 2-D480 (F), 6007-0 (PWA) |
| 606-1    | METAL HAND RAILINGS                                   | 88-02 (R)  |

| #A73A    | OBJECT MARKERS                                        | 88-01 (R), 2-D416 (F) |
| #A73B    | MARKERS                                               |            |
| #A73C    | DELINEATORS, CHANNELIZERS AND BARRICADES (USE STANDARD PLAN 6009 FOR BARRICADES AND STANDARD PLAN A73C FOR DELINEATORS AND CHANNELIZERS) |            |

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| #B0-1  | BRIDGE DETAILS                                       |            |
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| #B2-9  | LOAD TEST DETAILS (1)                                |            |
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| #B8-5  | CAST-IN-PLACE PRESTRESSED GIRDER DETAILS              |            |
| #B11-47| CABLE RAILING                                        |            |
| #B11-52| CHAIN LINK RAILING TYPE 7                            |            |
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Sec-7.2
SECTION 1

Street Improvements
### ASPHALT CONCRETE PAVEMENT LEGEND

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NOTE:
DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
NOTES:
1. P AND T TO BE DETERMINED BY LABORATORY TESTS.
2. FINISHED SURFACE OF BASE MATERIAL MAY BE CONSTRUCTED ON A STRAIGHT GRADE FROM CENTERLINE TO FLOWLINE WITH A.C. PAVEMENT VARYING UNIFORMLY FROM P AT CENTERLINE TO P+50mm (P+2") AT FLOWLINE.
3. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
NOTES:
1. P AND T TO BE DETERMINED BY LABORATORY TESTS.
2. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL.
   VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
NOTES:

1. WEAKENED-PLANE AND/OR CONTACT JOINTS SHALL BE PLACED IN GUTTER AT LOCATIONS SHOWN ON THE TYPICAL JOINT PLAN HEREBY.
2. WEAKENED-PLANE JOINTS SHALL BE PLASTIC CONTROL JOINTS OR 38 mm (1 1/2") DEEP SAW CUTS. CONCRETE SAWING SHALL TAKE PLACE WITHIN 24 HOURS AFTER CONCRETE IS PLACED.
3. DOWELS FOR CONTACT JOINTS SHALL BE 10 M BARS 460 mm LONG (NO.4 BARS 18" LONG).
4. ALL EXPOSED CORNERS ON PCC TO BE ROUNDED WITH 15 mm (1/2") RADIUS.
5. X=140 mm (5 1/2") AT POINTS A AND C, 89 mm (3 1/2") AT POINT B.
6. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
NOTES:
1. WEAKENED-PLANE AND /OR CONTACT JOINTS SHALL BE PLACED IN GUTTER AT LOCATIONS SHOWN ON THE TYPICAL JOINT PLAN HEREOF.
2. WEAKENED-PLANE JOINTS SHALL BE PLASTIC CONTROL JOINTS OR 3.8 mm (1/2") DEEP SAW CUTS. CONCRETE SAWING SHALL TAKE PLACE WITHIN 24 HOURS AFTER CONCRETE IS PLACED.
3. DOWELS FOR CONTACT JOINTS SHALL BE 10MM BARS 460 mm LONG (NO.4 BARS 18 INCHES LONG).
4. ALL EXPOSED CORNERS ON PCC TO BE ROUNDED WITH 15 mm (1/2") RADIUS.
5. X=190 mm (7 1/2") AT POINTS A AND C, 140 mm (5 1/2") AT POINT B.
6. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
CROSS GUTTER FOR INVERTED PCC SHOULDER STREET SECTION
STANDARD PLAN METRIC
1100-1 SHEET 1 OF 1
APPROVED THOMAS A. RALEMANN 5/31/1992 DIRECTOR OF PUBLIC WORKS 1999 REVISIONS
NOTES:

1. SEE APWA STD. 122, CROSS AND LONGITUDINAL GUTTERS, FOR DETAILS.

2. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
WALK RETURN
CASE II
(USE CASE II WHERE
UTILITIES ARE
IN RETURN AREA)

150 mm (6"
R/W
ECR
BCR
TRANSITION
4:1
1.2 m (4'
WIDTH AS SHOWN ON PLAN
150 mm (6"
1.5 m
(5'
WIDTH AS SHOWN ON PLAN
100 mm (4") PCC WALK OR
AS INDICATED ON PLAN

TYPICAL SECTION
NO SCALE

NOTE:
DIMENSIONS SHOWN ON THE PLAN FOR METRIC
AND ENGLISH UNITS ARE NOT EXACTLY EQUAL
VALUES. IF METRIC UNITS ARE USED, ALL
VALUES USED FOR CONSTRUCTION SHALL BE
METRIC VALUES. IF ENGLISH UNITS ARE USED,
ALL VALUES FOR CONSTRUCTION SHALL BE
ENGLISH VALUES.

WALK RETURN
CASE I

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SIDEWALK DETAILS AT INTERSECTIONS

STANDARD PLAN
METRIC
1130-1

APPROVED
THOMAS A. SALMANIANS
DIRECTOR OF PUBLIC WORKS
5/31/1992
DATE

1999

REVISIONS

SHEET 1 OF 1
PARKWAY PROTCTOR DETAIL

1.2 m (4') FOR CONCRETE FLOW LINE

HEIGHT VARIES
50mm TO 150mm
(2' TO 6')

SECTION B-B

GRADE ONLY @ 8%

VARIER 50mm TO
150 mm (2" TO 6")

SECTION A-A

NOTES:
1. ALL EXPOSED CORNERS TO BE ROUNDED WITH 13 mm (1/2") RADIUS.
2. DIMENSION SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES.
   IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF
   ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

PARKWAY EROSION PROTECTOR

STANDARD PLAN
METRIC
1150-1

APPROVED
5/31/1992
1999
1999

SHEET 1 OF 1
NOTE:
DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
**NOTE:**

Dimensions shown on the plan for metric and English units are not exactly equal values. If metric units are used, all values used for construction shall be metric values. If English units are used, all values used for construction shall be English values.

---

**LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS**

**CATCH BASIN GUTTER TRANSITION FOR INVERTED PCC SHOULDER STREET SECTION**

**APPROVED:** Thomas A. Gidwitz

**DATE:** 5/31/1992

**REVISIONS:** 1999

**STANDARD PLAN METRIC 1180-1**

**SHEET 1 OF 1**
NOTES

1. STREET NAME AND BLOCK NUMBER PLATES SHALL BE ALUMINUM ALLOY 6061 T6, 3mm (0.125 INCH) THICK.

2. STREET NAME AND BLOCK NUMBER PLATES SHALL BE COVERED WITH HIGH INTENSITY REFLECTIVE SHEETING.

3. STANDARD SHALL BE SILVER-WHITE LEGEND ON BLUE BACKGROUND.

4. STREET NAME SHALL BE 115 mm (4.5 INCH) UPPER CASE SERIES "C" LETTERS AND NUMBERS AND 85 mm (3.34 INCH) LOWER CASE SERIES "c" LETTERS. BLOCK NUMBERS / PRIVATE PLATE SHALL BE 75 mm (3 INCH) UPPER CASE SERIES "C" LETTERS AND NUMBERS. WHEN THE MESSAGE LENGTH EXCEEDS 1070mm (42 INCHES) AND CANNOT BE REDUCED TO 1050mm (41 INCHES), THE MESSAGE SHALL BE DIVIDED INTO TWO SIGNS, ONE OVER THE OTHER.

5. MANUFACTURE OF SIGN TO BE PER LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS SPECIFICATIONS FOR HIGH INTENSITY REFLECTIVE STREET NAME SIGNS. VENDOR SHALL PROVIDE WRITTEN WARRANTY AND WARRANTY NUMBER FROM MANUFACTURER OF REFLECTIVE SHEETING.

6. TYPE A BRACKET - 380mm (15 INCHES) LONG TO ACCOMMODATE BLADE AND BLOCK NUMBER PLATE.
   585mm (23 INCHES) LONG TO ACCOMMODATE 2 BLADES AND BLOCK NUMBER PLATE.

   TYPE B BRACKET - 255mm (10 INCHES) LONG TO ACCOMMODATE BLADE ONLY.
   460mm (18 INCHES) LONG TO ACCOMMODATE 2 BLADES.

7. TWO FASTENERS (RIVETS) SHALL BE USED TO ATTACH STREET NAME SIGN BLADES OF 610 AND 760mm (24 AND 30 INCH) SIGNS TO BRACKET. THREE FASTENERS SHALL BE USED TO ATTACH STREET NAME SIGN BLADES OF 915 AND 1070mm (36 AND 42 INCH) SIGNS TO BRACKET.

8. THE BLOCK NUMBERING SHALL BE OF EVEN HUNDRED AND IDENTICAL TO THE BLOCK NUMBER OF THE CORRESPONDING CORNER.

   THE BLOCK NUMBER SHALL BE FOLLOWED BY THE DIRECTIONAL DESIGNATION OF THE STREET. FOR EXAMPLE: 12700N.

9. POST, ANCHOR, SLEEVE TO BE 2.66mm (12 GAUGE) GALVANIZED STEEL WITH PERFORATIONS ALONG THE ENTIRE LENGTH, ON ALL 4 SIDES.

10. PERFORATIONS TO BE 11mm (7/16 INCH) DIAMETER, 25mm (1 INCH) ON CENTER LINE.

11. WHEN INSTALLING IN SOIL, ANCHOR, AND SLEEVE SHOULD BE DRIVEN INTO SOIL TOGETHER, LEAVING A PROTRUSION OF 25 OR 50mm (1 OR 2 INCHES) ABOVE GROUND.

12. POST, ANCHOR AND SLEEVE SHALL TELESOPHE FREELY.

13. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
SECTION 2

Sewers and Sanitation
TABLE OF DIMENSIONS

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>a</td>
<td>60 mm (2 1/2&quot;)</td>
</tr>
<tr>
<td>b</td>
<td>150 mm (6&quot;)</td>
</tr>
<tr>
<td>c</td>
<td>300 mm (12&quot;)</td>
</tr>
<tr>
<td>d</td>
<td>405 mm (16&quot;)</td>
</tr>
<tr>
<td>e</td>
<td>810 mm (32&quot;)</td>
</tr>
<tr>
<td>f</td>
<td>230 mm (9&quot;)</td>
</tr>
<tr>
<td>g</td>
<td>120 mm (4 1/2&quot;)</td>
</tr>
<tr>
<td>l</td>
<td>130 mm (5&quot;)</td>
</tr>
<tr>
<td>m</td>
<td>600 mm (24&quot;)</td>
</tr>
<tr>
<td>n</td>
<td>80 mm (3&quot;)</td>
</tr>
<tr>
<td>p</td>
<td>6 mm (1/4&quot;)</td>
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<tr>
<td>q</td>
<td>53 mm (2 1/8&quot;)</td>
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<tr>
<td>r</td>
<td>32 mm (1 1/4&quot;)</td>
</tr>
<tr>
<td>s</td>
<td>35 mm (1 3/8&quot;)</td>
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<tr>
<td>t</td>
<td>44 mm (1 3/4&quot;)</td>
</tr>
<tr>
<td>u</td>
<td>50 mm (2&quot;)</td>
</tr>
</tbody>
</table>

NOTE:

TO BE USED FOR DEPTHS LESS THAN 1.675 m (5'-6") FROM THE TOP OF THE MANHOLE TO THE TOP OF THE SEWER PIPE. DEPARTMENTAL APPROVAL REQUIRED.
CONCRETE FOR ALL PRECAST UNITS SHALL BE COMPACTLY VIBRATED IN THE FORMS. IT SHALL BE CURED ACCORDING TO APPROVED PRACTICE EITHER BY STEAM, SPRINKLING, MEMBRANE SOLUTION OR A COMBINATION OF THESE. IT SHALL DEVELOP 25MPa (3500PSI) OR GREATER STRENGTH IN 28 DAYS.

2. THE DEPTH OF CHANNELS SHALL EQUAL THE PIPE DIAMETER FOR ALL SIZES OF PIPE.

3. CHANNEL LOCATIONS AND OFFSETS TO BE PLACED AS SHOWN ON STANDARD PLAN 2004.

4. ALL FIELD POURED CONCRETE TO BE CLASS 310-C-17 (520-C-2500) AND ALLOWED TO SET 24 HOURS BEFORE PLACING PRECAST UNITS.

5. ALL PRECAST UNITS SHALL BE REINFORCED FOR H-20 BRIDGE LOADING.

6. ALL CEMENT MORTAR SHOWN SHALL BE CLASS "D" PER SECTION 201-5.1 OF STANDARD SPECIFICATIONS.

7. TO BE USED ONLY UPON APPROVAL OF THE DEPARTMENT.

8. MANHOLE STEPS SHALL BE INSTALLED AS PER STANDARD PLAN 635.

9. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
1. CONCRETE BASE AND STUB WALLS SHALL BE POURED IN ONE OPERATION TO A POINT 50mm (2") ABOVE INLET AND OUTLET PIPES. ALL PIPES SHALL BE RIGIDLY SUPPORTED BY TEMPORARY PIERS DURING THIS OPERATION. CONCRETE SHALL SET FOR 24 HOURS BEFORE PLACING PRECAST UNITS.

2. CONCRETE FOR ALL PRECAST UNITS SHALL BE COMPACTLY VIBRATED IN THE FORMS. IT SHALL BE CURED ACCORDING TO APPROVED PRACTICE EITHER BY STEAM, SPRINKLING, MEMBRANE SOLUTION, OR A COMBINATION OF THESE. IT SHALL DEVELOP 25 MPa (3500 PSI) OR GREATER STRENGTH IN 28 DAYS.

3. STEPS SHALL BE CAST IN PLACE AT TIME OF FABRICATION OR PLACED BETWEEN RINGS WITH 380mm (15") MAXIMUM SPACING BETWEEN STEPS.

4. THE DEPTH OF CHANNEL SHALL EQUAL THE PIPE DIAMETER FOR ALL SIZES OF PIPE. FOR SPECIAL CHANNELS IN TRAP OR GAUGING MANHOLES, SEE SPECIAL PLANS.

5. THE TOP OF MANHOLE AND THE STEPS SHALL BE PLACED DIRECTLY OVER THE OUTLET OF THE STRUCTURE EXCEPT AS OTHERWISE NOTED ON PLANS.

6. CENTRIFUGALLY SPUN UNITS MAY BE USED AT THE OPTION OF THE CONTRACTOR, CONFORMING TO SPECIFICATIONS FOR CENTRIFUGAL CONCRETE PIPE AND TO DETAILS ABOVE.

7. CEMENT MORTAR INSIDE JOINTS SHALL BE NEATLY STRUCK AND POINTED AND SHALL NOT EXCEED 10mm (3/8") IN THICKNESS.

8. RISER SECTIONS SHALL CONFORM TO ASTM C 478 AND SHALL HAVE A MINIMUM OF 50mm (2") OF COVER OVER THE STEEL ON THE INSIDE FACE.

9. AT THE OPTION OF THE CONTRACTOR A REINFORCED PRECAST MANHOLE BASE MAY BE SUBSTITUTED CONFORMING TO APWA STANDARD PLAN 207.

10. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
SECTION A-A

SECTION B-B

PLACEMENT OF CHANNELS

NOTE:
TO BE USED FOR DEPTHS LESS THAN 1.5 m (5 FEET) FROM THE TOP OF THE MANHOLE TO THE TOP OF THE SEWER PIPE.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

RECTANGULAR SHALLOW MANHOLE

APPROVED Thomas A. DiBianco 5/31/1992
DIRECTOR OF PUBLIC WORKS DATE

STANDARD PLAN
METRIC

2004-1

SHEET 1 OF 2
TABLE OF DIMENSIONS

<table>
<thead>
<tr>
<th>A</th>
<th>300mm (12&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>400mm (16&quot;)</td>
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<tr>
<td>C</td>
<td>600mm (24&quot;)</td>
</tr>
<tr>
<td>D</td>
<td>100mm (4&quot;)</td>
</tr>
<tr>
<td>E</td>
<td>230mm (9&quot;)</td>
</tr>
</tbody>
</table>

NOTES

1. THE DEPTH OF CHANNELS SHALL EQUAL THE PIPE DIAMETER FOR ALL SIZES OF PIPE.

2. ALL CONCRETE TO BE CLASS 295-C-17 (500-C-2500).

3. ALL CEMENT MORTAR SHALL BE CLASS "D" PER SECTION 201-5.1.

4. TO BE USED ONLY UPON APPROVAL OF THE DEPARTMENT.

5. PITCH 6mm (1/4 INCH) IN 300mm (12 INCHES).

6. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION-SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
TABLE OF DIMENSIONS

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>L</th>
<th>θ</th>
</tr>
</thead>
<tbody>
<tr>
<td>200mm (8&quot;)</td>
<td>150mm (6&quot;)</td>
<td>318mm (12 1/2&quot;)</td>
<td>13&quot;</td>
</tr>
<tr>
<td>200mm (8&quot;)</td>
<td>200mm (8&quot;)</td>
<td>318mm (12 1/2&quot;)</td>
<td>13&quot;</td>
</tr>
<tr>
<td>250mm (10&quot;)</td>
<td>200mm (8&quot;)</td>
<td>318mm (12 1/2&quot;)</td>
<td>13&quot;</td>
</tr>
<tr>
<td>250mm (10&quot;)</td>
<td>250mm (10&quot;)</td>
<td>388mm (15 1/4&quot;)</td>
<td>20&quot;</td>
</tr>
<tr>
<td>300mm (12&quot;)</td>
<td>250mm (10&quot;)</td>
<td>388mm (15 1/4&quot;)</td>
<td>20&quot;</td>
</tr>
<tr>
<td>300mm (12&quot;)</td>
<td>300mm (12&quot;)</td>
<td>466mm (18 3/8&quot;)</td>
<td>30&quot;</td>
</tr>
</tbody>
</table>

NOTES

1. FOR OTHER MANHOLE DETAILS SEE APWA STANDARD PLANS 200 AND 203 OR STANDARD PLAN 2003.

2. USE FOR ANY COMBINATION OF SIZES TO A MAXIMUM OF TWO 300mm (12") PIPES.

3. FOR PIPE DIAMETERS GREATER THAN 300mm (12"), PRIOR APPROVAL FROM THE DEPARTMENT IS REQUIRED.

4. ENCASE SIPHON ONLY TO THE EXTENT SHOWN ON PROJECT DRAWINGS.

5. PROVIDE ONE ALUMINUM GATE WITH EACH SIPHON MANHOLE.

6. THE DOWNSTREAM LEGS OF SIPHON BARRELS SHALL NOT EXCEED A GRADE OF +30.00%.

7. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
SECTION A-A

SECTION B-B

NOTE:

TO BE USED ONLY UPON APPROVAL BY THE DEPARTMENT WHEN SEWER IS OFF CENTER.
# TABLE OF DIMENSIONS

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>100mm (4&quot;)</td>
<td>300mm (12&quot;)</td>
<td>400mm (16&quot;)</td>
<td>500mm (20&quot;)</td>
<td>600mm (24&quot;)</td>
</tr>
</tbody>
</table>

## NOTES

1. ARCHES: LAY SPALLED BRICK ON EDGE TO FORM A TRUE RADIAL ARCH WITH FULL MORTAR JOINT AROUND ALL PIPE OPENINGS. TURN ARCH OF TWO SUCH COURSES OVER PIPES 380mm (15") OR MORE IN DIAMETER.

2. STEPS: SET LOWER STEP ON TOP OF THIRD SOLDIER COURSE AND NOTCH BRICK ABOVE. PLACE UPPER STEP IMMEDIATELY BELOW ROWLOCK COURSE WITH TREAD OF STEP PROJECTING UPWARD AND SET 50mm (2") OUT FROM WALL. OUTSIDE PROJECTION OF TOP STEP TO BE BENT DOWN.

3. CHANNEL BASE: THE DEPTH OF CHANNEL IN CHANNEL BASE SHALL EQUAL THE PIPE DIAMETER FOR ALL SIZES OF PIPE.

4. BRICKWORK: BRICKWORK TO BE CONSTRUCTED AS SHOWN ON STANDARD PLAN 203.

5. CONCRETE BASE: CONCRETE BASE TO BE CONSTRUCTED AS PER STANDARD PLAN 203, NOTES 1 & 10.

6. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
# Trap Bases

<table>
<thead>
<tr>
<th>Inlet Dia. (mm)</th>
<th>Inlet Increaser</th>
<th>Trap Size</th>
<th>Trap Per</th>
<th>Dia. of Manhole Base (D)</th>
<th>Outlet Diameter (in)</th>
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</thead>
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<tr>
<td>200mm (8&quot;)</td>
<td>200mm x 250mm (8&quot;x10&quot;)</td>
<td>250mm (10&quot;)</td>
<td>2016</td>
<td>1220mm (48&quot;)</td>
<td>230mm (10&quot;)</td>
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<tr>
<td>250mm (10&quot;)</td>
<td>250mm x 300mm (10&quot;x12&quot;)</td>
<td>300mm (12&quot;)</td>
<td>2016</td>
<td>1220mm (48&quot;)</td>
<td>300mm (12&quot;)</td>
</tr>
<tr>
<td>300mm (12&quot;)</td>
<td>300mm x 300mm (12&quot;x12&quot;)</td>
<td>380mm (15&quot;)</td>
<td></td>
<td>1220mm (48&quot;)</td>
<td>See Standard Plan 2008</td>
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</table>

(FOR 380mm (15") INLETS AND LARGER SEE STANDARD PLAN 2008-2: NO INCREASER REQUIRED)

## Base Dimensions

<table>
<thead>
<tr>
<th>Trap Diameter</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>A+B+C/2</th>
<th>T Min.</th>
</tr>
</thead>
<tbody>
<tr>
<td>250mm (10&quot;)</td>
<td>190mm (7 1/2&quot;)</td>
<td>370mm (14 1/2&quot;)</td>
<td>330mm (13&quot;)</td>
<td>725mm (28 1/2&quot;)</td>
<td>230mm (9&quot;)</td>
</tr>
<tr>
<td>300mm (12&quot;)</td>
<td>220mm (8 1/2&quot;)</td>
<td>420mm (16 1/2&quot;)</td>
<td>380mm (15&quot;)</td>
<td>830mm (32 1/2&quot;)</td>
<td>250mm (10&quot;)</td>
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<tr>
<td>380mm (15&quot;)</td>
<td>SEE STANDARD PLAN 2008-2</td>
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</table>

## Notes

1. **Where a Trap is Necessary in an Existing Structure, Break Out Concrete and Construct New Base.**

2. **For other Manhole Details, See APWA Standard Plans 200 and 203 or Standard Plan 2003.**

3. **All Cement Mortar Shown Shall be Class "D" Per Section 201-5.1.**

4. **Water Seal Shall be 25mm (1") Minimum.**

5. **Dimensions shown on the plan for Metric and English Units are not exactly equal values. If Metric Units are used, all values used for construction shall be Metric values. If English Units are used, all values used for construction shall be English values.**
### BASE & COVER DIMENSIONS

<table>
<thead>
<tr>
<th>INLET DIAMETER</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>T MIN.</th>
<th>FRAME &amp; COVER</th>
</tr>
</thead>
<tbody>
<tr>
<td>380mm (15&quot;)</td>
<td>250mm (10&quot;)</td>
<td>445mm (17 1/2&quot;)</td>
<td>460mm (18&quot;)</td>
<td>280mm (1&quot;)</td>
<td>PER APWA 210</td>
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<tr>
<td>460mm (18&quot;)</td>
<td>290mm (11 1/2&quot;)</td>
<td>495mm (19 1/2&quot;)</td>
<td>530mm (2&quot;)</td>
<td>330mm (1&quot;)</td>
<td>740mm (29&quot;) CLEAR OPENING</td>
</tr>
<tr>
<td>530mm (2&quot;)</td>
<td>330mm (13&quot;)</td>
<td>545mm (21 1/2&quot;)</td>
<td>610mm (24&quot;)</td>
<td>355mm (14&quot;)</td>
<td>MIN. OF A TYPE APPROVED BY THE DEPARTMENT</td>
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### TRAP BASES

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<tr>
<th>INLET DIA. &amp; TRAP SIZE</th>
<th>DIAMETER OF MANHOLE BASE (D)</th>
<th>OUTLET DIAMETER</th>
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<td>530mm (2&quot;)</td>
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<td>460mm (18&quot;)</td>
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</tr>
<tr>
<td>530mm (2&quot;)</td>
<td>525mm (5&quot;)</td>
<td>525mm (5&quot;)</td>
</tr>
</tbody>
</table>

### NOTES

1. FOR OTHER MANHOLE DETAILS, SEE APWA STANDARD PLANS 200 AND 203 OR STANDARD PLAN 2003.

2. FOR DETAILS OF GAS TRAP FABRICATION FOR 380mm (15"), 460mm (18"), AND 530mm (2") GAS TRAPS. SEE STANDARD PLAN 2017.

3. WATER SEAL SHALL BE 25mm (1") MINIMUM.

4. FOR TRAP INLETS LARGER THAN 530mm (2") SHOW BASE DETAIL ON PROFILE AS APPROVED BY THE DEPARTMENT.

5. ALL CEMENT MORTAR SHOWN SHALL BE CLASS "D" PER SECTION 201-5.1.

6. DOUBLE TRAP BASES ARE NOT ALLOWED IF ANY INLET IS 460mm (18") IN DIAMETER OR GREATER.

7. DIMENSIONS SHOWN ON THIS PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACT EQUAL VALUES. IF METRIC VALUES ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.
CASE I
SEE NOTES 1, 4, & 5 (SH. 2)

CASE II
SEE NOTES 1, 3, 5 & 6 (SH. 2)

CASE III
SEE NOTES 1, 2 & 5 (SH. 2)
NOTE:
TO BE USED IN FILLED AREA WHERE RELATIVE COMPACTION IS LESS THAN 90 PERCENT.

ROUND BASE

SQUARE BASE

SECTION A-A

SECTION B-B

SECTION C-C

SECTION D-D

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SPECIAL MANHOLE BASES

STANDARD PLAN METRIC

2011-2

APPROVED 5/31/1992

DIRECTOR OF PUBLIC WORKS

DATE

1995, 1999

REVISIONS
NOTES

SEPARATE DESIGN WILL BE REQUIRED IN EACH OF THE FOLLOWING CASES:

1. MANHOLE BASES LARGER THAN THOSE SHOWN.
2. MANHOLE DEPTH GREATER THAN 3.0m (10').
3. PILE LENGTH GREATER THAN 6.0m (20').
4. DIMENSIONS SHOWN ON THIS PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACT EQUAL VALUES. IF METRIC VALUES ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.
NOTES:
2. USE CAST IRON PER SEC. 206-3.3 OF THE STANDARD SPECIFICATIONS.
   2 COVERS APPROX. WT. 88 Kg (195 LBS) EACH. 176 Kg (390 LBS)
   FRAME 122 Kg (270 LBS)
3. DIMENSIONS SHOWN ON THIS PLAN
   TOTAL 298 Kg (660 LBS)
   FOR METRIC AND ENGLISH UNITS ARE NOT EXACT EQUAL VALUES. IF METRIC VALUES
   ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH
   UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

RECTANGULAR MANHOLE FRAME & COVER

APPROVED  Thomas A. Gibson 5/31/1992 1999
DIRECTOR OF PUBLIC WORKS DATE REVISIONS

STANDARD PLAN
METRIC

2014-1 SHEET 1 OF 1
NOTES

MATERIAL FOR THE STANDARD MANHOLE STEP SHALL BE ONE OF THE FOLLOWING:

1. 19mm (3/4") Ø STEEL CONFORMING TO ASTM A 15 OR A 107 GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A 123.

2. 19mm (3/4") Ø ALUMINUM ALLOY 6061-T6 CONFORMING WITH ASTM B 211 OR B 221. THE PORTION OF THE ALUMINUM STEPS TO BE EMBEDDED IN CONCRETE OR MORTAR SHALL BE GIVEN ONE COAT OF ZINC CHROMATE PRIMER.

3. 19mm (3/4") Ø OR 19mm (3/4") SQUARE OR EQUIVALENT CROSS SECTIONAL AREA WROUGHT IRON CONFORMING TO ASTM A 207.

4. MANHOLE STEPS SHALL BE INSTALLED AS PER STANDARD PLAN 635.

THE FOLLOWING STEP MAY BE SUBSTITUTED FOR THE STEPS SHOWN ABOVE:

COPOLYMER POLYPROPYLENE PLASTIC COATED STEP CONFORMING TO ASTM C 478, MODEL PS-2-PFS AND MODEL PS-2-BG (BETWEEN GRADE RINGS) MANUFACTURED BY M.A. INDUSTRIES, INC.: MODEL X038PS AND MODEL X040PS (BETWEEN GRADE RINGS) MANUFACTURED BY SOUTHWEST CONCRETE PRODUCTS OR A DEPARTMENT APPROVED EQUAL. STEPS SHALL BE CAST OR PLACED INTO THE MANHOLE SHAFFING BY THE MANUFACTURER PRIOR TO DELIVERY TO THE JOB SITE. STEPS SHALL BEAR THE MODEL NUMBER AS WELL AS ASTM C 478. STEPS OF DIFFERENT MANUFACTURE SHALL NOT BE INTERMIXED ON A SPECIFIC PROJECT UNLESS SHOWN ON THE PROJECT DRAWINGS.

5. DIMENSIONS SHOWN ON THIS PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACT EQUAL VALUES. IF METRIC VALUES ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.
## Dimentions of Casting

<table>
<thead>
<tr>
<th>Inlet Diam.</th>
<th>A</th>
<th>B</th>
<th>R</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>250mm (10&quot;)</td>
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<td>180mm</td>
<td>280mm</td>
<td>330mm</td>
<td>450mm</td>
</tr>
<tr>
<td>380mm (15&quot;) &amp; Larger</td>
<td>SEE STANDARD PLAN 2016-1</td>
<td></td>
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</tr>
</tbody>
</table>

## Notes

1. **Cast Iron Shall be Furnished per Section 206-3.1 and ASTM Specifications A 48, Class 30.**

2. **Flanges of Castings to be Machine Faced.**

3. **Castings Shall be Dipped Twice in Quality Hot Asphaltum Paint.**

4. **Rubber Gasket Shall be Furnished per Section 206-2.2.**

5. **Dimensions shown on this Plan for Metric and English Units are not exact equal values. If Metric Values are used, all values used for construction shall be Metric Values. If English Units are used, all values used for construction shall be English Units.**
**DIMENSIONS OF TRAP**

<table>
<thead>
<tr>
<th>INLET DIA.</th>
<th>A</th>
<th>D</th>
<th>R</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>380mm (15&quot;)</td>
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<td>460mm (18&quot;)</td>
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<td>430mm (17&quot;)</td>
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<td>575mm (22 9/16&quot;)</td>
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<td>530mm (21&quot;)</td>
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<td>500mm (20&quot;)</td>
<td>260mm (9 1/4&quot;)</td>
<td>680mm (26&quot;)</td>
</tr>
</tbody>
</table>

**NOTES:**

2. ALL MATERIAL TO BE STAINLESS STEEL EXCEPT AS NOTED.
3. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
TEMPORARY SAND TRAP

DIMENSIONS OF TRAP

<table>
<thead>
<tr>
<th>I.D.</th>
<th>L.</th>
<th>FLEXIBLE EQUIVALENT (SEE NOTES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>200mm (8&quot;)</td>
<td>270mm (10 1/2&quot;)</td>
<td>ST-2</td>
</tr>
<tr>
<td>250mm (10&quot;)</td>
<td>320mm (12 1/2&quot;)</td>
<td>ST-3</td>
</tr>
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<td>300mm (12&quot;)</td>
<td>410mm (16&quot;)</td>
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<td>ST-6</td>
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<tr>
<td>460mm (18&quot;)</td>
<td>490mm (19&quot;)</td>
<td>ST-8</td>
</tr>
</tbody>
</table>

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

TEMPORARY SAND TRAP

STANDARD PLAN METRIC

2018-1
NOTES

1. FOR USE IN NEW SUBDIVISIONS AND WHERE MANHOLE TOPS ARE LOWERED DUE TO STREET GRADE CHANGES OR PAVING OPERATIONS.
2. SAND TRAP AS MANUFACTURED BY FLEXIBLE INC. OR APPROVED EQUAL MAY BE USED IN LIEU OF ABOVE.
3. GATES IN FLEXIBLE SAND TRAP SHALL BE SOLDERED OR WELDED IN CLOSED POSITION.
4. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
CASE I
NORMAL TRENCH

NOTE:
BEDDING MATERIAL SUPPORTING THE CONDUIT SHALL BE GRAVEL, CRUSHED AGGREGATE OR NATIVE GRANULAR MATERIAL AS APPROVED BY THE ENGINEER.

CASE II
WET, SPONGY GROUND

CASE III
FILLED GROUND
(LESS THAN 90% COMPACTION)

NOTE:
WHERE NATURAL GROUND IS AT AN EXCESSIVE DEPTH BELOW THE INVERT OF THE PIPE, CONSTRUCTION SHALL COMPLY WITH THE SPECIAL NOTES ON THE PLANS.

CASE IV
BOTTOM TRENCH WIDTH EXCEEDS THE WIDTH SPECIFIED ON STANDARD PLAN 2027

NOTE:
CONCRETE CRADLE TO BE PLACED ON UNDISTURBED SOIL FREE OF CLAY OR SILT OTHERWISE, CONCRETE CRADLE SHOULD BE PLACED ON BEDDING PER SEC. 306-1.2.1 OF STANDARD SPECIFICATIONS.

NOTES:
1. ALL BEDDING MUST EXTEND TO AT LEAST 300mm (1 FOOT) OVER THE TOP OF PIPE.
2. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES.
   IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES.
   IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
ABS COMPOSITE (TRUSS) PIPE
ABS SOLID WALL (SDR 23.5 ASTM D 2751) PIPE
PVC SOLID WALL (SDR 35 ASTM D 3034) PIPE

1. SHALLOW SEWERS, COVER OVER PIPE < 1.2m (4 FEET):
USE ENCASEMENT OR SPECIAL DESIGN APPROVED BY THE DEPARTMENT.

2. ABS TRUSS OR SOLID WALL PIPE, DEPTH OF COVER 1.2–2.7m (4–9 FEET):
USE STANDARD PLAN 2021.

3. ABS TRUSS OR SOLID WALL PIPE, DEPTH OF COVER 2.7–6.1m (9–20 FEET):
USE FIGURE 1 BELOW.

4. PVC PIPE, DEPTH OF COVER 1.2–5.2m (4–17 FEET):
USE FIGURE 1 BELOW.

5. ABS TRUSS OR SOLID WALL PIPE, 6.1–9.2m (20–30 FEET) OR PVC PIPE, 5.2–9.2m (17–30 FEET):
USE ENCASEMENT PER STANDARD PLAN 2023, CASE 1.

6. ABS OR PVC PIPE DEEPER THAN 9.2m (30 FEET):
SPECIAL DESIGN REQUIRED.

FIGURE 1

- TRENCH WALL
- SEWER PIPE
- SAND BEDDING PER SECTION 306-1.2.1 STANDARD SPECIFICATIONS
- 13mm (1/2") CRUSHED ROCK

NOTES:
1. ADDITIONAL CRUSHED ROCK BASE WILL BE NECESSARY IN WET, SPONGY GROUND OR FILLED AREAS. REFER TO STANDARD PLAN 2021.
2. THIS STANDARD SHALL BE USED ONLY IN ACCORDANCE WITH SPECIAL PROVISIONS FOR THE CONSTRUCTION OF SANITARY SEwers, PART IV, PLASTIC SEWER PIPE.
3. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
CASE I
CONCRETE CRADLE

CASE II
CONCRETE ENCASEMENT

CASE III
SPECIAL CRADLE

CASE IV
SPECIAL ENCASEMENT

SCHEDULE OF DIMENSIONS
AND REINFORCING BARS
FOR SPECIAL CRADLE - CASE III

<table>
<thead>
<tr>
<th>&quot;D&quot; (DIAMETER)</th>
<th>&quot;X&quot; NO. OF 13M(+4) BARS</th>
<th>THICKNESS</th>
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<tr>
<td></td>
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<td>$Y_1$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$Y_2$</td>
</tr>
<tr>
<td>150mm (6&quot;)</td>
<td>2</td>
<td>100mm (4&quot;)</td>
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<td>130mm (5&quot;)</td>
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<td>230mm (9&quot;)</td>
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<td>6</td>
<td>300mm (12&quot;)</td>
</tr>
<tr>
<td>600mm (24&quot;)</td>
<td>6</td>
<td>330mm (13&quot;)</td>
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</tbody>
</table>

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

CRADLING AND ENCASEMENT

APPROVED

THOMAS A. DICKSON
DIRECTOR OF PUBLIC WORKS

1995. 1999

REVISIONS

SHEET 1 OF 2
NOTES

1. EXTEND BOTH ENDS OF CRADLE OR ENCASEMENT TO A POINT 25mm(1") SHORT OF FIRST PIPE JOINT BEYOND LOCATIONS SPECIFIED ON PLANS.

2. APPLY FORM OIL, THIN PLASTIC SHEET, OR OTHER ACCEPTABLE MATERIAL TO PIPE, TO PREVENT BOND BETWEEN PIPE AND CONCRETE.

3. USE CLASS 265-C-14(420-C-2000) CONCRETE FOR ALL CASES.

4. CONDITIONS OF REQUIRED USE:
   
a. CASE I - CONCRETE CRADLE
   1. WHEN OVERBURDEN DEPTH IS GREATER THAN 6.1m(20').
   2. AS A SUPPORT WHEN CROSSING OVER A STRUCTURE WITH A CLEARANCE LESS THAN 450mm(1.5') AND GREATER THAN 150mm(0.5').
   3. WHEN WITHIN A 45° ANGLE DOWNWARD FROM THE BOTTOM OF A FOOTING.

b. CASE II - CONCRETE ENCASEMENT
   1. WHEN CROSSING UNDER A STRUCTURE WITH A CLEARANCE LESS THAN 450mm(1.5') AND GREATER THAN 150mm(0.5').
   2. WHEN COVER DIRT IS LESS THAN 1.2m(4').
   3. WHEN LESS THAN 900mm(3') FROM A POWER POLE.

c. CASE III - SPECIAL CRADLE
   1. AS A SUPPORT WHEN CROSSING OVER A TRENCH GREATER THAN 1.2m(4') IN WIDTH SEE APWA STANDARD PLAN 224.

d. CASE IV - SPECIAL ENCASEMENT
   1. WHEN CROSSING UNDER A STRUCTURE WITH A WIDTH GREATER THAN 1.5m(5') AND A CLEARANCE LESS THAN 450mm(1.5') AND GREATER THAN 150mm(0.5').
   2. WHEN WITHIN 3m(10') OF A PRESSURIZED WATER MAIN, OR WITHIN 7.6m(25') OF A GRAVITY FLOW WATER MAIN.

5. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
WYE BRANCHES TO BE SUPPORTED AS SHOWN IN ALL CASES

TEE BRANCHES TO BE SUPPORTED AS SHOWN IF LAID FLAT

NOTES:
1. AGGREGATE BASE MATERIAL TO BE 13mm(1/2") CRUSHED ROCK PER SEC. 200-1.2 OF S&PWC.

2. DIMENSION SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

WYE OR TEE SUPPORT

STANDARD PLAN
METRIC

2024-1

APPROVED 5/31/1992
DIRECTOR OF PUBLIC WORKS

1999
DATE

REVISIONS

SHEET 1 OF 1
TEE OR WYE SADDLE JOINTS AND SUPPORT

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SADDLES FOR HOUSE LATERALS

APPROVED 5/31/1992

STANDARD PLAN METRIC

2025-2
NOTES

1. A WYE OR TEE SADDLE SHALL BE INSTALLED BY CUTTING A NEAT HOLE CONFORMING TO THE INSIDE DIAMETER OF THE SADDLE WHEN USING A SADDLE WITHOUT COLLAR AS SHOWN IN EPOXY RESIN JOINT DETAIL. WHEN USING A SADDLE WITH COLLAR THE DIAMETER OF THE HOLE SHALL BE OUTSIDE DIAMETER PLUS 3mm(1/8") AS SHOWN IN CEMENT COLLAR JOINT DETAIL.

2. BROKEN PIECES FROM CUTTING OF THE MAIN LINE SEWER MUST BE EXTRACTED CAREFULLY PRIOR TO PLACEMENT OF THE SADDLE.

3. THE SADDLE SHALL BE CEMENTED INTO PLACE USING CLASS "D" CEMENT MORTAR PER SECTION 201-5.1 OR OTHER CEMENTING AGENT APPROVED BY THE DEPARTMENT. THE SADDLE SHALL BE HELD SECURELY IN PLACE WHILE THE CEMENT OR OTHER APPROVED CEMENTING AGENT SETS. THE INSIDE OF THE JOINT BETWEEN PIPE AND SADDLE SHALL BE FILLED WITH CEMENTING MATERIAL AND NEATLY ROUNDED.

4. FOR INSTALLATION OF TEE SADDLE FOR CHIMNEY BASE REFER TO NOTES ABOVE AND APWA STANDARD PLAN 220, NOTE 6.

5. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
TO BE USED IN EASEMENTS WHERE THE SURFACE GRADE IS GREATER THAN 30% OR WHEN DESIGNATED ON THE PLAN

CASE I
Baffle Board

1. TO BE USED WHEN TRENCH IS EXCAVATED IN UNDISTURBED NATURAL SOIL UNLESS CASE II APPLIES.

2. THE BAFFLE BOARDS SHALL BE SPACED SO THAT THE TOP OF THE LOWER BOARD IS LEVEL WITH THE BOTTOM OF THE NEXT HIGHER BOARD.

3. THE UPPER 300 mm (1') LAYER OF THE BACKFILL IS TO BE TOP SOIL TAMPERED IN PLACE, PLANTED WITH MUSTARD AND RYE GRASS AND ADEQUATELY WATERED UNTIL GROWTH IS RESTORED.

CASE II
Soil Cement Backfill

1. TO BE USED IN SOFT SANDSTONE, SHALE, OR ROCK WHEN REQUIRED BY THE COUNTY ENGINEER OR MAY BE USED IN LIEU OF CASE I WITH THE APPROVAL OF THE DEPARTMENT.

2. THE ENTIRE TRENCH SHALL BE BACKFILLED WITH SOIL - CEMENT ABOVE THE BEDDING SHOWN TO THE FINISHED SURFACE UNLESS OTHERWISE NOTED ON THE PLANS.

3. THE SOIL - CEMENT SHALL CONSIST OF ONE SACK OF PORTLAND CEMENT PER CUBIC YARD OF BACKFILL. MATERIAL WITH SUFFICIENT FINES TO FILL ALL HOLES. THE SOIL AND CEMENT SHALL BE THOROUGHLY DRY MIXED. AFTER MIXING, WATER SHALL BE ADDED IN A QUANTITY SUFFICIENT ONLY TO SLIGHTLY MOISTEN THE MIXTURE SO THAT IT CAN BE PACKED BY HAND INTO A BALL AND RETAIN ITS SHAPE BUT NOT WET THE HANDS. THE SOIL - CEMENT SHALL THEN BE MECHANICALLY RAMMED INTO PLACE IN THE TRENCH IMMEDIATELY AFTER THE WATER IS ADDED.

NOTES:
1. IN ALL CASES ANCHOR BLOCKS WILL BE REQUIRED IN ACCORDANCE WITH WPWA STANDARD PLAN 221 UNLESS OTHERWISE NOTED ON THE PLANS.
2. ANY ALTERNATE MATERIALS, PLANS OR METHODS MUST BE SPECIFICALLY APPROVED BY THE DEPARTMENT.
3. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.

CASE III
Certified Compaction

1. TO BE USED WHEN SEWER IS LOCATED IN A COMPACTED FILL AREA BEING PLACED ACCORDING TO AN APPROVED GRADING PLAN.

2. THE SEWER PIPE MUST BE LAYED IN A TRENCH EXCAVATED IN THE COMPACTED FILL SLOPE AND DEEP ENOUGH TO PROVIDE AT LEAST 1.2 m (4') OF COVER OVER THE PIPE.

3. CERTIFICATION IS REQUIRED BY A SOIL TESTING LABORATORY AND SOILS ENGINEER THAT THE COMPACTON FOR THE BACKFILL MEETS THE GRADING PLAN REQUIREMENTS.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

EROSION PROTECTION IN STEEP SLOPES

STANDARD PLAN METRIC

2026-1

2026-1

SHEET 1 OF 1

APPROVED

THOMAS A. GIBRAN

5/31/1992

1999

DIRECTOR OF PUBLIC WORKS

DATE

REVISIONS
# Minimum Trench Width

## Maximum Trench Width

### Measured at Top of Pipe

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<tr>
<th>Pipe Size</th>
<th>Depth of Trench</th>
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<tbody>
<tr>
<td></td>
<td>5.5m-6.0m (18'-20')</td>
</tr>
<tr>
<td>100 mm (4') &amp; 150 mm (6')</td>
<td>600 mm (24')</td>
</tr>
<tr>
<td>200 mm (8')</td>
<td>690 mm (27')</td>
</tr>
<tr>
<td>250 mm (10')</td>
<td>740 mm (29')</td>
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<tr>
<td>300 mm (12')</td>
<td>810 mm (32')</td>
</tr>
<tr>
<td>380 mm (15')</td>
<td>890 mm (35')</td>
</tr>
<tr>
<td>460 mm (18')</td>
<td>990 mm (39')</td>
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<td>690 mm (27')</td>
<td>1250 mm (49')</td>
</tr>
<tr>
<td>760 mm (30')</td>
<td>1320 mm (52')</td>
</tr>
<tr>
<td>840 mm (33')</td>
<td>1420 mm (56')</td>
</tr>
<tr>
<td>900 mm (36')</td>
<td>1500 mm (59')</td>
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**Notes:**

1. If maximum allowable width specified is exceeded, special bedding & cradling must be provided per standard plan 2021. At contractor's expense.

2. Dimensions shown on the plan for metric and English units are not exactly equal values. If metric units are used, all values used for construction shall be metric values. If English units are used, all values used for construction shall be English values.

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**Los Angeles County Department of Public Works**

**Allowable Trench Widths**

**Approved:** Thomas A. Richardson 5/31/1992

**Date:** 1999

**Revisions:**

**Standard Plan Metric:** 2027-1

**Sheet 1 of 1**
CROSSING UNDER ROADWAY

CROSSING UNDER RAILROAD

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<th>DIAMETER OF STEEL CASING</th>
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<tr>
<td>PIPE SIZE</td>
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<tr>
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<tr>
<td>150mm(6&quot;)</td>
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<tr>
<td>200mm(8&quot;)</td>
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</tr>
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<td>380mm(15&quot;)</td>
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LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

JACKING STEEL CASING FOR SEWER PIPE

APPROVED Thomas A. Pilchanski 5/31/1992
DIRECTOR OF PUBLIC WORKS DATE

STANDARD PLAN METRIC

2028-1

SHEET 1 OF 2
NOTES

1. JACKED STEEL CASING SHALL BE INSTALLED PER SECTION 306-2.3 OF THE STANDARD SPECIFICATIONS.

2. USE TYPE "D", "F" OR "G" JOINTS PER SECTION 208-2 OF THE STANDARD SPECIFICATIONS FOR VCP INSTALLED IN CASING.

3. THE CASING THICKNESS SHALL BE NOT LESS THAN 10mm (3/8").

4. FOR PIPE SIZES 460mm (18") AND GREATER, CHECK WITH THE DEPARTMENT FOR DIAMETER AND THICKNESS OF CASING.

5. THE LENGTH OF CASING SHALL BE AS SHOWN, EXCEPT AS OTHERWISE INDICATED ON PLANS.

6. ANY ALTERNATE MATERIALS, SIZES OR CONSTRUCTION METHODS MUST BE SPECIFICALLY APPROVED BY THE DEPARTMENT.

7. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
18" x 18" GRATE AND FRAME
ALHAMBRA FOUNDRY NO.
A-2010 OR EQUIVALENT

CLEANOUT AND VENT
AS REQUIRED BY
PLUMBING ORDINANCE

ALL FITTINGS TO BE 4"
CAST IRON SOIL PIPE

SECTION A-A
NOTES

1. THE APPROVAL OF THE COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS MUST BE OBTAINED BEFORE INSTALLATION.

2. IF INSTALLED OUTSIDE BUILDING, ELEVATE THE SIDEWALLS ABOVE THE SURROUNDING GROUND SURFACE TO EXCLUDE STORM WATER.

3. IF LOCATED INSIDE OF BUILDING, PLACE THE GRATE AT FLOOR LEVEL.

4. STRUCTURE NOT FOR TRAFFIC LOADING.

5. THIS FACILITY TO BE CONSTRUCTED OF PORTLAND CEMENT CONCRETE.
NOTES

1. THE APPROVAL OF THE COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS MUST BE OBTAINED BEFORE INSTALLATION.

2. THE INTERCEPTOR TO BE CONSTRUCTED OF TYPE II PORTLAND CEMENT CONCRETE.

3. INTERCEPTOR EXCEEDING 6'-6" IN DEPTH MUST BE CONSTRUCTED OF REINFORCED CONCRETE.

4. IF INSTALLED INSIDE OF BUILDING, THE TOP OF INTERCEPTOR MAY BE LEVEL WITH FLOOR PROVIDED THAT WASTES ENTER THROUGH INLET PIPE ONLY.

5. ALL SURFACE WATER MUST DRAIN AWAY FROM INTERCEPTOR TO EXCLUDE RAIN WATER FROM PUBLIC SEWERS.

6. STRUCTURE NOT FOR TRAFFIC LOADING.
NOTES

1. THIS FACILITY TO BE CONSTRUCTED OF PORTLAND CEMENT CONCRETE.

2. APPROVAL OF THE COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS MUST BE OBTAINED BEFORE INSTALLATION.

3. STRUCTURE NOT FOR TRAFFIC LOADING.

4. INSTALL CLEANOUT AND VENT AS REQUIRED BY PLUMBING CODE.

5. SLOPE FLOOR OF INTERCEPTOR TO DRAIN.

6. BASKET TO BE FABRICATED FROM 16 GAGE SHEET METAL PERFORATED WITH 1/4" HOLES. JOINTS TO BE LAP WELDED OR SEAM WELDED.
GREEN WARNING LAMP ON WHEN RAIN SWITCH ACTUATED, SEE NOTE 1

PROVIDE "Y" FOR TESTING PURPOSES WHEN RAIN COLLECTOR IS 6" OR GREATER ABOVE THE GROUND. "Y" MUST NOT BE GREATER THAN 6" ABOVE GROUND

APPROVED RAIN ACTIVATED SWITCH

OVERFLOW TO APPROVED DRAINAGE SYSTEM
INTERCEPTOR
TO SEWER
PUMP WELL
SAMPLING BOX
RAIN SWITCH

SYSTEM LAYOUT

OVERFLOW

PUMP WELL WITH SUBMERSIBLE PUMP
USE STANDARD PLAN 2041 OR OTHER DEPARTMENT APPROVED SAND AND GREASE INTERCEPTOR

SECTION A-A

NOTE:
FOR DIMENSIONS OF INTERCEPTOR AND SAMPLING BOX, SEE STANDARD PLAN 2041.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
RAIN WATER DIVERSION SYSTEM

APPROVED 5/31/1992
DIRECTOR OF PUBLIC WORKS

STANDARD PLAN 2043-0
SHEET 1 OF 2
NOTES

1. THE APPROVAL OF THE COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS MUST BE OBTAINED BEFORE INSTALLATION.

2. IF INSTALLED OUTSIDE OF A BUILDING, ELEVATE THE SIDEWALLS ABOVE THE SURROUNDING GROUND SURFACE TO EXCLUDE STORM WATER.

3. IF LOCATED INSIDE OF A BUILDING, THE TOP OF SAMPLING BOX MAY BE LEVEL WITH FLOOR PROVIDED THAT WASTE ENTERS THROUGH INLET PIPE ONLY.

4. ALL SURFACE WATER MUST DRAIN AWAY FROM SAMPLING BOX TO EXCLUDE RAINWATER FROM THE PUBLIC SEWER.

5. STRUCTURE NOT FOR TRAFFIC LOADING.

6. THIS FACILITY TO BE CONSTRUCTED OF PORTLAND CEMENT CONCRETE.
PLATE DOOR WITH AN EPOXY COATING

LIGHTWEIGHT CONCRETE PER ASTM C 330 (28 DAY STRENGTH 3000 PSI) WITH WIRE MESH REINFORCEMENT. SEE NOTE 4

HEAVY DUTY TEE STRAP HINGE, SEE DETAIL. SH. 2

ANCHOR BOLTS

EXISTING SAMPLE BOX

LOSE ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SECURED SAMPLING FACILITY

STANDARD PLAN 2045-0

APPROVED 5/31/1992

DIRECTOR OF PUBLIC WORKS DATE

REVISIONS
HINGE DETAIL (SH. 1)

- PROVIDE CROSS VENTILATION
- WIRE-MESH
- 1/2" DIA. 1" EYE
- MONITORING SHELF (REMOVABLE) TS 2 x 2
  2" x 2" SQUARE STRUCTURAL TUBING

24" 24" 2'-6"
PUBLIC WORKS, WASTE MANAGEMENT DIVISION.

APPROVAL OF THE COUNTY OF LOS ANGELES DEPARTMENT OF
PUBLIC WORKS, WASTE MANAGEMENT DIVISION.

1. THE APPROVAL OF THE ENGINEER MUST BE OBTAINED PRIOR TO
INSTALLATION.

2. PROVIDE 120 VOLT RECEPTACLE, WITH CONTINUOUS CURRENT, INSIDE
SECURED SAMPLING FACILITY.

3. VENTILATION MUST BE PROVIDED FOR SECURED SAMPLING FACILITY.

4. OTHER CONSTRUCTION MATERIALS MAY BE SUBSTITUTED UPON
APPROVAL OF THE COUNTY OF LOS ANGELES DEPARTMENT OF
PUBLIC WORKS, WASTE MANAGEMENT DIVISION.

To prevent the over heating of sampling equipment,
local electrical codes, an electrical permit is required.
SECURED SAMPLING FACILITY INSTALLATION SHALL COMPLY WITH
installation notes.
GAS TIGHT MANHOLE FRAME AND COVER

INLET

OUTLET

SECTION A-A

ELEVATION B-B

CAPACITY IN GALLONS
750
1000
1200
1500

DIMENSIONS
A
4'-1"
4'-7"
5'-3"
5'-3"

B
5'-3"
5'-7"
6'-3"
6'-3"

C
5'-10"
6'-5"
6'-5"
7'-5"

D
4'-4"
4'-9"
4'-9"
5'-9"

E
4'-0"
4'-7"
4'-5"
5'-5"

F
3'-11"
4'-7"
5'-1"
5'-1"

EXCAVATION SPECIFICATIONS

DEPTH BELOW INLET
4'-11"
4'-7"
5'-3"
5'-3"

LENGTH
9'-6"
9'-6"
9'-6"
9'-6"

WIDTH
6'-10"
7'-5"
7'-5"
8'-5"

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

GREASE INTERCEPTOR

STANDARD PLAN 2046-1

APPROVED 5/31/1992

DIRECTOR OF PUBLIC WORKS 1995

SHEET 1 OF 2
NOTES

1. APPROVAL BY THE COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS MUST BE OBTAINED BEFORE INSTALLATION.

2. UNIT COMPONENTS SHALL BE PRECAST OR PREFABRICATED BY A MANUFACTURER RECOGNIZED BY THE DEPARTMENT OF PUBLIC WORKS AND SHALL CONFORM TO THE FOLLOWING MINIMAL MATERIAL SPECIFICATIONS:
   A. THE INTERCEPTOR SHALL BE CONSTRUCTED OF TYPE II PORTLAND CEMENT CONCRETE.
   B. MINIMUM COMPRESSIVE STRENGTH 3,000 PSI AT 28 DAYS.
   C. REINFORCING BAR INTERMEDIATE GRADE ASTM A615.
   D. REINFORCING WELDED WIRE MESH ASTM A185.

3. IF INSTALLED INSIDE OF BUILDING THE TOP OF INTERCEPTOR MAY BE LEVEL WITH FLOOR PROVIDED THAT WASTES ENTER THROUGH INLET PIPE ONLY.

4. ALL SURFACE WATER MUST DRAIN AWAY FROM INTERCEPTOR TO EXCLUDE RAIN WATER TO PUBLIC SEWERS.

5. ALL PIPING SHALL BE CAST IRON.

6. MANHOLE COVERS SHALL BE OF METAL.

7. STRUCTURE NOT FOR TRAFFIC LOADING.
NOTE:
"P" IS A PROHIBITED CONSTRUCTION ZONE

NOTE:
ZONES IDENTICAL ON EITHER SIDE OF CENTER LINES.
ZONE "P" IS A PROHIBITED ZONE. SECTION 64630 (e) (2)
CALIFORNIA ADMINISTRATIVE CODE, TITLE 22

LOSA NGELES COUNTY DEPARTMENT OF PUBLIC WORKS
REQUIREMENTS FOR SANITARY SEWERS IN
THE VICINITY OF PRESSURE WATER MAINS

APPROVED Thomas A. Kimmanes 5/31/1992 1999
DIRECTOR OF PUBLIC WORKS DATE

STANDARD PLAN METRIC
2100-1
SHEET 1 OF 2
NEW SEWER BEING INSTALLED

ZONE SPECIAL CONSTRUCTION REQUIRED FOR SEWER

A. SEWER LINES PARALLEL TO WATER MAINS SHALL NOT BE PERMITTED IN THIS ZONE WITHOUT APPROVAL FROM THE RESPONSIBLE HEALTH AGENCY AND WATER SUPPLIER.

B. A SEWER LINE PLACED PARALLEL TO A WATER LINE SHALL BE CONSTRUCTED OF:
   1. EXTRA STRENGTH VITRIFIED CLAY PIPE WITH COMPRESSION JOINTS.
   2. PLASTIC SEWER PIPE WITH RUBBER RING JOINTS (PER ASTM D 3034) OR EQUIVALENT.
   3. CAST OR DUCTILE IRON PIPE WITH COMPRESSION JOINTS.
   4. REINFORCED CONCRETE PRESSURE PIPE WITH COMPRESSION JOINTS (PER AWWA C302-74).

C. A SEWER LINE CROSSING A WATER MAIN SHALL BE CONSTRUCTED OF:
   1. DUCTILE IRON PIPE WITH HOT DIP BITUMINOUS COATING AND MECHANICAL JOINTS.
   2. A CONTINUOUS SECTION OF CLASS 200 (DR 14 PER AWWA 0990) PLASTIC PIPE OR EQUIVALENT, CENTERED OVER THE PIPE BEING CROSSED.
   3. A CONTINUOUS SECTION OF REINFORCED CONCRETE PRESSURE PIPE (PER AWWA C302-74) CENTERED OVER THE PIPE BEING CROSSED.
   4. ANY SEWER PIPE WITHIN A CONTINUOUS SLEEVE.

D. A SEWER LINE CROSSING A WATER MAIN SHALL BE CONSTRUCTED OF:
   1. A CONTINUOUS SECTION OF DUCTILE IRON PIPE WITH HOT DIP BITUMINOUS COATING.
   2. A CONTINUOUS SECTION OF CLASS 200 (DR 14 PER AWWA 0990) PLASTIC PIPE OR EQUIVALENT, CENTERED ON THE PIPE BEING CROSSED.
   3. A CONTINUOUS SECTION OF REINFORCED CONCRETE PRESSURE PIPE (PER AWWA C302-74) CENTERED ON THE PIPE BEING CROSSED.
   4. ANY SEWER PIPE WITHIN A CONTINUOUS SLEEVE.
   5. ANY SEWER PIPE SEPARATED BY A 3mx3mx100mm (10'x10'x4") THICK REINFORCED CONCRETE SLAB.

NOTES:

DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
SECTION 3

Flood Control and Storm Drain Facilities
NOTES:
1. ALL CELLS TO BE FILLED SOLID WITH GROUT AND RODDED. GROUT PRECAST TOP OPENING.
2. FLOOR TO BE PORTLAND CEMENT CONCRETE.
3. USE 8"x8"x8" AND 8"x8"x16" CONCRETE BLOCKS.
4. USE #4 BARS AT 16" O.C. FOR V<5'. FOR V>5' USE #4 BARS AT 8" O.C.
5. OPENINGS LARGER THAN 6" REQUIRE PROTECTION BAR(S) IF SPECIFIED BY THE ENGINEER.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

RURAL CATCH BASIN

STANDARD PLAN 3015-0

APPROVED 5/31/1992
DIRECTOR OF PUBLIC WORKS

SHEET 1 OF 2
PLAN VIEW                        END VIEW

PRECAST TOP DETAIL

STEEL LIST:

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>① NO.4 BARS, 62&quot; LONG</td>
<td>8</td>
</tr>
<tr>
<td>② NO.4 BARS, 46&quot; LONG</td>
<td>8</td>
</tr>
<tr>
<td>③ NO.4 BARS, 11&quot; LONG</td>
<td>6</td>
</tr>
<tr>
<td>④ NO.4 BARS, 19&quot; LONG</td>
<td>6</td>
</tr>
<tr>
<td>⑤ NO.4 BARS, 24&quot; LONG</td>
<td>4</td>
</tr>
<tr>
<td>⑥ MANHOLE FRAME &amp; COVER</td>
<td>1</td>
</tr>
<tr>
<td>⑦ 3&quot; O.D. STEEL PIPE, 4&quot; LONG</td>
<td>4</td>
</tr>
</tbody>
</table>

* ALHAMBRA FOUNDRY A-1530

NOTES:

1. BARS SHALL BE COVERED AT ALL POINTS WITH A MINIMUM OF 1" OF CONCRETE.
2. TIE ALL BARS WHERE THEY CROSS.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

RURAL CATCH BASIN

STANDARD PLAN

3015-0

SHEET 2 OF 2
<table>
<thead>
<tr>
<th>SINGLE BOX SIZE</th>
<th>2'-0&quot;W x 1'-0&quot;H</th>
<th>2'-0&quot;W x 2'-0&quot;H</th>
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<tbody>
<tr>
<td></td>
<td>DEPTH OF COVER IN FEET</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2'-0&quot;</td>
<td>5'</td>
</tr>
<tr>
<td>TOP SLAB THICKNESS, $T_1$</td>
<td>6 1/2&quot;</td>
<td>6 1/2&quot;</td>
</tr>
<tr>
<td>WALL THICKNESS, $T_2$</td>
<td>8&quot;</td>
<td>8&quot;</td>
</tr>
<tr>
<td>BOTTOM SLAB THICKNESS, $T_3$</td>
<td>7&quot;</td>
<td>7&quot;</td>
</tr>
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**TRANSVERSE REINFORCEMENT**

<table>
<thead>
<tr>
<th>BARS</th>
<th>BAR NO. &amp; SPACING</th>
<th>LENGTH, H</th>
<th>HORIZON. LENGTH, V</th>
<th>VERTICAL LENGTH, V</th>
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</thead>
<tbody>
<tr>
<td>B1 Bars</td>
<td><strong>4 4 0 0 8</strong></td>
<td>3'-1&quot;</td>
<td><strong>1'-1&quot;</strong></td>
<td><strong>2'-2 1/2&quot;</strong></td>
</tr>
<tr>
<td>B2 Bars</td>
<td><strong>4 4 0 0 8</strong></td>
<td>3'-1&quot;</td>
<td><strong>1'-1&quot;</strong></td>
<td><strong>2'-2 1/2&quot;</strong></td>
</tr>
<tr>
<td>B3 Bars</td>
<td><strong>4 4 0 0 8</strong></td>
<td>3'-1&quot;</td>
<td><strong>1'-1&quot;</strong></td>
<td><strong>2'-2 1/2&quot;</strong></td>
</tr>
<tr>
<td>C Bars</td>
<td><strong>4 4 0 0 8</strong></td>
<td>3'-1&quot;</td>
<td><strong>1'-1&quot;</strong></td>
<td><strong>2'-2 1/2&quot;</strong></td>
</tr>
<tr>
<td>C1 Bars</td>
<td><strong>4 4 0 0 8</strong></td>
<td>3'-1&quot;</td>
<td><strong>1'-1&quot;</strong></td>
<td><strong>2'-2 1/2&quot;</strong></td>
</tr>
<tr>
<td>C2 Bars</td>
<td><strong>4 4 0 0 8</strong></td>
<td>3'-1&quot;</td>
<td><strong>1'-1&quot;</strong></td>
<td><strong>2'-2 1/2&quot;</strong></td>
</tr>
<tr>
<td>C3 Bars</td>
<td><strong>4 4 0 0 8</strong></td>
<td>3'-1&quot;</td>
<td><strong>1'-1&quot;</strong></td>
<td><strong>2'-2 1/2&quot;</strong></td>
</tr>
</tbody>
</table>

**LONGITUDINAL REINFORCEMENT**

| NUMBER IN TOP SLAB | 6 | 7 | 6 | 7 | 5 | 7 | 6 | 7 |
| NUMBER IN BOTTOM SLAB | 7 | 7 | 6 | 6 | 6 | 7 | 6 | 6 |
| NUMBER IN WALLS | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| TOTAL NUMBER | 17 | 18 | 16 | 17 | 16 | 15 | 18 | 16 |
| CONCRETE: CU. YDS. PER LIN. FT. | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.25 | 0.25 | 0.25 |
| STEEL: LBS. PER LIN. FT. | 28.1 | 22.0 | 28.8 | 23.6 | 27.2 | 31.8 | 24.0 | 27.3 | 25.8 | 33.8 |

**LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS**

**REINFORCED CONCRETE BOX CULVERT**

**STANDARD PLAN**

**3053-0**

**SHEET 2 OF 21**
### SINGLE BOX SIZE

<table>
<thead>
<tr>
<th>3' - 0&quot; W x 1' - 0&quot; H</th>
<th>3' - 0&quot; W x 2' - 0&quot; H</th>
</tr>
</thead>
</table>

#### DEPTH OF COVER IN FEET

<table>
<thead>
<tr>
<th>TOP SLAB THICKNESS, $T_1$</th>
<th>2' - 1/2&quot;</th>
<th>5'</th>
<th>10'</th>
<th>15'</th>
<th>20'</th>
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</thead>
<tbody>
<tr>
<td>Wall Thickness, $T_2$</td>
<td>6' - 1/2&quot;</td>
<td>6' - 1/2&quot;</td>
<td>6' - 1/2&quot;</td>
<td>6' - 1/2&quot;</td>
<td>6' - 1/2&quot;</td>
</tr>
<tr>
<td>Bottom Slab Thickness, $T_3$</td>
<td>7'</td>
<td>7'</td>
<td>7'</td>
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<td>7'</td>
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#### TRANSVERSE REINFORCEMENT

<table>
<thead>
<tr>
<th>BAR NO. &amp; SPACING</th>
<th>BARS</th>
<th>LENGTH, H</th>
<th>VERT. LENGTH, V</th>
</tr>
</thead>
<tbody>
<tr>
<td>$B_1$</td>
<td></td>
<td>4'-1 1/2&quot;</td>
<td>2'-5 1/2&quot;</td>
</tr>
<tr>
<td>$B_2$</td>
<td></td>
<td>6'-1 1/2&quot;</td>
<td>4'-1 1/2&quot;</td>
</tr>
<tr>
<td>$C_1$</td>
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<td>3'-1 1/2&quot;</td>
<td>0'-1 1/2&quot;</td>
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<tr>
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<td>4'-1 1/2&quot;</td>
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<td>$D_1$</td>
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<tr>
<td>$E_2$</td>
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<td>4'-1 1/2&quot;</td>
<td>2'-5 1/2&quot;</td>
</tr>
</tbody>
</table>

#### LONGITUDINAL REINFORCEMENT

<table>
<thead>
<tr>
<th>BAR NO. &amp; SPACING</th>
<th>BARS</th>
<th>LENGTH, H</th>
<th>VERT. LENGTH, V</th>
</tr>
</thead>
<tbody>
<tr>
<td>$F_1$</td>
<td></td>
<td>4'-1 1/2&quot;</td>
<td>2'-5 1/2&quot;</td>
</tr>
<tr>
<td>$F_2$</td>
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<td>2'-5 1/2&quot;</td>
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<tr>
<td>$G_1$</td>
<td></td>
<td>4'-1 1/2&quot;</td>
<td>2'-5 1/2&quot;</td>
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<tr>
<td>$G_2$</td>
<td></td>
<td>4'-1 1/2&quot;</td>
<td>2'-5 1/2&quot;</td>
</tr>
</tbody>
</table>

### LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

**REINFORCED CONCRETE BOX CULVERT**

**STANDARD PLAN 3053-0**

**SHEET 3 OF 21**
<table>
<thead>
<tr>
<th>SINGLE BOX SIZE</th>
<th>3'-0&quot;W x 3'-0&quot;H</th>
<th>4'-0&quot;W x 1'-0&quot;H</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DEPTH OF COVER IN FEET</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2'-11&quot;</td>
<td>5'</td>
</tr>
<tr>
<td>TOP SLAB THICKNESS, T₁</td>
<td>6 1/2&quot;</td>
<td>6 1/2&quot;</td>
</tr>
<tr>
<td>WALL THICKNESS, T₂</td>
<td>8&quot;</td>
<td>8&quot;</td>
</tr>
<tr>
<td>BOTTOM SLAB THICKNESS, T₃</td>
<td>7&quot;</td>
<td>7&quot;</td>
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</table>

**TRANSVERSE REINFORCEMENT**

<table>
<thead>
<tr>
<th>BARS</th>
<th>BAR NO. &amp; SPACING</th>
<th>LENGTH, H</th>
<th>VERT. LENGTH, V</th>
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</thead>
<tbody>
<tr>
<td>B</td>
<td>+4 0&quot;5'</td>
<td>4'-1 1/2&quot;</td>
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</tr>
<tr>
<td>B₁</td>
<td>+4 0&quot;5'</td>
<td>4'-1 1/2&quot;</td>
<td></td>
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<tr>
<td>B₂</td>
<td>+4 0&quot;5'</td>
<td>4'-1 1/2&quot;</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>+4 0&quot;5'</td>
<td>4'-1 1/2&quot;</td>
<td></td>
</tr>
<tr>
<td>C₁</td>
<td>+4 0&quot;5'</td>
<td>4'-1 1/2&quot;</td>
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</tr>
<tr>
<td>C₂</td>
<td>+4 0&quot;5'</td>
<td>4'-1 1/2&quot;</td>
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<td>D</td>
<td>+4 0&quot;5'</td>
<td>4'-1 1/2&quot;</td>
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</tr>
<tr>
<td>F</td>
<td>+4 0&quot;5'</td>
<td>4'-1 1/2&quot;</td>
<td></td>
</tr>
<tr>
<td>F₁</td>
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<td>4'-1 1/2&quot;</td>
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<td>G</td>
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<td>4'-1 1/2&quot;</td>
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<td>H</td>
<td>+4 0&quot;5'</td>
<td>4'-1 1/2&quot;</td>
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</table>

**LONGITUDINAL REINFORCEMENT**

<table>
<thead>
<tr>
<th>NO. LONG BARS</th>
<th>NUMBER IN TOP SLAB</th>
<th>NUMBER IN BOTTOM SLAB</th>
<th>NUMBER IN WALLS</th>
<th>TOTAL NUMBER</th>
<th>CONCRETE: CU. YDS. PER LIN. FT.</th>
<th>STEEL: LBS. PER LIN. FT.</th>
</tr>
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<tbody>
<tr>
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**LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS**

**REINFORCED CONCRETE BOX CULVERT**

**STANDARD PLAN 3053-0 SHEET 4 OF 21**
<table>
<thead>
<tr>
<th>SINGLE BOX SIZE</th>
<th>4' - 0&quot; W x 2' - 0&quot; H</th>
<th>4' - 0&quot; W x 3' - 0&quot; H</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DEPTH OF COVER IN FEET</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2' - 0&quot;</td>
<td>5'</td>
</tr>
<tr>
<td>TOP SLAB THICKNESS, T_1</td>
<td>5 1/2&quot;</td>
<td>6 1/2&quot;</td>
</tr>
<tr>
<td>WALL THICKNESS, T_2</td>
<td>8&quot;</td>
<td>8&quot;</td>
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<tr>
<td>BOTTOM SLAB THICKNESS, T_3</td>
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**TRANVERSE REINFORCEMENT**

<table>
<thead>
<tr>
<th>B. BARS</th>
<th>BAR NO. &amp; SPACING</th>
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<td>B. BARS</td>
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<tr>
<td>C BARS</td>
<td>BAR NO. &amp; SPACING</td>
<td>HORIZ. LENGTH, H</td>
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<tr>
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<td>C_1 BARS</td>
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<tr>
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<td>1&quot; - 1&quot;</td>
<td>1&quot; - 1&quot;</td>
</tr>
<tr>
<td>C_2 BARS</td>
<td>BAR NO. &amp; SPACING</td>
<td>HORIZ. LENGTH, H</td>
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<td>4014&quot;</td>
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<tr>
<td></td>
<td>VERT. LENGTH, V</td>
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<tr>
<td></td>
<td>2&quot; - 0&quot;</td>
<td>2&quot; - 0&quot;</td>
</tr>
<tr>
<td>C_3 BARS</td>
<td>BAR NO. &amp; SPACING</td>
<td>HORIZ. LENGTH, H</td>
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<td>VERT. LENGTH, V</td>
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</tr>
<tr>
<td>D BARS</td>
<td>BAR NO. &amp; SPACING</td>
<td>LENGTH, H</td>
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<td>F BARS</td>
<td>BAR NO. &amp; SPACING</td>
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<tr>
<td>F_1 BARS</td>
<td>BAR NO. &amp; SPACING</td>
<td>LENGTH, H</td>
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<td>4020&quot;</td>
<td>4020&quot;</td>
</tr>
<tr>
<td>G BARS</td>
<td>BAR NO. &amp; SPACING</td>
<td>LENGTH, H</td>
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<td>4014&quot;</td>
</tr>
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<td>2&quot; - 0&quot;</td>
</tr>
</tbody>
</table>

**LONGITUDINAL REINFORCEMENT**

<table>
<thead>
<tr>
<th>NO. 4 LONG BARS</th>
<th>NUMBER IN TOP SLAB</th>
<th>NUMBER IN BOTTOM SLAB</th>
<th>NUMBER IN WALLS</th>
<th>TOTAL NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10</td>
<td>8</td>
<td>8</td>
<td>22</td>
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<tr>
<td></td>
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<tr>
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</tbody>
</table>

**CONCRETE**

- **CU. YDS. PER LIN. FT.**
  - 0.34, 0.34, 0.34, 0.34, 0.37, 0.39, 0.39, 0.39

**STEEL**

- **LBS. PER LIN. FT.**
  - 42.2, 30.4, 48.4, 48.9, 54.8, 50.6, 35.6, 61.8, 55.5, 51.1

**LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS**

**REINFORCED CONCRETE BOX CULVERT**

**STANDARD PLAN**

**SHEET 3 OF 21**
# Single Box Size

<table>
<thead>
<tr>
<th>Single Box Size</th>
<th>4' - 0&quot; W x 4' - 0&quot; H</th>
<th>5' - 0&quot; W x 1' - 0&quot; H</th>
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<tbody>
<tr>
<td><strong>Depth of Cover in Feet</strong></td>
<td><strong>2'-0&quot;</strong></td>
<td><strong>5'</strong></td>
</tr>
<tr>
<td><strong>Top Slab Thickness, T</strong></td>
<td>6 1/2&quot;</td>
<td>6 1/2&quot;</td>
</tr>
<tr>
<td><strong>Wall Thickness, T</strong></td>
<td>8&quot;</td>
<td>8&quot;</td>
</tr>
<tr>
<td><strong>Bottom Slab Thickness, T</strong></td>
<td>7&quot;</td>
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## Transverse Reinforcement

<table>
<thead>
<tr>
<th>BARS</th>
<th>BAR NO. &amp; SPACING</th>
<th>LENGTH, H</th>
<th>HOR. LENGTH, H</th>
<th>VERT. LENGTH, V</th>
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<tr>
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<td><strong>+4020</strong></td>
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<td><strong>+7020</strong></td>
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<tr>
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<td><strong>5-1/2</strong></td>
<td><strong>5-1/2</strong></td>
</tr>
<tr>
<td>C</td>
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<td><strong>+404</strong></td>
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<td><strong>+404</strong></td>
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<tr>
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<td><strong>2-8 1/2</strong></td>
<td><strong>2-8 1/2</strong></td>
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<tr>
<td>C</td>
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<td><strong>3-1/2</strong></td>
<td><strong>3-1/2</strong></td>
<td><strong>3-1/2</strong></td>
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## Longitudinal Reinforcement

<table>
<thead>
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<th>BARS</th>
<th>BAR NO. &amp; SPACING</th>
<th>LENGTH, H</th>
<th>HOR. LENGTH, H</th>
<th>VERT. LENGTH, V</th>
</tr>
</thead>
<tbody>
<tr>
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<td><strong>+404</strong></td>
<td><strong>+509</strong></td>
<td><strong>+604</strong></td>
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<tr>
<td>B</td>
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<td><strong>2-0</strong></td>
<td><strong>2-0</strong></td>
<td><strong>2-0</strong></td>
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<tr>
<td>B</td>
<td><strong>3-1/2</strong></td>
<td><strong>3-1/2</strong></td>
<td><strong>3-1/2</strong></td>
<td><strong>3-1/2</strong></td>
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<tr>
<td>B</td>
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<td><strong>+401</strong></td>
<td><strong>+501</strong></td>
<td><strong>+601</strong></td>
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<tr>
<td>B</td>
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## Reinforced Concrete Box Culvert

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<th>10</th>
<th>9</th>
<th>9</th>
<th>9</th>
<th>9</th>
<th>10</th>
<th>10</th>
<th>10</th>
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</thead>
<tbody>
<tr>
<td>Number in Bottom Slab</td>
<td>10</td>
<td>10</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
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<td>10</td>
</tr>
<tr>
<td>Number in Walls</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>4</td>
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<tr>
<td>Total Number</td>
<td>28</td>
<td>28</td>
<td>26</td>
<td>26</td>
<td>26</td>
<td>26</td>
<td>26</td>
<td>24</td>
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</tr>
<tr>
<td>Concrete: Cu. Yds. Per Lin. Ft.</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.34</td>
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<tr>
<td>Steel: Lbs. Per Lin. Ft.</td>
<td>55.5</td>
<td>41.2</td>
<td>65.3</td>
<td>59.2</td>
<td>64.3</td>
<td>49.1</td>
<td>37.5</td>
<td>52.2</td>
<td>53.3</td>
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Los Angeles County Department of Public Works

Reinforced Concrete Box Culvert

Standard Plan 3053-0

Sheet 6 of 21
## Single Box Size

<table>
<thead>
<tr>
<th></th>
<th>5'-0&quot;W x 2'-0&quot;H</th>
<th>5'-0&quot;W x 3'-0&quot;H</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Top Slab Thickness</strong>, $T_1$</td>
<td>6 3/4&quot;</td>
<td>7&quot;</td>
</tr>
<tr>
<td><strong>Wall Thickness</strong>, $T_2$</td>
<td>8&quot;</td>
<td>8&quot;</td>
</tr>
<tr>
<td><strong>Bottom Slab Thickness</strong>, $T_3$</td>
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<td>7&quot;</td>
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</table>

### Transverse Reinforcement

<table>
<thead>
<tr>
<th>Bar</th>
<th>No. &amp; Spacing</th>
<th>Length, H (in)</th>
<th>Vert. Length, V (in)</th>
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</thead>
<tbody>
<tr>
<td>B</td>
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<td>6'-1/2&quot;</td>
<td>3'-0&quot;</td>
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<tr>
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<td>+4-07&quot;</td>
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<tr>
<td>B</td>
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<td>6'-1/2&quot;</td>
<td>6'-0&quot;</td>
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<td></td>
<td>+4-10&quot;</td>
<td>6'-1/2&quot;</td>
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</tr>
<tr>
<td>C</td>
<td>+4-04&quot;</td>
<td>6'-1/2&quot;</td>
<td>8'-0&quot;</td>
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<tr>
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<td>-1-1/2&quot;</td>
<td>6'-1/2&quot;</td>
<td>9'-0&quot;</td>
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<td>-1-1/2&quot;</td>
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<td>10'-0&quot;</td>
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### Longitudinal Reinforcement

<table>
<thead>
<tr>
<th>Bar</th>
<th>No. &amp; Spacing</th>
<th>Length, H (in)</th>
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</thead>
<tbody>
<tr>
<td>B</td>
<td>+4-06&quot;</td>
<td>7'-0&quot;</td>
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<tr>
<td></td>
<td>+4-07&quot;</td>
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<td>+4-08&quot;</td>
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<td>10'-0&quot;</td>
</tr>
<tr>
<td></td>
<td>+4-10&quot;</td>
<td>11'-0&quot;</td>
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</tbody>
</table>

### Concrete

- **Concrete: Cu. Yds. Per Lin. Ft.**
  - 0.38
  - 0.38
  - 0.40
  - 0.42
  - 0.46
  - 0.43
  - 0.43
  - 0.45
  - 0.47
  - 0.51

- **Steel: Lbs. Per Lin. Ft.**
  - 50.6
  - 42.6
  - 57.2
  - 38.5
  - 63.4
  - 56.0
  - 47.0
  - 62.5
  - 63.1
  - 70.5

---

**Los Angeles County Department of Public Works**

**Reinforced Concrete Box Culvert**

**Standard Plan 3053-0**

**Sheet 7 of 21**
## SINGLE BOX SIZE

<table>
<thead>
<tr>
<th>5'-0&quot;W x 4'-0&quot;H</th>
<th>5'-0&quot;W x 5'-0&quot;H</th>
</tr>
</thead>
</table>

### DEPTH OF COVER IN FEET

| 2'-11" | 5' | 10' | 15' | 20' | 2'-11" | 5' | 10' | 15' | 20' |
|--------|----|-----|-----|-----|--------|----|-----|-----|-----|-----|
| TOP SLAB THICKNESS, T1 | 6 | 3/4" | 6 1/2" | 7" | 7 1/2" | 8 1/2" | 6 3/4" | 6 1/2" | 7" | 7 1/2" | 8 1/2" |
| WALL THICKNESS, T2 | 8" | 8" | 8" | 8" | 8" | 8" | 8" | 8" | 8" | 8" | 8" |
| BOTTOM SLAB THICKNESS, T3 | 7" | 7" | 7 3/4" | 8 1/4" | 9 1/2" | 7" | 7" | 7" | 8 1/4" | 9 1/2" |

### TRANSVERSE REINFORCEMENT

<table>
<thead>
<tr>
<th>BARS</th>
<th>BAR NO. &amp; SPACING</th>
<th>LENGTH, H</th>
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<tbody>
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</tr>
<tr>
<td>B1</td>
<td>+4#4</td>
<td>5'</td>
</tr>
<tr>
<td>C</td>
<td>+4#4</td>
<td>5'</td>
</tr>
<tr>
<td>C1</td>
<td>+4#4</td>
<td>5'</td>
</tr>
<tr>
<td>C2</td>
<td>+4#4</td>
<td>5'</td>
</tr>
<tr>
<td>C3</td>
<td>+4#4</td>
<td>5'</td>
</tr>
<tr>
<td>D</td>
<td>+4#4</td>
<td>5'</td>
</tr>
<tr>
<td>E</td>
<td>+4#4</td>
<td>5'</td>
</tr>
<tr>
<td>F</td>
<td>+4#4</td>
<td>5'</td>
</tr>
<tr>
<td>F1</td>
<td>+4#4</td>
<td>5'</td>
</tr>
<tr>
<td>G</td>
<td>+4#4</td>
<td>5'</td>
</tr>
<tr>
<td>H</td>
<td>+4#4</td>
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### LONGITUDINAL REINFORCEMENT

<table>
<thead>
<tr>
<th>NO. LONG BARS</th>
<th>NUMBER IN TOP SLAB</th>
<th>NUMBER IN BOTTOM SLAB</th>
<th>NUMBER IN WALLS</th>
<th>TOTAL NUMBER</th>
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<tr>
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<tr>
<td></td>
<td>2</td>
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</table>

### CONCRETE:

- CU. YDS. PER LIN. FT: 0.48, 0.48, 0.50, 0.52, 0.53, 0.53, 0.56, 0.57, 0.62

### STEEL:

- LBS. PER LIN. FT: 59.3, 54.6, 65.0, 65.8, 72.5, 64.4, 55.8, 68.9, 69.3, 74.0

---

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REINFORCED CONCRETE
BOX CULVERT

STANDARD PLAN
3053-0
SHEET 8 OF 21
<table>
<thead>
<tr>
<th>SINGLE BOX SIZE</th>
<th>6'-0&quot;W x 1'-0&quot;H</th>
<th>6'-0&quot;W x 2'-0&quot;H</th>
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<tbody>
<tr>
<td>DEPTH OF COVER IN FEET</td>
<td>2'-11&quot;</td>
<td>9&quot;</td>
</tr>
<tr>
<td>TOP SLAB THICKNESS, $T_1$</td>
<td>7&quot;</td>
<td>6 1/2&quot;</td>
</tr>
<tr>
<td>WALL THICKNESS, $T_2$</td>
<td>8&quot;</td>
<td>8&quot;</td>
</tr>
<tr>
<td>BOTTOM SLAB THICKNESS, $T_3$</td>
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**TRANSVERSE REINFORCEMENT**

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<td>$B_1$ BARS</td>
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<td>LENGTH, H</td>
</tr>
<tr>
<td>$C$ BARS</td>
<td>BAR NO. &amp; SPACING</td>
<td>HOR. LENGTH, H</td>
</tr>
<tr>
<td>$C_1$ BARS</td>
<td>BAR NO. &amp; SPACING</td>
<td>HOR. LENGTH, H</td>
</tr>
<tr>
<td>$C_2$ BARS</td>
<td>BAR NO. &amp; SPACING</td>
<td>HOR. LENGTH, H</td>
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<td>$C_3$ BARS</td>
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<td>LENGTH, H</td>
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<tr>
<td>$F$ BARS</td>
<td>BAR NO. &amp; SPACING</td>
<td>LENGTH, H</td>
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<tr>
<td>$F_1$ BARS</td>
<td>BAR NO. &amp; SPACING</td>
<td>LENGTH, H</td>
</tr>
<tr>
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**LONGITUDINAL REINFORCEMENT**

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<tbody>
<tr>
<td>NUMBER IN BOTTOM SLAB</td>
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<td>12</td>
<td>12</td>
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<td>12</td>
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<tr>
<td>NUMBER IN WALLS</td>
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<td>TOTAL NUMBER</td>
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<tr>
<td>CONCRETE: CU. YDS. PER LIN. FT.</td>
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<td>0.42</td>
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**LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS**

**REINFORCED CONCRETE BOX CULVERT**

**STANDARD PLAN**

**3053-O**

**SHEET 9 OF 21**
<table>
<thead>
<tr>
<th>SINGLE BOX SIZE</th>
<th>6'-0&quot;W x 3'-0&quot;H</th>
<th>6'-0&quot;W x 4'-0&quot;H</th>
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</thead>
<tbody>
<tr>
<td><strong>DEPTH OF COVER IN FEET</strong></td>
<td><strong>2'-0&quot;I</strong></td>
<td><strong>5'</strong></td>
</tr>
<tr>
<td>TOP SLAB THICKNESS, ( T_1 )</td>
<td>7&quot;</td>
<td>6 1/2&quot;</td>
</tr>
<tr>
<td>WALL THICKNESS, ( T_2 )</td>
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<td>8&quot;</td>
</tr>
<tr>
<td>BOTTOM SLAB THICKNESS, ( T_3 )</td>
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**TRANSVERSE REINFORCEMENT**

<table>
<thead>
<tr>
<th><strong>BARS</strong></th>
<th><strong>BAR NO. &amp; SPACING</strong></th>
<th><strong>LENGTH, H</strong></th>
<th><strong>BAR NO. &amp; SPACING</strong></th>
<th><strong>LENGTH, H</strong></th>
<th><strong>BAR NO. &amp; SPACING</strong></th>
<th><strong>LENGTH, H</strong></th>
<th><strong>BAR NO. &amp; SPACING</strong></th>
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**VERTICAL REINFORCEMENT**

<table>
<thead>
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<th><strong>LENGTH, H</strong></th>
<th><strong>BAR NO. &amp; SPACING</strong></th>
<th><strong>VERT. LENGTH, V</strong></th>
<th><strong>BAR NO. &amp; SPACING</strong></th>
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<th><strong>BAR NO. &amp; SPACING</strong></th>
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**LONGITUDINAL REINFORCEMENT**

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Los Angeles County Department of Public Works

Reinforced Concrete Box Culvert

Standard Plan

3053-0

Sheet 11 of 21
### Double Box Size

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<td>5'-2&quot;</td>
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<td>5'-2&quot;</td>
<td>5'-2&quot;</td>
<td>5'-2&quot;</td>
<td>5'-2&quot;</td>
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<tr>
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<td>1'-8 1/2&quot;</td>
<td>1'-8 1/2&quot;</td>
<td>1'-8 1/2&quot;</td>
<td>1'-8 1/2&quot;</td>
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<td>1'-8 1/2&quot;</td>
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<tr>
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<td>14</td>
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<td>14</td>
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<tr>
<td><strong>CONCRETE: CU. YDS. PER LIN. FT.</strong></td>
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**LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS**

**REINFORCED CONCRETE BOX CULVERT**

**STANDARD PLAN**

**3053-0**

**SHEET 13 OF 21**
<table>
<thead>
<tr>
<th>DOUBLE BOX SIZE</th>
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<th>4'-0&quot;W x 3'-0&quot;H</th>
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<tbody>
<tr>
<td>DEPTH OF COVER IN FEET</td>
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<td>5'</td>
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<tr>
<td>TOP SLAB THICKNESS, T1</td>
<td>6 1/2&quot;</td>
<td>6 1/2&quot;</td>
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<tr>
<td>WALL THICKNESS, T2</td>
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<tr>
<td>BOTTOM SLAB THICKNESS, T3</td>
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**TRANSVERSE REINFORCEMENT**

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<th>BAR NO. &amp; SPACING</th>
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</tr>
<tr>
<td>Cn</td>
<td>+4&quot;0'1&quot; +4&quot;0'1&quot; +4&quot;0'1&quot; +4&quot;0'1&quot; +4&quot;0'1&quot; +4&quot;0'1&quot; +4&quot;0'1&quot; +4&quot;0'1&quot; +4&quot;0'1&quot; +4&quot;0'1&quot; +4&quot;0'1&quot; +4&quot;0'1&quot;</td>
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<td>Cn</td>
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<td><strong>HOR. LENGTH, H</strong></td>
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<tr>
<td>Cn</td>
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**LONGITUDINAL REINFORCEMENT**

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<tbody>
<tr>
<td>LONG BARS</td>
<td>NUMBER IN BOTTOM SLAB</td>
<td>15</td>
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</tr>
<tr>
<td>NUMBER IN WALLS</td>
<td>TOTAL NUMBER</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
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<td>CONCRETE: CU. YDS. PER LIN. FT.</td>
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<td>0.60</td>
<td>0.60</td>
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LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REINFORCED CONCRETE BOX CULVERT

STANDARD PLAN

3053-0

SHEET 14 OF 21
<table>
<thead>
<tr>
<th>DOUBLE BOX SIZE</th>
<th>4'-0&quot;W x 4'-0&quot;H</th>
<th>5'-0&quot;W x 1'-0&quot;H</th>
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<tbody>
<tr>
<td></td>
<td>2'-11&quot;</td>
<td>5'</td>
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<tr>
<td>TOP SLAB THICKNESS, $T_1$</td>
<td>6 1/2&quot;</td>
<td>6 1/2&quot;</td>
</tr>
<tr>
<td>WALL THICKNESS, $T_2$</td>
<td>8&quot;</td>
<td>8&quot;</td>
</tr>
<tr>
<td>BOTTOM SLAB THICKNESS, $T_3$</td>
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### Transverse Reinforcement

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<tr>
<th>BARS</th>
<th>BARS</th>
<th>LENGTH, H</th>
<th>HORIZ. LENGTH, H</th>
<th>VERT. LENGTH, V</th>
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<tbody>
<tr>
<td>B <em>1</em></td>
<td>B <em>2</em></td>
<td>+4 0&quot;20&quot;</td>
<td>+4 0&quot;20&quot;</td>
<td>+4 0&quot;16&quot;</td>
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<tr>
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<td>B <em>2</em></td>
<td>9'-9&quot;</td>
<td>9'-9&quot;</td>
<td>9'-9&quot;</td>
</tr>
<tr>
<td>C <em>1</em></td>
<td>B <em>2</em></td>
<td>+7 0&quot;20&quot;</td>
<td>+4 0&quot;20&quot;</td>
<td>+4 0&quot;16&quot;</td>
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<tr>
<td>C <em>1</em></td>
<td>B <em>2</em></td>
<td>9'-9&quot;</td>
<td>3'-4&quot;</td>
<td>3'-4&quot;</td>
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<tr>
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<td>C <em>3</em></td>
<td>+4 0&quot;00&quot;</td>
<td>+4 0&quot;14&quot;</td>
<td>+4 0&quot;14&quot;</td>
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<tr>
<td>C <em>2</em></td>
<td>C <em>3</em></td>
<td>2'-8&quot;</td>
<td>2'-8&quot;</td>
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<tr>
<td>C <em>2</em></td>
<td>C <em>3</em></td>
<td>3'-11/2&quot;</td>
<td>3'-11/2&quot;</td>
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<td>C <em>2</em></td>
<td>C <em>3</em></td>
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<td>+4 0&quot;14&quot;</td>
<td>+4 0&quot;14&quot;</td>
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<tr>
<td>C <em>2</em></td>
<td>C <em>3</em></td>
<td>0'-1&quot;</td>
<td>0'-1/2&quot;</td>
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<tr>
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<td>C <em>3</em></td>
<td>-1'-2&quot;</td>
<td>-1'-2&quot;</td>
<td>-1'-2&quot;</td>
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</table>

### Longitudinal Reinforcement

| NUMBER IN TOP SLAB | 17 | 17 | 15 | 15 | 15 | 20 | 19 | 18 | 18 | 18 |
| NUMBER IN BOTTOM SLAB | 17 | 17 | 15 | 15 | 15 | 19 | 19 | 18 | 18 | 18 |
| NUMBER IN WALLS | 12 | 12 | 12 | 12 | 12 | 6 | 6 | 6 | 6 | 6 |
| TOTAL NUMBER | 46 | 46 | 42 | 42 | 42 | 45 | 44 | 42 | 42 | 42 |
| CONCRETE: CU. YDS. PER LIN. FT. | 0.74 | 0.74 | 0.74 | 0.76 | 0.84 | 0.61 | 0.61 | 0.63 | 0.68 | 0.82 |
| STEEL: LBS. PER LIN. FT. | 85.8 | 86.4 | 82.7 | 85.1 | 88.4 | 83.5 | 63.2 | 88.2 | 90.0 | 95.0 |

Los Angeles County Department of Public Works

Reinforced Concrete Box Culvert

Standard Plan

3053-0

Sheet 15 of 21
<table>
<thead>
<tr>
<th>DOUBLE BOX SIZE</th>
<th>5'-0&quot;W x 2'-0&quot;H</th>
<th>5'-0&quot;W x 3'-0&quot;H</th>
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</thead>
<tbody>
<tr>
<td>DEPTH OF COVER IN FEET</td>
<td>2'-0&quot;</td>
<td>5'</td>
</tr>
<tr>
<td>TOP SLAB THICKNESS, $T_1$</td>
<td>6 1/2&quot;</td>
<td>6 1/2&quot;</td>
</tr>
<tr>
<td>WALL THICKNESS, $T_2$</td>
<td>8&quot;</td>
<td>8&quot;</td>
</tr>
<tr>
<td>BOTTOM SLAB THICKNESS, $T_3$</td>
<td>7&quot;</td>
<td>7&quot;</td>
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**TRANSVERSE REINFORCEMENT**

<table>
<thead>
<tr>
<th>BARS</th>
<th>BAR NO. &amp; SPACING</th>
<th>LENGTH, H</th>
<th>VERT. LENGTH, V</th>
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<tr>
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<tr>
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<td>+408&quot;</td>
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</table>

**HOR. LENGTH, H**

- 2-1/2' | 1-3/2' | 2' | 2-1/2' | 2-1/2' | 2-1/2' | 2-1/2' | 2-1/2' | 2-1/2' | 2-1/2' | 2-1/2' | 2-1/2' | 2-1/2' |

**VERT. LENGTH, V**

- 1-1/2' | 1-1/2' | 2" | 2-1/2" | 2-1/2" | 2-1/2" | 2-1/2" | 2-1/2" | 2-1/2" | 2-1/2" | 2-1/2" | 2-1/2" | 2-1/2" |

**C BARS**

<table>
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<tr>
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<td>+404&quot;</td>
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**VERT. LENGTH, V**

- 1' | 1' | 1' | 1' | 1' | 1' | 1' | 1' | 1' | 1' |

**D BARS**

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<thead>
<tr>
<th>BAR NO. &amp; SPACING</th>
<th>LENGTH, H</th>
<th>VERT. LENGTH, V</th>
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<tbody>
<tr>
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<td>+408&quot;</td>
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<tr>
<td>+408&quot;</td>
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<td>+408&quot;</td>
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</tbody>
</table>

**VERT. LENGTH, V**

- 3'-1" | 3'-1" | 3'-1" | 3'-1" | 3'-1" | 3'-1" | 3'-1" | 3'-1" | 3'-1" | 3'-1" |

**F BARS**

<table>
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**H BARS**

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**H BARS**

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</table>

**TOTAL NUMBER**

- 44 | 42 | 42 | 42 | 42 | 51 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 |

**CONCRETE: CU. YDS. PER LIN. FT.**

- 0.68 | 0.68 | 0.71 | 0.77 | 0.91 | 0.76 | 0.76 | 0.80 | 0.86 | 0.98

**STEEL: LBS. PER LIN. FT.**

- 87.3 | 64.7 | 90.9 | 93.2 | 98.8 | 95.0 | 71.9 | 99.4 | 102.6 | 105.9

**LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS**

**REINFORCED CONCRETE BOX CULVERT**

**STANDARD PLAN**

**3053-0**

**SHEET 16 OF 21**
<table>
<thead>
<tr>
<th>DOUBLE BOX SIZE</th>
<th>5' - 0&quot;W x 4' - 0&quot;H</th>
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<tbody>
<tr>
<td>DEPTH OF COVER IN FEET</td>
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</tr>
<tr>
<td>2'-11&quot;</td>
<td>5'</td>
<td>10'</td>
</tr>
<tr>
<td>TOP SLAB THICKNESS, $T_1$</td>
<td>6 1/2&quot;</td>
<td>6 1/2&quot;</td>
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<tr>
<td>WALL THICKNESS, $T_2$</td>
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<tr>
<td>BOTTOM SLAB THICKNESS, $T_3$</td>
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<td>7&quot;</td>
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**TRANSVERSE REINFORCEMENT**

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<th>BAR NO. &amp; SPACING</th>
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<td>B1</td>
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</tr>
<tr>
<td>B2</td>
<td>---</td>
</tr>
<tr>
<td>B3</td>
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</tr>
<tr>
<td>C</td>
<td>---</td>
</tr>
<tr>
<td>C1</td>
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<tr>
<td>C2</td>
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<tr>
<td>C3</td>
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</tr>
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<td>---</td>
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<td>F1</td>
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<td>---</td>
</tr>
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<tr>
<td>H</td>
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</tr>
<tr>
<td>H1</td>
<td>---</td>
</tr>
<tr>
<td>CW</td>
<td>---</td>
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**LONGITUDINAL REINFORCEMENT**

| NUMBER IN TOP SLAB | 20 | 19 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 |
| NUMBER IN BOTTOM SLAB | 19 | 19 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 |
| NUMBER IN WALLS | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| TOTAL NUMBER | 51 | 50 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 |
| CONCRETE: CU, YDS. PER LIN. FT. | 0.83 | 0.83 | 0.88 | 0.93 | 1.06 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 |
| STEEL: LBS. PER LIN. FT. | 99.3 | 77.3 | 102.8 | 106.0 | 110.2 | 110.3 | 85.2 | 110.2 | 113.5 | 116.7 |

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REINFORCED CONCRETE BOX CULVERT

STANDARD PLAN 3053-0

SHEET 17 OF 21
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<tr>
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### DEPTH OF COVER IN FEET

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<th>LENGTH, H</th>
<th>BAR</th>
<th>NO. &amp; SPACING</th>
<th>LENGTH, H</th>
<th>BAR</th>
<th>NO. &amp; SPACING</th>
<th>LENGTH, H</th>
<th>BAR</th>
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<td>9-9&quot;</td>
<td>15'</td>
<td>16'-0&quot;</td>
<td>12-10&quot;</td>
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<td>14-10&quot;</td>
</tr>
<tr>
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<td>19'-0&quot;</td>
<td>14-10&quot;</td>
</tr>
<tr>
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<td>9-9&quot;</td>
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<tr>
<td>D</td>
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<td>12-10&quot;</td>
<td>20'</td>
<td>19'-0&quot;</td>
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### LONGITUDINAL REINFORCEMENT

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<td>52</td>
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<td>6'-0&quot;W x 4'-0&quot;H</td>
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### DEPTH OF COVER IN FEET

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<th></th>
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<tbody>
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<td>+4 03&quot;</td>
<td>+4 04&quot;</td>
<td>+4 05&quot;</td>
<td>+4 06&quot;</td>
<td>+4 07&quot;</td>
<td>+4 08&quot;</td>
<td>+4 09&quot;</td>
<td>+4 10&quot;</td>
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<tr>
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<td>13'-9&quot;</td>
<td>13'-9&quot;</td>
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<td>13'-9&quot;</td>
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<td>+4 03&quot;</td>
<td>+4 04&quot;</td>
<td>+4 05&quot;</td>
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<td>+4 08&quot;</td>
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### TRANSVERSE REINFORCEMENT

### LONGITUDINAL REINFORCEMENT

| NUMBER IN TOP SLAB | 26 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 |
| NUMBER IN BOTTOM SLAB | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 |
| NUMBER IN WALLS | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| TOTAL NUMBER | 60 | 56 | 56 | 56 | 56 | 60 | 56 | 56 | 56 | 56 |
| CONCRETE: CU. YDS. PER LIN. FT. | 0.84 | 0.84 | 0.97 | 1.07 | 1.24 | 0.92 | 0.92 | 1.05 | 1.14 | 1.33 |
| STEEL: LBS. PER LIN. FT. | 119.1 | 97.2 | 124.7 | 125.2 | 133.3 | 121.9 | 96.7 | 128.0 | 128.7 | 133.3 |

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LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REINFORCED CONCRETE BOX CULVERT

STANDARD PLAN

3053-O

SHEET 19 OF 21
## Double Box Size

<table>
<thead>
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<th>Double Box Size</th>
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<th>6'-0&quot;W x 6'-0&quot;H</th>
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<tbody>
<tr>
<td><strong>Depth of Cover in Feet</strong></td>
<td><strong>2'-11&quot;</strong></td>
<td><strong>5'</strong></td>
</tr>
<tr>
<td><strong>Top Slab Thickness, T_1</strong></td>
<td>6 1/2</td>
<td>6 1/2</td>
</tr>
<tr>
<td><strong>Wall Thickness, T_2</strong></td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td><strong>Bottom Slab Thickness, T_3</strong></td>
<td>8</td>
<td>7</td>
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### Transverse Reinforcement

<table>
<thead>
<tr>
<th>BARS</th>
<th>BAR NO. &amp; SPACING</th>
<th>LENGTH, H</th>
<th>HORIZ. LENGTH, H</th>
<th>VERT. LENGTH, V</th>
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<tbody>
<tr>
<td>B_1</td>
<td><strong>408'</strong></td>
<td><strong>309'</strong></td>
<td><strong>409'</strong></td>
<td><strong>409'</strong></td>
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<tr>
<td>C_1</td>
<td><strong>608'</strong></td>
<td><strong>509'</strong></td>
<td><strong>609'</strong></td>
<td><strong>609'</strong></td>
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<tr>
<td>C_2</td>
<td><strong>404'</strong></td>
<td><strong>401'</strong></td>
<td><strong>401'</strong></td>
<td><strong>401'</strong></td>
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<tr>
<td>C_3</td>
<td><strong>404'</strong></td>
<td><strong>401'</strong></td>
<td><strong>401'</strong></td>
<td><strong>401'</strong></td>
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<tr>
<td>D_1</td>
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<td><strong>401'</strong></td>
<td><strong>401'</strong></td>
<td><strong>401'</strong></td>
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<tr>
<td>F</td>
<td><strong>404'</strong></td>
<td><strong>401'</strong></td>
<td><strong>401'</strong></td>
<td><strong>401'</strong></td>
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<tr>
<td>F_1</td>
<td><strong>502'</strong></td>
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<td><strong>609'</strong></td>
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<tr>
<td>G</td>
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<td><strong>402'</strong></td>
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<tr>
<td>H</td>
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<tr>
<td>H_1</td>
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<td><strong>403'</strong></td>
<td><strong>403'</strong></td>
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<tr>
<td>C_W</td>
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<td><strong>406'</strong></td>
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### Longitudinal Reinforcement

<table>
<thead>
<tr>
<th>NO. LONG BARS</th>
<th>NUMBER IN TOP SLAB</th>
<th>NUMBER IN BOTTOM SLAB</th>
<th>NUMBER IN WALLS</th>
<th>TOTAL NUMBER</th>
<th>CONCRETE: CU. YDS. PER LIN. FT.</th>
<th>STEEL: LBS. PER LIN. FT.</th>
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<tbody>
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<td>72</td>
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<td>1.39</td>
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<td>134.9</td>
<td>144.4</td>
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<td>193.3</td>
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Los Angeles County Department of Public Works

Reinforced Concrete Box Culvert

Standard Plan

3053-0

Sheet 20 of 21
1. DIMENSIONS FROM FACE OF CONCRETE TO STEEL ARE TO CENTER OF BAR, AND SHALL BE 2" UNLESS OTHERWISE SHOWN.

2. CONCRETE DIMENSIONS SHALL BE MEASURED HORIZONTALLY OR VERTICALLY ON THE PROFILE, AND PARALLEL TO OR AT RIGHT ANGLES (OR RADIALLY) TO CENTERLINE OF CONDUIT ON THE PLAN EXCEPT AS OTHERWISE SHOWN.

3. NO SPLICES IN TRANSVERSE STEEL REINFORCEMENT WILL BE PERMITTED OTHER THAN SHOWN ON THE DRAWING WITHOUT APPROVAL OF THE ENGINEER.

4. THE TRANSVERSE REINFORCING STEEL SHALL TERMINATE 1 1/2" FROM THE CONCRETE SURFACES UNLESS OTHERWISE SHOWN ON THE STRUCTURAL DETAILS.

5. D BARS MAY BE SPLICED 20 DIAMETERS AT THE LOWER CONSTRUCTION JOINT.


7. ALL LONGITUDINAL BARS SHALL BE NO. 4 BARS. SPACING SHALL BE 18" UNLESS OTHERWISE SHOWN. BARS IN TOP AND BOTTOM SLABS SHALL BE SPACED SYMMETRICALLY ABOUT THE CENTERLINE. BARS IN WALLS SHALL BE SPACED SYMMETRICALLY ABOUT MID-HEIGHT OF THE WALLS.

8. CONCRETE QUANTITIES ARE BASED ON A 6" x 6" FILLET AND THE STEEL QUANTITIES DO NOT INCLUDE ANY OPTIONAL SPLICE.

9. INVERT THICKNESS IS CALCULATED FOR BAR COVERS SHOWN. IT MUST BE INCREASED FOR HIGH VELOCITIES, SALT WATER, INDUSTRIAL WASTES, ABRASIVE BED LOAD, OR HARMFUL GROUNDWATER (USUALLY 1/2" FOR EACH CONDITION).

**STRUCTURAL DESIGN CRITERIA**

L.A.C.F.C.D. STRUCTURAL DESIGN MANUAL
DATED APRIL 1982

**LIVE LOAD**

HS 20-44 UNLESS OTHERWISE NOTED

**DEAD LOAD**

EARTH LOAD PER MARSTON'S FORMULA: w=110 PCF

Kₚ=K_μ=0.150

B₁ = OUTSIDE WIDTH OF BOX PLUS 3 FEET

SIDE EARTH 37 PSF PER FOOT OF DEPTH

INTERNAL WATER PRESSURE: 62.4 PSF PER FOOT OF DEPTH

WEIGHT OF CONCRETE: 150 PCF

**ALLOWABLE STRESSES**

f'c = 4000 PSI AT 28 DAYS

f_c = 1800 PSI

f_s = 24,000 PSI

n = 8

SHEAR AND BOND STRESSES

PER A.C.I. 318-63

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REINFORCED CONCRETE BOX CULVERT

STANDARD PLAN

3053-0

SHEET 21 OF 21
NOTES

1. CATCH BASIN PROTECTION BAR AND STIRRUPS TO BE INSTALLED AT INLETS ONLY.

2. STEEL SUPPORTS TO BE SPACED EVENLY IN OPENING AND NOT TO EXCEED 2.14 m (7') C.C. THREAD 75 mm (3') ON UPPER END.

3. NOT LESS THAN THREE 16 mm Ø X 250 mm (5/8" Ø X 10") ANCHOR BOLTS WELDED TO ANGLE.

4. SLOPE 2% UNLESS OTHERWISE SHOWN: SIDEWALK FINISH.

5. CONSTRUCTION JOINT.

6. MANHOLES IN PARKWAY AREAS SHALL BE PER STD. PLAN 312, CATCH BASIN MANHOLE FRAME & COVER.

7. REINFORCING STEEL SHALL HAVE A COVERING OF AT LEAST 25 mm (1") OF CONCRETE AT ALL POINTS.

8. FOR REINFORCING AROUND MANHOLE IN SIDEWALK AREA SEE STD. PLAN 300. CURB OPENING CATCH BASIN.

9. SPACING OF TRANSVERSE REINFORCEMENT SHALL BE MEASURED ALONG C OF CULVERT EXCEPTING INLET/OUTLET NO. 1.

10. ALL REINFORCING BARS SHALL BE LAPPED 20 BAR DIAMETERS AT ALL SPlices.

11. FLOOR TO BE TROWELED SMOOTH.

12. A HEADED STEEL STUD 13 mm X 130 mm (1/2" X 5 3/16") WITH HEAD DIA. = 25 mm (1") ATTACHED BY A FULL PENETRATION BUTT WELD MAY BE USED AS AN ALTERNATE ANCHOR.

13. REINFORCING STEEL AND CONCRETE SHALL BE PER APWA "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION".

14. VALUES FOR D, S, L & V ARE SHOWN ON PROJECT PLANS.

15. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
<table>
<thead>
<tr>
<th>D (IN.)</th>
<th>B (IN.)</th>
<th>Z (IN.)</th>
<th>Y (FT.)</th>
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<tbody>
<tr>
<td>300mm (12)</td>
<td>600mm (24)</td>
<td>130mm (5)</td>
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<tr>
<td>375mm (15)</td>
<td>680mm (27)</td>
<td>130mm (5)</td>
<td>1.20m (4)</td>
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<tr>
<td>450mm (18)</td>
<td>830mm (33)</td>
<td>130mm (5)</td>
<td>1.20m (4)</td>
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<tr>
<td>525mm (21)</td>
<td>980mm (39)</td>
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<td>1.20m (4)</td>
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<tr>
<td>750mm (30)</td>
<td>1280mm (51)</td>
<td>150mm (6)</td>
<td>1.40m (4.5)</td>
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<td>900mm (36)</td>
<td>1500mm (60)</td>
<td>150mm (6)</td>
<td>1.50m (5)</td>
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<td>1050mm (42)</td>
<td>1800mm (72)</td>
<td>180mm (7)</td>
<td>1.80m (6)</td>
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<td>1200mm (48)</td>
<td>2030mm (81)</td>
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<td>1500mm (60)</td>
<td>2400mm (96)</td>
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<td>2250mm (90)</td>
<td>3600mm (144)</td>
<td>230mm (9)</td>
<td>3.40m (11)</td>
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</table>

NOTES

1. THE AUTOMATIC FLAP GATE SHALL BE MOUNTED ON A CONCRETE COLLAR THAT IS Poured IN THE END OF A JUNCTION STRUCTURE SPUR. THE JUNCTION STRUCTURE SHALL BE SHOWN OR SPECIFIED ON THE PROJECT DRAWINGS.

2. MOUNTING BOLTS SHALL BE EMBEDDED 130mm (5") INTO THE COLLAR.

3. THE Y DIMENSION IS MEASURED AT THE TOP OF THE JUNCTION STRUCTURE SPUR FOR CONNECTIONS TO TRAPEZOIDAL RC CHANNELS.

4. THE CONCRETE COLLAR SHALL BE REINFORCED PER STANDARD PLAN 380 IF ANGLE σ EXCEEDS 10°.

5. AUTOMATIC FLAP GATES SHALL BE FLAT BACK UNLESS OTHERWISE SHOWN.

6. AUTOMATIC FLAP GATES SHALL MEET THE REQUIREMENTS OF THE ADDITIONAL PROVISIONS OF THE "GRAY BOOK" AND/OR THE SPECIAL PROVISIONS OF THE SPECIFICATIONS.

7. DIMENSIONS SHOWN ON THIS PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACT EQUAL VALUES. IF METRIC VALUES ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.

THE FOLLOWING STANDARD PLANS ARE INCORPORATED HEREIN:

331 JUNCTION STRUCTURE - PIPE TO PIPE (INLET ID ≥ 600mm (24") OR OD > .5 MAIN LINE ID)

333 JUNCTION STRUCTURE - PIPE TO RCC

380 CONCRETE COLLAR FOR PIPES 300mm (12 INCHES) THROUGH 1800mm (72 INCHES)
NOTE:

CASE 1 BEDDING (LOAD FACTOR 2.1)
shall be used where specified on project drawings or where required
as an alternative to case 2 or case 3 bedding as provided hereon,
and on sh. 2. case 4 bedding shall be used instead of case 1 against
sheeting or unstable trench sides if so required by the engineer.

CASE 2
VITRIFIED CLAY AND PLAIN CONCRETE PIPE

NOTES:

CASE 2 BEDDING & BACKFILL AROUND PIPE (LOAD FACTOR 1.8)
(a) W at spring line shall not be less than 150mm (6") for any depth
of trench. This dimension may include the thickness of any sheeting.
(b) Where cover is 2.5m (8'-0") or less, w measured at top of pipe may
be any dimension greater than 150mm (6").
(c) Where cover is greater than 2.5m (8'-0"), w measured at top of pipe
shall not be greater than 200mm (8") unless the contractor at his
own expense provides case 1 bedding or stronger pipe. The stated
200mm (8") includes the thickness of any sheeting.
(d) Screebed bedding A to fit curvature and grade of pipe, type of
screeed and the method of use to be approved by the engineer.
CASE 3
REINFORCED CONCRETE PIPE

NOTES:
CASE 3 BEDDING & BACKFILL AROUND RCP (LOAD FACTOR 1.8)
(a) W AT SPRING LINE SHALL NOT BE LESS THAN THE FOLLOWING: 150mm (6") FOR RCP 1500mm (60") OR LESS IN DIAMETER, 250mm (10") FOR RCP 1575mm (62") TO 2700mm (108") IN DIAMETER, AND 300mm (12") FOR PIPE LARGER THAN 2700mm (108") IN DIAMETER. THESE DIMENSIONS MAY INCLUDE THE THICKNESS OF ANY SHEETING.
(b) WHERE COVER IS 3m (10'-0") OR LESS, W MEASURED AT THE TOP OF THE RCP MAY BE ANY DIMENSION GREATER THAN THE ABOVE SPECIFIED MINIMUM, UNLESS OTHERWISE SPECIFIED ON THE PROJECT DRAWINGS.
(c) WHERE COVER IS GREATER THAN 3m (10'-0"), W MEASURED AT TOP OF PIPE SHALL NOT BE GREATER THAN 250mm (10") FOR RCP 2700mm (108") IN DIAMETER OR LESS, OR 300mm (12") FOR RCP OVER 2700mm (108") IN DIAMETER UNLESS THE CONTRACTOR AT HIS OWN EXPENSE PROVIDES CASE 1 BEDDING OR STRONGER RCP. THESE DIMENSIONS INCLUDE THE THICKNESS OF ANY SHEETING.
(d) SCREED BEDDING A TO FIT CURVATURE AND GRADE OF RCP, TYPE OF SCREED AND THE METHOD OF USE TO BE APPROVED BY THE ENGINEER.

CASE 4

CASE 5

NOTE:
CASE 5 BEDDING (LOAD FACTOR 2.7)
SHALL BE USED WHERE SPECIFIED ON THE PROJECT DRAWINGS. CASE 4 BEDDING SHALL BE USED INSTEAD OF CASE 5 AGAINST SHEETING OR UNSTABLE TRENCH WALLS IF SO REQUIRED BY THE ENGINEER.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

PIPE BEDDING IN TRENCHES

STANDARD PLAN
METRIC
3080-2
SHEET 2 OF 3
NOTES:

CASE 6 BEDDING (LOAD FACTOR 1.5)

(a)

NOTES (a), (b), AND (c) FROM CASE 3 SHALL APPLY.

(b)

WHERE SUBGRADE IS COMPOSED OF OTHER THAN GRANULAR OR SANDY MATERIAL, THE TRENCH SHALL BE EXCAVATED TO A DEPTH OF AT LEAST 800mm (3') BELOW THE PIPE AND BACKFILLED WITH A BEDDING MATERIAL OR OTHER MATERIALS AS MAY BE SPECIFIED OR OTHERWISE APPROVED BY THE DEPARTMENT.

NOTES

1. USE CASE 3 FOR RCP, CASE 2 FOR VITRIFIED CLAY, PLASTIC AND PLAIN CONCRETE PIPE UNLESS OTHERWISE SPECIFIED OR SHOWN ON THE PROJECT DRAWINGS.

2. FOR RCP 675mm (27") IN DIAMETER AND LARGER, BEDDING A SHALL BE COMPOSED OF SAND, 20mm (3/4") OR 15mm (1/2") CRUSHED ROCK, 5mm (NO.3 OR 4) CONCRETE AGGREGATE OR GRAVEL OR OTHER GRANULAR MATERIAL AS SPECIFIED AND SHALL HAVE A SAND EQUIVALENT VALUE OF NOT LESS THAN 20 UNLESS OTHERWISE APPROVED BY THE ENGINEER.

3. WHERE RCP SMALLER THAN 675mm (27") IN DIAMETER IS USED, THE REQUIREMENTS IN NOTE 2 SHALL BE MET EXCEPT THAT A GRADATION COARSER THAN 4.75mm (NO.4) CONCRETE AGGREGATE OR NO COARSER THAN 15mm (1/2") CRUSHED ROCK SHALL BE USED.

4. BEDDING B SHALL BE COMPOSED OF SAND OR OTHER GRANULAR MATERIAL AND SHALL HAVE A SAND EQUIVALENT VALUE NOT LESS THAN 20 AS SPECIFIED IN SUBSECTION 306-1.2.1 AS AMENDED UNLESS OTHERWISE APPROVED BY THE ENGINEER AND SHALL BE COMPLETED PRIOR TO PLACING THE BALANCE OF THE BACKFILL. THE MAXIMUM ROCK SIZE FOR BEDDING B SHALL BE 100mm (4") IN THE GREATEST DIMENSION. NESTING OF ROCKS WILL NOT BE PERMITTED.

5. UNLESS SPECIFIED ON THE PROJECT DRAWINGS, CONCRETE SHALL BE 200-C-15 (420-C-2000).

6. CONCRETE BACKFILL SHALL BE POURED FROM WALL TO WALL OF THE TRENCH AND FROM THE BOTTOM OF THE TRENCH TO A MINIMUM DEPTH OF 100mm (4") OVER THE TOP OF THE PIPE.

7. CONCRETE BACKFILL SHALL BE PROVIDED FOR RCP 525mm (2") IN DIAMETER OR LESS WHERE THE COVER IS EQUAL TO OR LESS THAN 600mm (24"), FOR RCP GREATER THAN 525mm (2") IN DIAMETER BUT LESS THAN 975mm (39") WHERE THE COVER IS LESS THAN 375mm (15") AND FOR RCP 975mm (39") OR GREATER WHERE THE COVER IS LESS THAN 300mm (12"). CONCRETE BACKFILL SHALL BE IN ACCORDANCE WITH NOTES 5 AND 6.

8. 3-EDGE BEARING TEST LOAD FACTOR = 1.0.

9. DIMENSIONS SHOWN ON THIS PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACT EQUAL VALUES. IF METRIC VALUES ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.
REPLACE PCC Pavement

WHERE PORTLAND CEMENT CONCRETE PAVEMENT OR BITUMINOUS PAVEMENT EXISTS, REPLACE WITH THE APPLICABLE STRUCTURAL SECTION SHOWN HEREON. WHERE CONSTRUCTION IS PERFORMED BENEATH UNPAVED SHOULDER AREAS, THE BACKFILL SHALL BE PLACED UP TO THE ORIGINAL GROUND SURFACE.

REPLACE PCC PAVEMENT

230mm (9") UNIFORM THICKNESS

PLACE AGGREGATE SUBBASE MATERIAL TO RELATIVE COMPACTION OF 95%.

PLACE MATERIAL TO RELATIVE COMPACTION OF 95%.

REPLACE PCC PAVEMENT

300mm (12") MIN.

W=300mm (12") MIN.

BEDDING B, SEE NOTE 7

PORTLAND CEMENT CONCRETE PAVEMENT

RCP SECTION
(BENEATH ANY ROADBED)

CONSTRUCT PAVEMENT SECTION AS INDICATED FOR RC PIPES SECTION ABOVE.

PLACE BACKFILL TO RELATIVE COMPACTION OF 95%, SEE NOTE 7.

PORTLAND CEMENT CONCRETE PAVEMENT

RCB SECTION
(BENEATH ANY ROADBED)

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

PAVEMENT REMOVAL, EXCAVATION, BACKFILL AND RESURFACING IN STATE HIGHWAYS

STANDARD PLAN METRIC

3081-1

APPROVED

DIRECTOR OF PUBLIC WORKS

DATE

REVISIONS

SHEET 1 OF 2
NOTES

1. AT TIME OF EXCAVATION OPERATIONS ALL PORTLAND CEMENT CONCRETE WEARING SURFACES AND PORTLAND CEMENT CONCRETE BASES SHALL BE CUT 40mm (1 1/2") DEEP WITH A PAVEMENT SAW PRIOR TO BREAKING. AT TIME OF RESURFACING OPERATIONS ALL PORTLAND CEMENT AND BITUMINOUS TYPE WEARING SURFACES SHALL BE CUT 40mm (1 1/2") DEEP WITH A PAVEMENT SAW AND TRIMMED IN ACCORDANCE WITH THE ADDITIONAL PROVISIONS OF THE STANDARD SPECIFICATIONS AS AMENDED AND/OR THE SPECIAL PROVISIONS OF THE SPECIFICATIONS.

2. IF SIDE WALLS CAVE IN:
   A. FOR LONGITUDINAL CUT, EXCAVATE TO SURFACE AND 300mm (12") INTO UNDISTURBED MATERIAL, OR TO NEXT PAVEMENT JOINT IF WITHIN IN (3').
   B. FOR TRANSVERSE CUTS EXCAVATE TO SURFACE AND 300mm (12") INTO UNDISTURBED MATERIAL, OR TO NEXT PAVEMENT JOINT IF WITHIN 1.5M (5').

3. WHERE EXISTING PAVEMENT STRUCTURAL SECTION CONSISTS OF PORTLAND CEMENT CONCRETE WITH A BITUMINOUS WEARING SURFACE, REPLACE IN KIND.

4. USE BITUMINOUS SECTION FOR ALL PAVED SHOULDERS, UNLESS OTHERWISE SPECIFIED.

5. UNLESS OTHERWISE SPECIFIED, EXISTING UNPAVED Shoulders SHALL NOT BE PAVED.

6. WHERE CEMENT TREATED BASE IS ENCOUNTERED, REPLACEMENT SHALL BE IN ACCORDANCE WITH THE ADDITIONAL PROVISIONS OF THE "GRAY BOOK" AND/OR THE SPECIAL PROVISIONS OF THE SPECIFICATIONS.

7. ADDITIONAL CONSTRUCTION REQUIREMENTS FOR PAVEMENT REMOVAL, EXCAVATION, BACKFILL, BEDDING, AND RESURFACING IN OR BEneath PAVED ROADBEDS, ARE SPECIFIED IN THE ADDITIONAL PROVISIONS OF THE "GRAY BOOK" AND/OR THE SPECIAL PROVISIONS OF THE SPECIFICATIONS AND STANDARD PLAN 3080, CASE 3.

8. REQUIREMENTS FOR CONSTRUCTION IN OR BEneath MEdIAN STRIPS AND OTHER AREAS NOT BEneath ROADBEDS ARE SPECIFIED IN THE ADDITIONAL PROVISIONS OF THE "GRAY BOOK" AND/OR THE SPECIAL PROVISIONS OF THE SPECIFICATIONS.

9. WHERE COVER IS GREATER THAN 3M (10'), W MEASURED AT THE TOP OF THE PIPE SHALL NOT BE GREATER THAN 300mm (12") UNLESS THE CONTRACTOR AT HIS OWN EXPENSE PROVIDES CASE ! BEDDING IN ACCORDANCE WITH STANDARD PLAN 3080 OR STRONGER PIPE. THESE DIMENSIONS INCLUDE THE THICKNESS OF ANY SHEETING.

10. DIMENSIONS SHOWN ON THIS PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACT EQUAL VALUES. IF METRIC VALUES ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.
NOTE: DIMENSIONS SHOWN ON THIS PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACT EQUAL VALUES. IF METRIC VALUES ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.
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<tr>
<td>1</td>
<td>INDEX TO DRAWINGS</td>
</tr>
<tr>
<td>2</td>
<td>GENERAL NOTES, STRUCTURAL NOTES AND DESIGN DATA</td>
</tr>
<tr>
<td>3</td>
<td>BARRIER WALL DETAILS AND STRUT DETAILS</td>
</tr>
<tr>
<td>4</td>
<td>END ANCHORAGE DETAILS, TYP. ROCK ABUTMENT AND SLOPING ALTERNATE</td>
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<td>GROUTED ROCK AT ABUTMENTS AND ATTACHMENT DETAILS</td>
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<td>6</td>
<td>LOW FLOW DETAIL</td>
</tr>
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<td>7</td>
<td>REMOVABLE PANEL</td>
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GENERAL NOTES

1. CONSTRUCTION SHALL NOT BE STARTED UNTIL PROJECT ENGINEER HAS VERIFIED BARRIER LOCATION IN THE FIELD.
2. FOOTING SHALL NOT BE POUR ED UNTIL PROJECT ENGINEER AND/OR DEPARTMENT GEOLOGIST HAS EXAMINED FOOTING AND KEY EXCAVATION.
3. PLANKS ABOVE A HEIGHT OF H/2 SHALL NOT BE PLACED UNTIL FOOTING CONCRETE HAS CURED FOR 7 DAYS.
4. ON PROJECTS WHERE AN ACCESS ROAD TO THE BACK OF BARRIER IS NOT PROVIDED, CONSTRUCT REMOVABLE PANEL AS SHOWN ON SH. 7.
5. ALL RAILS ARE STANDARD 60 LBS./YD. ASCE RAILROAD RAILS.

STRUCTURAL NOTES

1. DIMENSIONS FROM FACE OF CONCRETE TO REINFORCING STEEL ARE TO CENTER OF BAR AND SHALL BE 2" UNLESS OTHERWISE SHOWN.
2. PLACING OF CONCRETE REINFORCING STEEL SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE'S "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE", 1988 EDITION, SECTION 7.3.
3. REINFORCING STEEL MAY BE SPLICED USING A 30 BAR DIAMETER LAP STAGGERED 30 BAR DIAMETERS.
4. REINFORCING STEEL SHALL BE IN ACCORDANCE WITH ASTM A 615, GRADE 60.
5. STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH ASTM A 36.
6. BASE OF RAIL SHALL FACE UPRIGHT.
7. W 5 x 16 STRUCTURAL STEEL SECTIONS MAY BE SUBSTITUTED FOR 60° RAILS.
8. STRUTS MAY BE DELETED FOR SECTIONS WITH WALL HEIGHTS 4"-6" OR LESS.
9. A RAIL SHALL BE PLACED AT EACH SIDE OF THE SPILLWAY.
10. BOLTS SHALL BE IN ACCORDANCE WITH ASTM A 325 EXCEPT FOR BOLTS USED WITH TIMBER WHICH SHALL BE IN ACCORDANCE WITH ASTM A 307. WASHERS USED WITH TIMBER SHALL BE MALLEABLE IRON.
11. TIMBER SHALL BE DOUGLAS FIR-LARCH NO. 3 OR BETTER, TREATED WITH AMONIACAL COPPER ZINC IN ACCORDANCE WITH SUBSECTION 204-2.
12. PLANKS SHALL BE BOLTED TO RAILS AT EACH END AND AT INTERVALS NOT TO EXCEED 9'-0".
13. PLANKS SHALL BE SPLICED AT EACH END. SPLICES SHALL BE LOCATED HALFWAY BETWEEN RAILS AND SHALL BE STAGGERED. SPLICES SHALL BE MADE WITH AN 18" LONG PLANK BOLTED WITH 2-3/8" BOLTS 5' FROM THE CENTER ON EACH SIDE OF THE SPLICE.

DESIGN DATA

LOADS

| EQUIVALENT FLUID PRESSURE | 90#/FT^3 |
| DEPTH OF FLOW OVER STRUCTURE | 2 FT |
| BEARING PRESSURE | 2000#/FT^2 |

ALLOWABLE STRESSES (INCREASE ALL STRESSES BY 1/3)

\[
\begin{align*}
\frac{f}{c} & = 3,250 \text{ PSI} @ 28 \text{ DAYS} \\
\frac{f}{c} & = 1,460 \text{ PSI} \\
\frac{f}{s} & = 24,000 \text{ PSI (GRADE 60)} \\
\text{SHEAR AND BOND STRESSES PER ACI 318.88} \\
\text{STRUCTURAL STEEL STRESSES PER AISC. 7TH ED.} \\
\text{TIMBER STRESSES PER NDS, 1982 ED.}
\end{align*}
\]

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

BARRIER - RAIL AND TIMBER

GENERAL NOTES, STRUCTURAL NOTES AND DESIGN DATA

STANDARD PLAN

3085-1

SHEET 2 OF 7
### STRUT

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<tr>
<th>SECT.</th>
<th>WALL HT.</th>
<th>H3</th>
<th>H5</th>
<th>X</th>
<th>Y</th>
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### DIMENSION TABULATION

#### BARRIER WALL

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<tr>
<th>WALL DETAILS</th>
<th>SECTIONS</th>
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<tr>
<td>WALL HT.</td>
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<tr>
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<tr>
<td>KEY DEPTH</td>
<td>H</td>
</tr>
<tr>
<td>SLAB THICK.</td>
<td>H</td>
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<td>H</td>
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<tr>
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<tr>
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<td>W</td>
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</tr>
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<td>BI BAR</td>
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</tr>
<tr>
<td>B2 BAR</td>
<td>NO.</td>
</tr>
<tr>
<td>B3 BAR</td>
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### SECTION TABULATION

- For wall height less than 7'-0", values for WI & W3 are proportional to the tabulated values for 7'-0".

### BARRIER WALL DETAIL

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

BARRIER - RAIL AND TIMBER

BARRIER WALL DETAILS AND STRUT DETAILS

STANDARD PLAN

3085-1

SHEET 3 OF 7
A (SH. 5)

5' OF 12" GROUTED ROCK OR 8'' GUNITE

FINISHED GRADE
EXISTING GROUND LINE

60° RAIL, TYP.

END WALL

*+80°24" EACH WAY
FOR 6' > 4'
+80°24" FOR
6' < 4'

12" (TYP.)

3' x 12" HEADER

L 4 x 4 OR EQUIV.

1/2" BOLT
Ø 4'-0"

DETAIL "A"

NOTE:
REFER TO PROJECT DRAWING WALL ELEVATION
VIEW FOR DIMENSIONS a AND b.

ELEVATION

4'-0" MAX.

IST. RAIL

EXISTING GROUND LINE

d DETAIL "E"

TOP OF BARRIER

FIRM FOUNDATION MATERIAL
AS DETERMINED BY PROJECT
ENGINEER OR ENGINEERING
GEOLOGIST

ABUTMENT
MAIN BARRIER

STRUCTURAL DETAILS AS CALLED OUT FOR
STEP* ABUTMENT, SLAB AND KEY DEPTH
MEASURED NORMAL TO SLOPE, TAPER
DEPTHS UNIFORMLY FROM TOP TO BOTTOM

NOTE:
TO BE USED ONLY WHERE BASE SLAB
SLOPE IS 1/12 TO 1 OR FLATTER.

END ANCHORAGE
FOR SLOPING ALTERNATE

TYPICAL END ANCHORAGE

END ANCHORAGE
FOR ROCK ABUTMENT

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

BARRIER - RAIL AND TIMBER
END ANCHORAGE DETAILS, TYP.
ROCK ABUTMENT AND SLOPING ALTERNATE

STANDARD PLAN

3085-1

SHEET 4 OF 7
ALTERNATE ATTACHMENT DETAIL

TYPICAL ATTACHMENT DETAIL

ATTACHMENT DETAILS

SECTION A-A (SH.4)

GROUTED ROCK AT ABUTMENTS

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

BARRIER - RAIL AND TIMBER
GROUTED ROCK AT ABUTMENTS AND ATTACHMENT DETAILS

STANDARD PLAN 3085-1
SHEET 5 OF 7
LONGITUDINAL SECTION

NOTES:

1. CONCRETE BACKFILL, KEY, AND FTG. SLAB MAY BE POURED MONOLITHICALLY.
2. PIPE IN BARRIER SHALL BE SPACED AT A CLEAR DISTANCE EQUAL TO 2/3 OF THE CSP DIAMETER.
3. REFER TO PROJECT DRAWINGS FOR LOCATION AND SIZE OF CSP (NOT REQUIRED FOR ALL WALLS).

LOW FLOW DETAIL

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

BARRIER - RAIL AND TIMBER

LOW FLOW DETAIL
**DETAIL "C"**

- PL 3/8 x 10' 0" - 10' 0"
- TOP OF FOOTING
- TS 7 x 7 x 0.0208
- 1/2" MIN.
- HIGH STRENGTH GROUT
- TS 6 x 6 x 0.1875
- 1/4" WELD BEAD
  4-EACH SIDE
  (FULL FACE)
- PL 3/8 x 10' 0" - 10' 0"

**DETAIL "D"**

- 60° RAIL
- 2-3/4" x 2 1/2"
- BOLTS
- HIGH STRENGTH GROUT
- PL 1/2 x 2 1" - 0"
- SAW CUT
- 1 1/4" Ø x 5" PIN
  W/COTTER PIN IN 1 1/2" HOLE
  GRIND PIN TO TAPER TO 1"

**PLAN**

- REMOVABLE PANEL
- RAILS, STRUTS NOT SHOWN
- BOILER TUBE CROSS BRACE
  WELD TO ALL RAILS

**NOTES:**

1. BOLT ALL PLANKS TO ALL RAILS IN THE REMOVABLE PANEL AND TO EXTERIOR RAIL ADJACENT TO EACH SIDE OF PANEL.
2. STRUT RAILS AT THE SPLICE ARE TO BE SAW CUT AT RIGHT ANGLES TO THE LONGITUDINAL AXIS (DO NOT BURN). SEGMENTS ARE NOT TO BE INTERCHANGED.
3. RAILS IN EXCESS OF 4 3/8" DEEP SHALL BE OFFSET IN THE TS 6 x 6 AND SHALL HAVE BOTTOM FACE OF RAIL WELDED TO TUBE WALL, TOP AND BOTTOM.
4. WHEN REMOVING PANEL FOR CLEANOUT PURPOSES, SPLICE PLATES SHALL NOT BE REMOVED UNTIL LIFTING EQUIPMENT IS IN PLACE. ONCE LIFTING IS BEGUN, LIFTING EQUIPMENT SHALL REMAIN ATTACHED UNTIL REMOVAL IS COMPLETE.
5. STANDARD 1 1/2" DIAMETER STEEL PIPE MAY BE USED IN LIEU OF BOILER TUBE.

---

**BARRIER-RAIL AND TIMBER REMOVABLE PANEL**

**LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS**

**BARRIER - RAIL AND TIMBER REMOVABLE PANEL**

**STANDARD PLAN**

**3085-1**

**SHEET 7 OF 7**
Typical Elevation:

16" spreader at each post, fasten to posts with 9-gage galvanized wire. See detail "A", SH. 2.

Lateral braces to be placed at end posts and angle post, 16'-0" OC, at inlet structures, or as directed by the engineer. See Note 7, SH. 3. Braces shall contact opposite sides of vertical pipe posts.

Typical Section:

Los Angeles County Department of Public Works

Open Channel - Revetment

Double Pipe and Wire

Page 1 of 3

3086-0

Approved

Thomas A. Dickinson
Director of Public Works

5/31/1992

Date

Revisions
NOTES

1. HEIGHT H IS SHOWN ON THE PROJECT DRAWINGS.

2. LENGTH OF POSTS SHALL BE 2H OR 10'-0" WHICHEVER IS GREATER.

3. LENGTH OF LATERAL BRACES SHALL BE 1.5H OR 10'-0" WHICHEVER IS GREATER.

4. POSTS, BRACES, AND SPREADERS SHALL BE 2 1/4" OD BOILER TUBE, 2" NOMINAL DIAMETER GALVANIZED STEEL PIPE OR EQUIVALENT.

5. WIDTHS OF WOVEN WIRE FENCING VARY, DE pending ON HEIGHT H.

6. BOILER TUBE MAY BE USED MATERIAL IF IT IS IN GOOD CONDITION AND QUALITY OF MATERIAL IS ACCEPTABLE TO THE ENGINEER. THE CONTRACTOR SHALL SUBMIT A REPRESENTATIVE SAMPLE TO DEMONSTRATE QUALITY AND CONDITION OF USED MATERIAL FOR THE ENGINEER TO DETERMINE ACCEPTABILITY.

7. LATERAL BRACES SHALL BE REQUIRED AT 8'-0" OC IN UNSTABLE AREAS. REFER TO PROJECT DRAWINGS FOR AFFECTED REACH.
CASE 2
SUBDRAINAGE PLAN
DOUBLE DRAIN (ONE EACH SIDE) AND MANHOLE EACH SIDE

SECTION 8-8

SECTION 9-9

SECTION 10-10

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SUBDRAINAGE SYSTEM FOR RC RECTANGULAR OPEN CHANNEL CASE 2

STANDARD PLAN 3087-2

SHEET 3 OF 8
CASES 1, 2 & 3
SECTION 6-6 (SH. 2, 4 & 7)

NOTE:
ADD #8 AS SHOWN. TOP AND BOTTOM FACES. TYPICAL CHANNEL WALL AND BASE SLAB REINFORCEMENT NOT SHOWN. CUT TYPICAL WALL BASE SLAB REINFORCEMENT 2" CLEAR OF MANHOLE FRAME. REINFORCEMENT SHOWN IS TYPICAL FOR MANHOLES.

TYPICAL CHANNEL WALL AND BASE SLAB REINFORCEMENT NOT SHOWN
ROUGHENED CONSTRUCTION JOINT

OPTIONAL ROUGHENED CONSTRUCTION JOINT

SECTION 6A-6A

SECTION 7A-7A

Los Angeles County Department of Public Works
Subdrainage System for RC Rectangular Open Channel Case 2

Standard Plan 3087-2
Sheet 5 of 8
SECTION 15-15 (SH. 6)

INVERT SLAB REINFORCEMENT NOT SHOWN

SECURE FLAP GATE TO 6" ADAPTOR FLANGE WITH 1/2" Ø CAP SCREWS

12" WIDE X 15" HIGH X 5" DEEP RECESS FOR 6" FLAP GATE

6" ADAPTOR B/F

12" MIN.

FILTER MATERIAL A

FILTER MATERIAL B

DRAIN MATERIAL

6" PERFORATED COLLECTOR PIPE

FILTER MATERIAL B

FILTER MATERIAL A

6" FLAP GATE

6" ADAPTOR B/F

& MANHOLE FRAME AND COVER

CHANNEL INVERT

6" ADAPTOR B/F

16 (SH. 5)

FLOW

FLOW

GATE BOXES WITH 2 FLAP GATES EACH

SECTION 16-16 (SH. 6)

REINFORCEMENT NOT SHOWN. SEE SH. 5

SUBDRAINAGE OUTLET 6" CAST IRON PIPE

7-STEEL STEPS AT 12" PER STD. PLAN 633

REINFORCEMENT NOT SHOWN. SEE SH. 5

MANHOLE, FOR LOCATION, SEE PLAN AND PROFILE. PROJECT DRAWINGS

SECTION 17-17

SUBDRAINAGE OUTLET

COMPANION FLANGE WITH PLUG

GATE BOXES WITH 2 FLAP GATES EACH

CORNER FITTING ON ONE SIDE OF CHANNEL ONLY. EXTEND ADAPTOR TO CLEAR EDGE OF BOX, AS SHOWN

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SUBDRAINAGE SYSTEM FOR RC RECTANGULAR OPEN CHANNEL CASE 3

STANDARD PLAN 3087-2

SHEET 7 OF 8
NOTES

CASES

1. CASE 1, 2, OR 3 SHALL BE USED AS INDICATED ON THE PROJECT DRAWINGS.

FILTER AND DRAIN MATERIAL, SUBDRAIN PIPE

2. DRAIN MATERIAL, FILTER MATERIAL A AND FILTER MATERIAL B, AND SUBDRAIN PIPE SHALL BE EITHER NON-REINFORCED CONCRETE PIPE, VITRIFIED CLAY PIPE, ABS SOLID WALL PIPE, ABS OR PVC COMPOSITE PIPE, PVC PLASTIC PIPE, OR POLYETHYLENE (PE) SOLID WALL PIPE, AND SHALL MEET THE REQUIREMENTS OF THE STANDARD SPECIFICATIONS AND/OR THE SPECIAL PROVISIONS OF SPECIFICATIONS.

SUBDRAIN MANHOLES AND APPURTENANCES

3. AUTOMATIC FLAP GATES
   THE FLAP GATES SHALL BE FLAT BACK, ADJUSTABLE, INCLINED FACE, AUTOMATIC FLAP GATES, DESIGNED FOR SEATING HEAD OF NOT LESS THAN 20' AND SHALL MEET THE REQUIREMENTS OF ADDITIONAL PROVISIONS OF THE "GRAY BOOK" AND/OR THE SPECIAL PROVISIONS OF SPECIFICATIONS.

   THE BELL AND FLANGED ADAPTORS, COMPANION FLANGES, AND GATE BOXES SHALL BE CAST FROM GRAY IRON, ASTM A 48, CLASS 30.

5. SUBDRAINAGE MANHOLE APPURTENANCES AND FITTINGS WHEN TYPE II FLAP GATE USED EXCEPT FOR THE BELL AND FLANGED ADAPTORS AND COMPANION FLANGES, THE BELL AND SPIGOT OUTLET PIPES AND FITTINGS SHALL BE CAST IRON, AWWA C 100, CLASS D, OR AWWA C 110.

6. SUBDRAINAGE MANHOLE APPURTENANCES AND FITTINGS-MISCELLANEOUS
   THE FLANGED END OF THE ADAPTORS SHALL BE DRILLED AND TAPPED TO RECEIVE 4-1/2" CAP SCREWS; SAID HOLES SHALL BE LOCATED TO MATCH THE HOLES PROVIDED IN THE FLAP GATES.
   THE COMPANION FLANGES SHALL BE DRILLED WITH 9/16" HOLES TO MATCH THE DRILLED AND TAPPED HOLES IN THE FLANGED END OF THE ADAPTORS.
   THE CONTRACTOR SHALL SUBMIT DETAILED SHOP DRAWINGS OF THE GATE BOXES FOR APPROVAL BY THE DEPARTMENT PRIOR TO CASTING.
   A DEPARTMENT APPROVED TYPE OF WATERPROOF, NEOPRENE GASKET SHALL BE PLACED BETWEEN THE ADAPTORS AND THE FLAP GATES, GATE BOXES OR COMPANION FLANGES, AS THE CASE MAY BE.
   ALL BOLTS, NUTS AND OTHER FASTENERS TO BE USED WITH THE ADAPTORS, COMPANION FLANGES AND GATE BOXES SHALL BE FABRICATED FROM TYPE 316 STAINLESS STEEL, OR EQUIVALENT.
   THE COMPANION FLANGE PLUG SHALL BE MADE FROM TYPE 316 STAINLESS STEEL, OR EQUIVALENT.
   THE PRESSURE MANHOLE FRAME AND COVER SHALL BE IN ACCORDANCE WITH APWA STANDARD PLAN 2111 EXCEPT THAT THE MANHOLE FRAME SHALL BE EMBEDDED IN THE INVERT SLAB ELIMINATING THE NEED FOR THE 5/8" BY 8" ANCHOR BOLTS.
   THE SCREW STUDS REQUIRED TO HOLD THE STEEL PRESSURE PLATES SHALL BE STEEL.

7. EPOXY COATING SHALL BE BY THE FUSION PROCESS USING 100 PERCENT POWDER EPOXY RESINS, OR BY A DEPARTMENT APPROVED EQUAL EPOXY SYSTEM.

8. A PRECAST SUBDRAINAGE MANHOLE MAY BE USED SUBJECT TO THE WRITTEN APPROVAL OF THE ENGINEER.
CASE 1
VERTICAL

CASE 2
SLOPING

ZONE A
SYM. ABOUT \( \phi \)
53° .75:1 OR \( \phi \), WHICHEVER IS LESS

ZONE B

CASE 3
COMBINED

CASE 4
SHIELD

CASE 5
BEAM PENETRATION

NOTE:
IF THE TRENCH WALLS ARE SLOPED, \( K_w = 25 \) VALUES MAY BE REDUCED BY THE
PERCENTAGES TABULATED BELOW. FOR \( K_w \) VALUES OTHER THAN 25 THE PERCENT-
AGE REDUCTION SHALL VARY UNIFORMLy FROM 0 AT A VERTICAL SLOPE TO 100
AT A SLOPE EQUAL TO THE ANGLE OF REPOSE OF THE SOIL BUT NOT GREATER
THAN THE REDUCTION SHOWN FOR \( K_w = 25 \).

SLOPE RATIO
(HORIZONTAL TO VERTICAL)

<table>
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<tr>
<th>SLOPE RATIO</th>
<th>PERCENTAGE REDUCTION</th>
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<tr>
<td>1:5.1 TO VERTICAL</td>
<td>0</td>
</tr>
<tr>
<td>1:2.1 TO 1:5</td>
<td>33</td>
</tr>
<tr>
<td>.75:1.1 TO 1:2</td>
<td>67</td>
</tr>
<tr>
<td>HORIZONTAL TO .75:1</td>
<td>100</td>
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LEGEND

P = UNIT PRESSURE IN PSF
P1 = UNIT PRESSURE IN PSF
(USE \( K_w \) VALUE REQUIRED BY THE SLOPE)
P2 = UNIT PRESSURE IN PSF (VERTICAL PORTION), VARIED FROM A VALUE
EQUAL TO .8KWH WHEN \( \phi = 90^\circ \) TO A VALUE EQUAL TO .8Kw [h+1.25(H-h)]
TAN \( \phi \) WHEN \( \phi = 53^\circ \)
K = COEFFICIENT OF ACTIVE EARTH PRESSURE
w = UNIT WEIGHT OF SOIL IN PCF
H = DEPTH OF EXCAVATION IN FEET
h = DEPTH OF VERTICAL PORTION OF EXCAVATION IN FEET
\( \phi \) = EXCAVATION ANGLE. NO SHORING IS REQUIRED AT THE ANGLE OF REPOSE
AT WHICH THE SOIL WILL SAFELY STAND, BUT IN NO CASE SHALL THIS
ANGLE BE GREATER THAN 53°
D = DEPTH OF PENETRATION IN FEET
Fp = RESULTANT FORCE IN POUND PER FOOT OF BEAM WIDTH
x = DISTANCE TO \( F_p \) FROM SUBGRADE IN FEET

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

CRITERIA FOR THE DESIGN
OF SHORING FOR EXCAVATIONS

STANDARD PLAN
METRIC
3090-1

APPROVED: Thomas A. Pfeiffer
DIRECTOR OF PUBLIC WORKS
DATE: 5/31/1992
REVISIONS: 1999

SHEET 1 OF 4
GENERAL MINIMUM REQUIREMENTS

DESIGN

1. A SHORING SYSTEM SHALL CONSIST OF MAIN HORIZONTAL AND VERTICAL BRACING THAT WILL FUNCTION AS A TEMPORARY EARTH SUPPORTING STRUCTURE, SUPPORT FOR EXISTING IMPROVEMENTS, AND FOR PROTECTION OF WORKERS. SHORING FOR EXCAVATIONS SHALL BE DESIGNED TO WITHSTAND NOT LESS THAN THE LOADS INDICATED ON SHEET 1 AND SHALL COMPLY WITH THE STATE OF CALIFORNIA, DEPARTMENT OF INDUSTRIAL RELATIONS, CONSTRUCTION SAFETY ORDERS UNLESS MODIFIED ON THIS DRAWING OR IN THE SPECIAL PROVISIONS OF THE SPECIFICATIONS.

A. SOIL PARAMETERS Kw

Kw IS THE PRODUCT OF THE COEFFICIENT OF ACTIVE EARTH PRESSURE (K) AND THE UNIT WEIGHT OF SOIL (w). VALUES OF Kw SHALL NOT BE LESS THAN NOTED IN THE SPECIAL PROVISIONS OF THE SPECIFICATIONS.

B. VERTICAL OR HORIZONTAL SHORES

SHORES SHALL BE DESIGNED FOR P = 0.8KwH UNLESS SOLID SUPPORT SHORES ARE USED IN WHICH CASE P = 0.6KwH MAY BE USED. SHORES SHALL NOT BE LESS THAN 50mm(2") THICK AND 200mm(8") WIDE, SPACED A MAXIMUM OF 2.5m (9'-0") OC HORIZONTALLY, AND EXTEND FROM TOP TO BOTTOM OF EXCAVATION. WHEN PILERS ARE USED FOR VERTICAL SHORES, THE EMBEDMENT LENGTH AND ANY ANCHOR DETAILS SPECIFIED MUST BE SUPPORTED BY CALCULATIONS. RESULTANT FORCE Fp SHALL BE PER SUBSECTION 306-1.1.6.2 AS AMENDED.

DEFINITIONS

1. SHEETING - A WALL OF PLANKS PLACED AGAINST THE TRENCH EARTH FACE, SPANNING VERTICALLY BETWEEN HORIZONTAL SUPPORTS.

2. LAGGING - A WALL OF PLANKS PLACED AGAINST THE TRENCH EARTH FACE, SPANNING HORIZONTALLY BETWEEN VERTICAL SUPPORTS.

3. TYPE A SOLID SUPPORT SHORES - EITHER CONTINUOUS ABUTTING SHEETING OR LAGGING (LAGGING MAY BE INTERMITTENTLY SPACED IF THE LOAD CONDITIONS PERMIT) PLACED IMMEDIATELY AFTER THE EXCAVATION REACHES THE SUBGRADE.

4. TYPE B SOLID SUPPORT SHORES - EITHER ABUTTING SHEETING OR ABUTTING LAGGING PLACED IMMEDIATELY SUBSEQUENT TO EXCAVATION AND ESTABLISHMENT OF THE TRENCH WALL. IN NO CASE SHALL THE DEPTH OF THE UNSUPPORTED TRENCH WALL EXCEED 600mm(24").

C. HORIZONTAL BRACES OR STRUTS

STRUTS SHALL BE DESIGNED FOR P = 0.8KwH AND A 1780N(400 LB.). CONCENTRATED LOAD AT THE CENTER LINE. HORIZONTAL SPACING OF BRACES OR STRUTS SHALL NOT EXCEED 2.5m(9'-0") OC, UNLESS AN APPROVED WALER SYSTEM IS UTILIZED. THE WALERS MUST BE OF SUFFICIENT STRENGTH TO SUSTAIN THE LOADS APPLIED FROM THE VERTICAL MEMBERS, AND BE OF SUFFICIENT STIFFNESS TO MINIMIZE DEFLECTIONS OF THE VERTICAL MEMBERS.

TO FACILITATE PLACEMENT OF PIPE THE CONTRACTOR MAY:

1. REMOVE THE CROSS BRACING BELOW THE LEVEL OF THE TOP OF THE PIPE. REMOVAL OF BRACING SHALL BE LIMITED TO A DISTANCE OF 4m(14'-0") IN ADVANCE OF THE PLACEMENT OF PIPE.

2. REMOVE AN ENTIRE-vertical shoring set provided that the maximum spacing between the remaining sets does not exceed 4m(14'-0") OC.

3. IF ITEMS 1 OR 2 ABOVE ARE USED, WORKERS WILL NOT BE PERMITTED IN THAT PORTION OF THE TRENCH WHERE THE SUPPORT HAS BEEN REMOVED.

IMMEDIATELY SUBSEQUENT TO PLACEMENT OF THE PIPE THE CONTRACTOR SHALL REPLACE THE VERTICAL SHORING SET PREVIOUSLY REMOVED WITH A SET DESIGNED TO SUPPORT THE EXCAVATION WALL FROM THE TOP OF THE PIPE TO THE GROUND SURFACE. TO FACILITATE CONSTRUCTION OF Poured-in-PLACE STRUCTURES THE 1.5m(5') LIMITATION NOTED IN THE CONSTRUCTION SAFETY ORDERS ON SPACING OF CROSS BRACING WILL BE WAIVED FOR THE AREA BELOW THE TOP OF THE STRUCTURE.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

CRITERIA FOR THE DESIGN OF SHORING FOR EXCAVATIONS

STANDARD PLAN METRIC

3090-1 • SHEET 2 OF 4
D. WALERS OR STRINGERS

WALERS SHALL BE DESIGNED FOR P = .8kwh. SPECIAL ATTENTION SHALL BE EXERCISED IN DESIGNING FOR HORIZONTAL SHEAR AND FOR THE CONDITION WHERE INTERMEDIATE WALERS AND/OR CROSS BRACING ARE REMOVED.

E. EXISTING IMPROVEMENTS AND SURCHARGE LOADS

ALL EXISTING IMPROVEMENTS MUST BE CONSIDERED IN THE DESIGN OF THE SHORING SYSTEM AND PROTECTED IN PLACE UNLESS OTHERWISE INDICATED ON THE PROJECT DRAWINGS OR SPECIFICATIONS. PARALLEL UTILITIES EXCEPT FOR METALLIC CONDUITS USED FOR THE PURPOSE OF CONTAINING ELECTRICAL CABLES AND PIPES 100mm(4") OR LESS IN DIAMETER USED FOR LOW PRESSURE GAS DISTRIBUTION SYSTEMS OUTSIDE OF THE LIMITS OF VERTICAL EXCAVATIONS MUST NOT BE EXPOSED BY USING SLOPING EXCAVATIONS. ALSO, EXISTING IMPROVEMENTS SHALL NOT IMPOSE ADVERSE LOADS ON THE SHORING OR BE SUBJECTED TO ADVERSE LOADS CAUSED BY THE SHORING IN ADDITION TO THE EARTH LOADS. THE SHORING SYSTEM MUST SUSTAIN LOADS IMPOSED BY TRAFFIC CONSTRUCTION EQUIPMENT, ADJACENT STRUCTURES, OR ANY OTHER SURCHARGE LOADS. THE LOAD IMPOSED ON THE SHORING SYSTEM BY NORMAL STREET VEHICULAR TRAFFIC MAY BE ASSUMED TO BE EQUAL TO THE LOAD IMPOSED BY 600mm(24") OF EARTH.

2. DIMENSIONS SHOWN ON THIS PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACT EQUAL VALUES. IF METRIC VALUES ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.

MATERIALS GENERAL

ALL MATERIALS USED FOR SHORING, SHEETING, AND LAGGING IN COMPLYING WITH THE PROVISIONS OF THIS STANDARD DRAWING, MAY BE NEW OR USED BUT SHALL BE FREE FROM DEFECTS AND DAMAGE THAT MIGHT IN ANY WAY IMPAIR THEIR PROTECTIVE FUNCTION. ALLOWABLE STRESSES SPECIFIED IN THE PUBLICATIONS LISTED HEREON MAY BE INCREASED BY 1/3.

A. LUMBER

DESIGN FOR LUMBER SHALL BE IN ACCORDANCE WITH NATIONAL DESIGN SPECIFICATIONS FOR STRESS-GRADE LUMBER. THE GRADE OR STRUCTURAL PROPERTIES OF LUMBER USED FOR SHORING, SHALL CORRESPOND TO THAT SPECIFIED IN CURRENT STANDARD GRADING AND DRESSING RULES OR THE WEST COAST LUMBER INSPECTION BUREAU. ALL LUMBER MUST BEAR THE GRADE STAMP. USED MATERIAL MAY BE DESIGNED IN ACCORDANCE WITH THE STANDARD GRADING AND DRESSING RULES IN EFFECT AT THE TIME THE LUMBER WAS GRADED. THE MAXIMUM PERMISSIBLE FLEXURAL STRESS SHALL NOT EXCEED 15MPa(2000 PSI). THE 15MPa(2000 PSI) STRESS LIMITATION INCLUDES THE 1/3 INCREASE NOTED ABOVE. NON-STRESS GRADE LUMBER FOR SOLID SUPPORT SHORES MAY BE USED WHEN Kw ≤ 4710N/m²(300 CF). PROVIDING THE FOLLOWING THICKNESS AND SPACING REQUIREMENTS ARE OBSERVED.

| MINIMUM ROUGH | MAXIMUM Vertical | MAXIMUM Horiz. |
| SHEETING OR | SPACING OF WALLERS | SPACING OF UPRIGHTS |
| LAGGING | FOR SOLID SHEETING | FOR LAGGING |
| 50mm(2") | 1m(4'-0") | 1m(4'-0") |
| 80mm(3") | 2m(7'-0") | 2m(7'-0") |

HOWEVER, THE MINIMUM ROUGH THICKNESS AND MAXIMUM SPACING TABULATED ABOVE FOR NON-STRESS GRADE LUMBER MAY BE DISREGARDED PROVIDED STRESS GRADE LUMBER OR STEEL IS DESIGNED TO BE USED FOR SOLID SUPPORT SHORES.

B. STRUCTURAL STEEL

DIMENSIONS, PROPERTIES, AND DESIGN SHALL BE IN ACCORDANCE WITH THE CURRENT AISC MANUAL OF STEEL CONSTRUCTION.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

CRITERIA FOR THE DESIGN OF SHORING FOR EXCAVATIONS

STANDARD PLAN

METRIC

3090-1

SHEET 3 OF 4
GENERAL MINIMUM REQUIREMENTS (CONT.)

C. SPECIAL SHORING SYSTEMS

SYSTEMS SUCH AS SPEED-SHORE, TREN-SHORE, ETC., WILL BE ALLOWED ONLY IF THE CONTRACTOR FILES OR HAS FILED WITH THE DEPARTMENT SUBSTANTIATING CERTIFIED TESTS CLEARLY DENOTING THE CAPACITY OF THE SYSTEM. UNTESTED MEMBERS OF SPECIAL SYSTEMS, COMPOSITE MEMBERS, BUILT-UP MEMBERS, ETC., MUST BE THEORETICALLY DESIGNED. VERTICAL SHORES MUST BE AT LEAST 200mm (8") WIDE. STRUTS TESTED UNDER IDEAL OR LABORATORY CONDITIONS SHALL BE USED WITH A MINIMUM SAFETY FACTOR OF 1.5.

D. SHIELDS

1. SHIELDS ARE ACCEPTABLE AS A MEANS OF SHORING EXCAVATIONS, AS SHOWN ON CASE 4, WITH THE FOLLOWING RESTRICTIONS.
   a. ZONE A SHALL NOT INTERCEPT PROPERTY LINES OR INTERCEPT AN AREA REQUIRED BY THE SPECIFICATIONS FOR TRAFFIC.
   b. ZONE A SHALL NOT CONTAIN ANY EXISTING UTILITY OTHER THAN METALLIC ELECTRIC CONDUITS OR PIPE 100mm (4") OR LESS IN DIAMETER USED FOR LOW PRESSURE GAS DISTRIBUTION.
   c. ZONE A AND B SHALL NOT SUPPORT SURCHARGE DEAD LOADS SUCH AS PILING OR BUILDINGS.

   THE RESTRICTIONS STATED IN b ABOVE WILL BE WAIVED PROVIDED THE CONTRACTOR SUBMITS WRITTEN APPROVAL FROM THE OWNER OF THE UTILITY FOR THE PROPOSED CONSTRUCTION METHOD. THE CONTRACTOR COMPLIES WITH ANY SUPPORT OR PROTECTION METHODS REQUIRED BY THE UTILITY COMPANY, AND THE OWNER OF THE UTILITY STATES, IN WRITING, THAT THEY WILL ACCEPT RESPONSIBILITY FOR ALL CLAIMS FOR DAMAGES THAT MAY ARISE AS A RESULT OF DISTURBANCE TO THE UTILITY. AN ACCEPTABLE SHORING SYSTEM MUST BE INSTALLED WHEN THE SHIELD IS REMOVED.

2. THE LENGTH OF UNSUPPORTED TRENCH IN FRONT OF THE SHIELD SHALL BE 2.5m (9'-0") MAXIMUM FROM THE FORWARD EDGE OF THE SHIELD TO THE TOE OF SLOPE BEING EXCAVATED.

3. SHIELDS SHALL CONFORM TO THE DESIGN CRITERIA NOTED HEREON.

E. TEMPORARY BRIDGES

PLANS AND CALCULATIONS FOR SHORING SYSTEMS AT TEMPORARY BRIDGES SHALL MEET THE REQUIREMENTS OF SUBSECTION 7-10.3.6(7) AS AMENDED.

CALCULATIONS AND DRAWINGS

SHORING SYSTEMS SHALL BE DESIGNED BY A CIVIL OR STRUCTURAL ENGINEER REGISTERED IN THE STATE OF CALIFORNIA.

A. COMPLETE CALCULATIONS MUST BE SUBMITTED TO THE DEPARTMENT NOTING ALL ASSUMPTIONS AND REFERENCES. CALCULATIONS SHALL BE BASED ON STANDARD METHODS AND PROCEDURES BY RECOGNIZED AUTHORITIES. COMPUTER PRINTOUTS AND OTHER SUBMITTALS THAT DO NOT CLEARLY INDICATE THE COMPUTATION METHOD WILL NOT BE ACCEPTED. CROSS-SECTIONS OR SKETCHES SHOWING THE LOCATION OF EXISTING IMPROVEMENTS AND UTILITIES SHALL BE INCLUDED WHEN THE TYPE OF SHORING IS AFFECTED.

B. DEPARTMENT STANDARD PLAN 3091 SHOWS THE FORMAT THAT IS TO BE USED. HOWEVER, THE SUPPORTING CALCULATIONS MAY BE ATTACHED ON LETTER-SIZED PAPER.

ACCEPTANCE

IF FOUND IN CONFORMANCE WITH THIS DRAWING AND THE SPECIFICATIONS, THE DEPARTMENT WILL INDICATE ACCEPTANCE BY SIGNING THE SUBMITTED DRAWINGS. IF THE METHOD SELECTED AND ACCEPTED BY THE DEPARTMENT DOES NOT PROVIDE ADEQUATE SUPPORT UNDER ACTUAL FIELD CONDITIONS, IT SHALL BE REPLACED WITH AN ACCEPTED ALTERNATE. THE DETAILS ARE ALSO SUBJECT TO THE REVIEW OF THE DIVISION OF INDUSTRIAL SAFETY. ANY DEVIATION FROM THE ACCEPTED DESIGN MUST BE APPROVED BY THE DEPARTMENT.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

CRITERIA FOR THE DESIGN OF SHORING FOR EXCAVATIONS

STANDARD PLAN METRIC

3090-1

SHEET 4 OF 4
SKETCH

DETAILS OF SHORING INDICATING SIZE AND SPACING OF ALL MEMBERS.

SEQUENCE OF PLACEMENT AND REMOVAL OF MEMBERS SHALL BE NOTED AS REQUIRED TO INSURE SAFETY OF WORKERS.

DESIGN CRITERIA

1. DESIGN LOADS BASED ON LACFCD *CRITERIA FOR THE DESIGN OF SHORING FOR EXCAVATIONS.
   K.w = ______________ N/m³ (pcf)
   Θ = ______________°

2. SOIL TYPE ______________

3. ALL TIMBER SHALL BE ______________ GRADE.

4. ALLOWABLE STRESSES:
   STRESS WOOD STEEL
   FLEXURAL AXIAL COMPRESSION ____________ ____________
   SHEAR ____________ ____________
   MODULUS.E. ____________ ____________

5. MAXIMUM EXCAVATION DEPTH ______________ METERS (FEET).

CALCULATIONS

CASE ______________: SHORING FOR EXCAVATIONS

APPLICABLE REACHES:

STA. ______________ TO STA. ______________

STA. ______________ TO STA. ______________

NOTES:

REACHES GIVEN ARE APPROXIMATE. IF A TYPE OF SOIL IS ENCOUNTERED WITHIN THE ABOVE REACHES WHICH, IN ACCORDANCE WITH THE CRITERIA SET FORTH ON STANDARD PLAN 3090, REQUIRES THE USE OF A DIFFERENT METHOD OF SHORING, THEN SHORING DETAILS WILL BE REVISED AS PROVIDED IN THE PROJECT SPECIFICATIONS.
NOTES

1. THIS STANDARD PLAN MAY BE USED IN LIEU OF CASE 3 OF STANDARD PLAN 3080.

2. ALL RCP SHALL HAVE A D-LOAD RATING DERIVED IN ACCORDANCE WITH LAND DEVELOPMENT DIVISION PROCEDURAL MANUAL STANDARD C-3.

3. WHERE SUBGRADE IS COMPOSED OF OTHER THAN GRANULAR OR SANDY MATERIAL, THE TRENCH SHALL BE excavated TO A DEPTH OF AT LEAST 75mm (3") BELOW THE PIPE AND BACKFILLED WITH A BEDDING MATERIAL OR OTHER MATERIALS AS MAY BE SPECIFIED OR OTHER WISE APPROVED BY THE DEPARTMENT.

4. THE MINIMUM WIDTH B OF TRENCH SHALL BE D' + 300mm (12") AND WHERE THE COVER IS GREATER THAN 2.5m (8'-0") THE MAXIMUM WIDTH OF THE TRENCH AT THE TOP OF THE RCP SHALL BE D' + 600mm (24"). IF THIS CONDITION IS NOT MET, STANDARD PLAN 3080 REQUIREMENTS MUST BE MET.

5. BEDDING A SHALL BE PLACED 1/15 D' BELOW THE BOTTOM OF THE RCP. FOR RCP 675mm (27") IN DIAMETER AND LARGER IT SHALL BE COMPOSED OF SAND, 20mm (3/4") OR 15mm (1/2") CRUSHED ROCK, 5mm (NO.3 OR NO.4) CONCRETE AGGREGATE OR GRAVEL, OR OTHER GRANULAR MATERIAL AS SPECIFIED AND SHALL HAVE A SAND EQUIVALENT VALUE OF NOT LESS THAN 20 UNLESS OTHERWISE SPECIFIED BY THE DEPARTMENT.

6. WHERE RCP SMALLER THAN 675mm (27") IN DIAMETER IS USED, THE REQUIREMENTS IN NOTE 5 SHALL BE MET EXCEPT THAT A GRADATION NO COARSER THAN NO. 4 CONCRETE AGGREGATE OR 15mm (1/2") CRUSHED ROCK SHALL BE USED.

7. BEDDING B SHALL BE PLACED ABOVE BEDDING A AND SHALL BE COMPOSED OF SAND OR OTHER GRANULAR MATERIAL AND SHALL HAVE A SAND EQUIVALENT VALUE OF NOT LESS THAN 20 AS SPECIFIED IN SUBSECTION 306-1.2.1 AS AMENDED UNLESS OTHERWISE APPROVED BY THE DEPARTMENT AND SHALL BE COMPLETED PRIOR TO PLACING THE BALANCE OF THE BACKFILL. THE MAXIMUM ROCK SIZE FOR BEDDING B SHALL BE 100mm (4") IN THE GREATEST DIMENSION. NESTING OF ROCKS WILL NOT BE PERMITTED.

8. THE MINIMUM COVER DEPTH FOR RCP 525mm (21") OR LESS IN DIAMETER IS 600mm (24") AND FOR RCP 600mm (24") AND GREATER IS 300mm (12"). WHEN THE MINIMUM COVER REQUIREMENTS NOTED ABOVE ARE NOT MET, CONCRETE BACKFILL SHALL BE REQUIRED IN ACCORDANCE WITH STANDARD PLAN 3080.

9. 3-EDGE BEARING TEST LOAD FACTOR = 1.0.
## Unified Soil Classification

### Major Divisions

<table>
<thead>
<tr>
<th>Major Divisions</th>
<th>Group Symbols</th>
<th>Typical Names</th>
<th>Identification Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ME</td>
<td>Well-graded Gravels, Gravel-Sand Mixtures, Little or No Fines.</td>
<td>Wide range in grain sizes and substantial amounts of all intermediate particle sizes.</td>
</tr>
<tr>
<td></td>
<td>GM</td>
<td>Silty Gravels, Gravel-Sand-Silt Mixtures.</td>
<td>Nonplastic fines or fines with low plasticity. (For identification procedures see CL below)</td>
</tr>
<tr>
<td></td>
<td>GC</td>
<td>Clayey Gravels, Gravel-Sand-Clay Mixtures.</td>
<td>Plastic fines (for identification procedures see CL below)</td>
</tr>
<tr>
<td></td>
<td>SW</td>
<td>Well-graded Sands, Gravelly Sands, Little or No Fines.</td>
<td>Wide range in grain sizes and substantial amounts of all intermediate particle sizes.</td>
</tr>
<tr>
<td></td>
<td>SP</td>
<td>Poorly-graded Sands, Gravelly Sands, Little or No Fines.</td>
<td>Predominantly one size or a range of sizes with some intermediate sizes missing.</td>
</tr>
<tr>
<td></td>
<td>SM</td>
<td>Silty Sands, Sand-Silt Mixtures.</td>
<td>Nonplastic fines or fines with low plasticity. (For identification procedures see CL below)</td>
</tr>
<tr>
<td></td>
<td>SC</td>
<td>Clayey Sands, Sand-Clay Mixtures.</td>
<td>Plastic fines (for identification procedures see CL below)</td>
</tr>
</tbody>
</table>

### Identification Procedures

- **Dry Strength (Crushing Characteristics)**
  - ML: Inorganic Silts and very fine sands, Rock flour, Silty or Clayey Fine Sands or Clayey Silts with slight plasticity.
  - MH: Inorganic Silts, Micaeous or Diatomaceous Fine Sandy or Silty soils, Elasic Silts.
  - CH: Inorganic Clays of High Plasticity, Fat Clays.

- **Dilatancy (Reaction to Shaking)**
  - ML: None to slight
  - CL: Medium to high
  - OL: Slight to medium
  - MH: Slight to medium
  - CH: High to very high
  - OH: Medium to very slow

- **Toughness (Consistency Near PL)**
  - ML: None
  - CL: Medium
  - OL: Slight
  - MH: Slight to medium
  - CH: None
  - OH: Slight to medium

### Boundary Classifications

  - Predominantly identified by color, odor, spongy feel and frequently by fibrous texture.

---

*Boundary Classifications: Soils possessing characteristics of two groups are designated by combinations of group symbols. For example SW-GC, well-graded gravel-sand mixture with clay binder. (2) All sieve sizes on this chart are U.S. Standard.*

---

**Los Angeles County Department of Public Works**

**Unified Soil Classification System**

**Approved:** Thomas A. Gilman 5/31/1992

**Date:** 1999

**Revisions:** Sheet 1 of 3

**Standard Plan Metric:** 3093-1
### Unified Soil Classification

#### Information Required for Describing Soils

- For undisturbed soils, add information on stratification, degree of compactness, cementation, moisture conditions, and drainage characteristics.

  **Example:** Silty sand, gravelly; about 20% hard, angular gravel particles; 10mm (1/2") max. size; rounded and subangular sand grains coarse to fine; about 15% non-plastic fines with low dry strength; well compacted and moist in place; alluvial sand (SM).

#### Laboratory Classification Criteria

| Cu ≤ $D_{50}$ / $D_{10}$ greater than 4 | GW |
| Cu = $D_{50}$ / $D_{10}$ between one and 3 | GP |

**Atterberg Limits: Below "A" Line or PI Less Than 4**

- Above "A" line with PI between 4 and 7 are borderline cases requiring use of dual symbols.

**Atterberg Limits: Above "A" Line with PI Greater Than 7**

- Limits plotting in hatched zone with PI between 4 and 7 are borderline cases requiring use of dual symbols.

#### Use Grain Size Curve in Identifying the Fractions As Given Under Field Identification

- Determine percentages of gravel and sand from grain-size curve, depending on percentage of fines (fraction smaller than 75 µm) in material.

#### Plasticity Index Chart

- For laboratory classification of fine-grained soils.

---

**(1) Boundary Classifications:** Soils possessing characteristics of two groups are designated by combinations of group symbols. For example, GW-GC, well-graded gravel-sand mixture with clay binder. (2) All sieve sizes on this chart are U.S. Standard.
GENERAL NOTE

I. DIMENSIONS SHOWN ON THIS PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACT EQUAL VALUES. IF METRIC VALUES ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.

FIELD IDENTIFICATION PROCEDURES FOR FINE-GRADED SOILS OR FRACTIONS

THESE PROCEDURES ARE TO BE PERFORMED ON THE MINUS 450 μm (NO. 40) SIEVE SIZE PARTICLES, APPROXIMATELY .4mm (1/64"), FOR FIELD CLASSIFICATION PURPOSES, SCREENING IS NOT INTENDED, SIMPLY REMOVE BY HAND THE COARSE PARTICLES THAT INTERFERE WITH THE TESTS.

DILATANCY (REACTION TO SHAKING)


DRY STRENGTH (CRUSHING CHARACTERISTICS)

AFTER REMOVING PARTICLES LARGER THAN 450 μm (NO. 40) SIEVE SIZE, MOLD A PAT OF SOIL TO THE CONSISTENCY OF PUTTY, ADDING WATER IF NECESSARY. ALLOW THE PAT TO DRY COMPLETELY BY SUN, SLOW, OR AIR DRYING AND THEN TEST ITS STRENGTH BY BREAKING AND CRUMBLING BETWEEN THE FINGERS. THIS STRENGTH IS A MEASURE OF THE CHARACTER AND QUANTITY OF THE COLLOIDAL FRACTION CONTAINED IN THE SOIL. THE DRY STRENGTH INCREASES WITH INCREASING PLASTICITY.

HIGH DRY STRENGTH IS CHARACTERISTIC FOR CLAYS OF THE CH GROUP. A TYPICAL INORGANIC SILT POSSESSES ONLY VERY SLIGHT DRY STRENGTH. SILTY FINE SANDS AND SILTS HAVE ABOUT THE SAME SLIGHT DRY STRENGTH, BUT CAN BE DISTINGUISHED BY THE FEEL WHEN POWDERING THE DRIED SPECIMEN. FINE SAND FEELS GRITTY WHEREAS A TYPICAL SILT HAS THE SMOOTH FEEL OF FLOUR.

TOUGHNESS (CONSISTENCY NEAR PLASTIC LIMIT)

AFTER REMOVING PARTICLES LARGER THAN THE 450 μm (NO. 40) SIEVE SIZE, A SPECIMEN OF SOIL ABOUT 6.504 mm³ (⅛ CUBIC INCH) IN SIZE IS MOLDED TO THE CONSISTENCY OF PUTTY. IF TOO DRY, WATER MUST BE ADDED AND IF STICKY, THE SPECIMEN SHOULD BE SPREAD OUT IN A THIN LAYER AND ALLOWED TO LOSE SOME OF ITS MOISTURE BY EVAPORATION. THEN THE SPECIMEN IS ROLLED OUT BY HAND ON A SMOOTH SURFACE OR BETWEEN THE PALMS INTO A THREAD ABOUT 3 mm (⅛") IN DIAMETER. THE THREAD IS THEN FOLDED AND REROLLED REPEATEDLY. DURING THIS MANIPULATION THE MOISTURE CONTENT IS GRADUALLY REDUCED AND THE SPECIMEN STIFFENS. FINALLY LOSES ITS PLASTICITY, AND CRUMBLES WHEN THE PLASTIC LIMIT IS REACHED.


HIGHLY ORGANIC CLAYS HAVE A VERY WEAK AND SPONGY FEEL AT THE PLASTIC LIMIT.
SECTION THROUGH BARREL

ELLiptical Cage

Lap 150mm (6") Min., Weld to longitudinal reinforcement

Circumferential reinforcement at springline

Longitudinal reinforcement

Supplemental bell reinforcement

Circumferential reinforcement

5-coils or hoops equally spaced

Approx. same size and spacing as in barrel

SECTION A-A

LEGEND

<table>
<thead>
<tr>
<th>Normal Circumferential Reinforcement</th>
<th>Normal Longitudinal Reinforcement</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADDITIONAL CIRCUMFERENTIAL REINFORCEMENT</td>
<td>ADDITIONAL LONGITUDINAL REINFORCEMENT</td>
</tr>
</tbody>
</table>

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

ADDITIONAL REINFORCEMENT FOR BELL END OF RCP

STANDARD PLAN METRIC

3095-1

APPROVED

Thomas A. Fruinencen

DIRECTOR OF PUBLIC WORKS

5/31/1992

1999

REVISIONS
NOTES

1. THIS DETAIL APPLIES WHERE A SINGLE ELLIPTICAL CAGE IS USED. WHERE ONE ELLIPTICAL CAGE AND ONE INNER CIRCULAR CAGE IS USED, THE SIZE AND SPACING OF THE ADDITIONAL CIRCUMFERENTIAL REINFORCEMENT SHALL BE THAT OF THE ELLIPTICAL CAGE. WHERE TWO CIRCULAR CAGES ARE USED THE ADDITIONAL REINFORCEMENT IS NOT REQUIRED.

2. THE ADDITIONAL REINFORCEMENT SHOWN IS NOT REQUIRED, PROVIDED:
   A. THE NORMAL CIRCUMFERENTIAL REINFORCEMENT WITHOUT CHANGE IN DIAMETER(S) IS CARRIED TO WITHIN APPROXIMATELY 50mm (2") OF THE RCP END AND ONE COMPLETE COIL IS PLACED PARALLEL TO THE END OF THE RCP.
   B. A MINIMUM OF THREE COILS, INCLUDING ONE COMPLETE COIL PARALLEL TO THE END OF THE RCP, IS PLACED IN THE BELL.

3. DIMENSIONS SHOWN ON THIS PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACT EQUAL VALUES. IF METRIC VALUES ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.
JACKED SECTION WITH ADDITIONAL REINFORCEMENT

SECTION A-A

REINFORCEMENT IN OUTSIDE FACE OF WALL

50 mm x 100 mm (2' x 4') TRANSVERSE JOINT TO BE PLACED IN ALTERNATE REINFORCEMENT SPACING

SECTION B-B

TOP OF WALL
BASE OF WALL
CONSTRUCTION JOINT DETAILS FOR RCB JACKED IN PLACE

ADDITIONAL LONGITUDINAL REINFORCEMENT SCHEDULE

<table>
<thead>
<tr>
<th>MEMBER THICKNESS</th>
<th>BAR NO. AND SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>165 mm - 255 mm (6 1/2' TO 10')</td>
<td>#13 M @ 225 mm (#4 @ 9')</td>
</tr>
<tr>
<td>260 mm - 350 mm (10 1/4' TO 13')</td>
<td>#16 M @ 225 mm (#5 @ 9')</td>
</tr>
<tr>
<td>340 mm PLUS (13 1/4' PLUS)</td>
<td>#19 M @ 225 mm (#6 @ 9')</td>
</tr>
</tbody>
</table>

LEGEND

- NORMAL RCB REINFORCEMENT FOR SECTION TO BE JACKED.
- ADDITIONAL RCB REINFORCEMENT FOR MODIFIED SECTION.
- ADDITIONAL TRANSVERSE RCB REINFORCEMENT.
- NORMAL TRANSVERSE RCB REINFORCEMENT.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

ADDITIONAL REINFORCEMENT FOR JACKED RCB

APPROVED

THOMAS A. FELDMAN
DIRECTOR OF PUBLIC WORKS

STANDARD PLAN METRIC

3096-1

SHEET 1 OF 2
NOTES

1. THE CONTRACTOR SHALL USE JACKING HEADS OR LOAD SPREADING BEAMS OF SUCH DESIGN AND SIZE AS TO SPREAD THE JACKING FORCE UNIFORMLY OVER THE ENTIRE INVERT SECTION.

2. IF THE LOAD SPREADING DEVICE OR JACKING HEAD SELECTED DOES NOT PERMIT THE REQUIRED 20 BAR DIAMETER EXTENSION OF THE NORMAL LONGITUDINAL REINFORCEMENT, CONTINUITY MAY BE MAINTAINED BY DOWELING FROM THE ADJACENT SECTION.

3. THE LEADING EDGE OF THE CONDUIT SHALL BE EQUIPPED WITH A JACKING HEAD SECURELY ANCHORED THERETO. THE LENGTH AND DETAILS OF THE JACKING HEAD SHALL BE SUBJECT TO APPROVAL BY THE DEPARTMENT.

4. THE USE OF GUIDE RAILS, SLABS, CRADLES, ETC., WILL BE SUBJECT TO WRITTEN APPROVAL BY THE DEPARTMENT.

5. FOR MULTIPLE BARREL RCB SECTIONS THE ADDITIONAL REINFORCEMENT SHALL BE PLACED IN ALL EXTERIOR WALLS AND SLABS.

6. REFER TO THE PROJECT DRAWINGS FOR ADDITIONAL NOTES AND DETAILS.

7. DIMENSIONS SHOWN ON THIS PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACT EQUAL VALUES. IF METRIC VALUES ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.
SECTION 4

Street Lighting and Traffic Signals
SYMBOLS

PROPOSED

EXISTING

SIGNAL AND LIGHTING CONDUIT
DETECTOR AND SERVICE CONDUIT
STREET LIGHTING CONDUIT
SPECIAL VISOR (Left angle shown - reverse for right angle)
PULL BOX
STREET LIGHTING PULL BOX (With transformer - "ballast")
CONTROLLER CABINET
VEHICLE SIGNAL HEADS (Each arrow represents 3-200 mm (8') sections)
VEHICLE SIGNAL HEAD WITH BACK PLATE
PEDESTRIAN SIGNAL HEAD
PROGRAMMED VISIBILITY VEHICLE SIGNAL HEAD (3-300 mm (12') sections)
MAST ARM WITH VEHICLE SIGNAL HEAD, 3-300 mm (12') SECTIONS (With back plate)
ELECTROLIER (Mast arm type)
NONILLUMINATED MAST ARM MOUNTED SIGN
ILLUMINATED MAST ARM MOUNTED SIGN
3-300 mm (12') SECTIONS WITH RED ARROW, YELLOW ARROW AND GREEN ARROW LENSES (Arrow in direction indicated)
UNDERGROUND SERVICE CABINET

TRAFFIC SIGNAL POLE
MAGNETOMETER DETECTOR
INDUCTIVE LOOP DETECTOR
ULTRA-SONIC DETECTOR
FLASHING BEACON
FIRE HYDRANT
TELEPHONE POLE
UTILITY POLE
RAILROAD CROSSING SIGNAL

NOTE:
DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
TRAFFIC SIGNAL SYMBOLS

APPROVED 5/31/1992

DIRECTOR OF PUBLIC WORKS DATE

STANDARD PLAN
METRIC

4000-1

REVISIONS

SHEET 1 OF 1
SECTION 5

Landscaping and Irrigation Systems
SECTION 6

General Facilities
ALL EXISTING PIPE SIZES MAY VARY. THE CONTRACTOR SHALL VERIFY IN THE FIELD TO DETERMINE EXACT SIZES OF EXISTING PIPES AND REQUIRED SLEEVES.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

TYPICAL FENCE POST EXTENSION DETAILS

TYPE A

FASTEN GALV. CAP TO POST EXTENSION WITH 6 mm (1/4") GALV. ROUND HEAD RIVET

EXIST. FENCE POST

6 mm (1/4") GALV. ROUND HEAD RIVET

6 mm (1/4") GALV. ROUND HEAD RIVET

FENCE POST EXTENSION (GALV.)

PIPE INSERT (GALV.)

150 mm (6") MIN.

150 mm (6") MIN.

150 mm (6") MIN.

150 mm (6") MIN.

REFER TO PROJECT DRAWINGS FOR EXTENSION LENGTH

EXIST. 32 mm (1 1/4") GALV. STEEL NIPPLE. SEE PROJECT DRAWINGS FOR EXTENSION LENGTH

TYPE C

FASTEN GALV. CAP TO POST EXTENSION WITH 6 mm (1/4") GALV. ROUND HEAD RIVET

EXIST. 32 mm (1 1/4") GALV. PIPE (EXIST. 32 mm (1 1/4") CAP SHOWN ABOVE)

TYPE B

NOTE:

TYPE D

FASTEN GALV. CAP TO POST EXTENSION WITH 6 mm (1/4") GALV. ROUND HEAD RIVET

WELD ON 300 mm (12") SECTION. CLEAN AND COAT WELD AREA PER SUBSECTION 210-3.5 OF STANDARD SPECIFICATIONS

150 mm (6")

300 mm (12")

5 mm (3/16)

5 mm (3/16)

5 mm (3/16)

5 mm (3/16)

TYP. TOP OF CHANNEL WALL

5 mm (3/16)

TYP. TOP OF CHANNEL WALL

5 mm (3/16)

TYP.
DETAILS FOR LENGTHS IN EXCESS OF 6 M (20')

R/W FENCING
PER STD. PLAN 600
3 m (10'-0")
MAX. SPACING
3 m (10'-0")
MAX. SPACING

75 mm (3") MIN.
125 mm (5") MAX.

TIE FENCE FABRIC WITH
2 TIES OF 2 mm (14 GA.)
WIRE PER TEE POST, TYP.

35 mm x 2.74 m (1 3/8' x 9'-0")
TEE POSTS, TYP.
SEE NOTE 4

GALV. 2 STRAND,
4 POINT BARBED WIRE
2.5 mm (12 1/2 GA.)

35 mm x 1.83 m
(1 3/8' x 6'-0")
TEE POSTS, TYP.

GALV. 1.47 m (58") TYPE 1
ELLWOOD FENCE FABRIC

GROUND LINE
300 mm (12") MIN. DIA.

DETAILS FOR LENGTHS OF 6 M (20') OR LESS

R/W FENCING
PER STD. PLAN 600
3 m (10'-0")
MAX. SPACING

75 mm (3") MIN.
125 mm (5") MAX.

GALV. 2 STRAND,
4 POINT BARBED WIRE
2.5 mm (12 1/2 GA.)

35 mm x 1.83 m
(1 3/8' x 6'-0")
TEE POSTS, 4 REQUIRED

GALV. 1.47 m (58") TYPE 1
ELLWOOD FENCE FABRIC

GROUND LINE
300 mm (12") MIN. DIA.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

BREAKAWAY FENCING

APPROVED
DIRECTOR OF PUBLIC WORKS

5/31/1992
1999

STANDARD PLAN
METRIC
6001-1

REVISIONS
SHEET 1 OF 2
NOTES

1. ALL FENCE MATERIALS AND FITTINGS SHALL CONFORM TO "STANDARD SPECIFICATIONS" UNLESS OTHERWISE SPECIFIED.

2. THE FABRIC SHALL BE PLACED ON THE DOWNSTREAM SIDE OF THE POSTS, STRETCHED TAUT, AND FASTENED AS SHOWN.

3. POSTS SHALL BE 35 mm x 35 mm x 3 mm (1 3/8" x 1 3/8" x 1/8") MINIMUM, GALVANIZED TEE FENCE POSTS.

4. TEE POSTS NOT TO BE EMBEDDED IN CONCRETE. TEE POSTS SHALL BE DRIVEN 900 mm (3'-0") INTO GROUND AT 6 m (20'-0") OC. OTHER INTERMEDIATE TEE POSTS SHALL BE SET AS SHOWN.

5. DIMENSIONS SHOWN ON THIS PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACT EQUAL VALUES. IF METRIC VALUES ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.
TYPICAL FENCE ELEVATION

PORTABLE SECURITY FENCE AS FABRICATED BY ACE FENCE CO.
OR DEPARTMENT APPROVED EQUAL

POST CAP DETAIL

SECTION A-A

SECTION B-B

TYPICAL FIELD INSTALLATION

END STAND DETAIL

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

PORTABLE SECURITY FENCE FOR OPEN TRENCHES

STANDARD PLAN
METRIC

6002-1

SHEET 1 OF 2

APPROVED 5/31/1992

DIRECTOR OF PUBLIC WORKS

1999

REVISIONS
NOTES

1. ALL CHAIN LINK FENCE MATERIAL SHALL CONFORM TO "STANDARD SPECIFICATIONS" UNLESS OTHERWISE SPECIFIED.

2. FABRIC SHALL BE TIED TO TOP AND BOTTOM RAILS AND CENTER POSTS WITH 3mm (11 GA.) WIRE AT MAX. 375mm (15") INTERVAL.

3. POST RAIL JOINTS SHALL BE WELDED ALL AROUND WITH 3 mm (1/8") FILLET WELD.

4. IN LIEU OF GALVANIZING, POSTS MAY BE PAINTED WITH A ZINC CHROMATE PRIMER COAT AND AN ALL PURPOSE ALUMINUM FINISH COAT.

5. FENCE PANELS SHALL BE HOSED OFF WITH WATER WHEN NECESSARY TO REMOVE ACCUMULATED DIRT SO THAT A CLEAN APPEARANCE IS MAINTAINED AT ALL TIMES.

6. SAND BAGS SHALL BE PLACED ON THE END STANDS TO INCREASE STABILITY WHEN OVERTURNING IS A PROBLEM, AS DETERMINED BY THE ENGINEER.

7. DIMENSIONS SHOWN ON THIS PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACT EQUAL VALUES. IF METRIC VALUES ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.
NOTES:
1. POSTS SHALL BE TREATED DOUGLAS FIR.
2. POSTS SHALL BE PAINTED WITH YELLOW TRAFFIC PAINT. APPLY 2 ROWS
   OF REFLECTORIZED TAPE 100 mm (4") APART TO THE TOP OF EACH POST.
3. THE NUMBER OF POSTS VARIES WITH THE WIDTH OF ENTRANCE.
4. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT
   EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED
   FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED,
   ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
NOTES:

1. POSTS SHALL BE PAINTED WITH YELLOW TRAFFIC PAINT. APPLY 2 ROWS
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   EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED
   FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED,
   ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
PRIOR TO THE END OF EACH WORKDAY, AND WHENEVER WORKERS ARE NOT WITHIN VISUAL SIGHT OF THE EXCAVATION, THE CONTRACTOR SHALL EITHER BACKFILL THE EXCAVATION OR ERECT AND MAINTAIN FENCES AROUND THE EXCAVATION OR COVER THE EXCAVATION. THE FOLLOWING ARE MINIMUM ACCEPTABLE MEASURES ONLY AND COMPLIANCE WITH THIS STANDARD DOES NOT RELIEVE THE CONTRACTOR OF HIS OBLIGATION TO PROTECT THE PUBLIC BY ALL NECESSARY MEANS.

CASE A

CASE B

CASE C

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

MINIMUM PUBLIC SAFETY REQUIREMENT FOR OPEN EXCAVATIONS

STANDARD PLAN METRIC 6008-1

APPROVED  THOMAS A. DILLMAN  5/31/1992
DIRECTOR OF PUBLIC WORKS  DATE

REVISIONS  1999
NOTES

1. EXCEPTIONS: FENCES OR COVERS WILL BE OPTIONAL WITH THE CONTRACTOR IF THE EXCAVATION IS EITHER:

   A. LESS THAN 900 mm (3') DEEP UNLESS UNUSUALLY HAZARDOUS CONDITIONS EXIST.
   B. LESS THAN 1.5 m (5') DEEP WITH SUFFICIENT WARNING DEVICES SUCH AS LANTERNS, FLASHERS, OR BARRICADES.
   C. FOR CASE B, LESS THAN 1.1 m (3 1/2') DEEP IN THE VERTICAL PORTION WITH UPPER SIDE SLOPES OF 1:1 OR FLATTER.
   D. IN AN AREA THAT IS NOT ACCESSIBLE TO THE PUBLIC.

2. COVERS FOR NON-VEHICULAR TRAFFIC MAY BE:

   A. 6 mm (1/4") STEEL PLATES.
   B. 50 mm (2") PLANKS.
   C. 19 mm (3/4") PLYWOOD.

3. STEEL PLATE COVER FOR VEHICULAR TRAFFIC REQUIRE PROPER TRENCH BRACING AND STEEL PLATES WITH SUFFICIENT STRENGTH TO WITHSTAND TRAFFIC LOADING IN ACCORDANCE WITH THE REQUIREMENTS OF THE EXCAVATION PERMIT.

4. POSTS FOR FENCES SHALL BE 50 mm x 100 mm (2" x 4") WOOD OR EQUIVALENT STEEL OR PIPE. IN PAVED AREAS, POSTS MAY BE FLUSH WITH SURFACE IF SUFFICIENTLY ANCHORED AND BRACED. RAILS SHALL BE 25 mm x 100 mm (1" x 4") WOOD.

5. FOR CASE A AND B, FENCES MAY BE:

   A. WOOD PICKETS TIED WITH WIRE AND POSTS 2.4 m (8') CC.
   B. 50 mm x 100 mm (2" x 4") POSTS 2.4 m (8') CC AND WIRE MESH.
   C. 50 mm x 100 mm (2" x 4") POSTS 2.4 m (8') CC WITH TOP AND BOTTOM RAIL AND CHICKEN WIRE.
   D. SAME AS NOTE 6 ITEM C.

6. FOR CASE C, FENCES MAY BE:

   A. WOOD PICKETS TIED WITH WIRE AND BOTTOM RAIL.
   B. TOP AND BOTTOM RAIL WITH CHICKEN WIRE.
   C. THREE RAILS EQUALLY SPACED WITH BOTTOM RAIL 150 mm (6") ABOVE GROUND.

7. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE ADEQUATE SHORING, BRACING AND/OR COVERS OVER ANY EXCAVATION IN ACCORDANCE WITH SECTIONS 7-10.4 AND 306-I.1.6 OF THE STANDARD SPECIFICATIONS.

8. DIMENSIONS SHOWN ON THIS PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACT EQUAL VALUES. IF METRIC VALUES ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

MINIMUM PUBLIC SAFETY REQUIREMENT FOR OPEN EXCAVATIONS
NOTE:
REINFORCING STEEL SHALL HAVE 40 mm (1 1/2") COVER

RAILING ELEVATION

SECTION A-A

NOTE:
DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
NOTE:
WALL EXPANSION JOINTS TO BE LOCATED AT ALL DECK JOINTS, AT E PIERS OR BENTS, AND AT UNIFORM SPACING 12 m (40') MAX. BETWEEN THOSE SPECIFIED. JOINT SIZE TO BE 13 mm (1/2") MIN. AND INCREASED TO MATCH DECK JOINTS. CURB JOINTS TO BE LOCATED AS SPECIFIED ON PLANS.
6.07 m (19'-11") PRECAST CONCRETE PANEL
6.10 m (20'-0") LAYING LENGTH
1-#16 (5) CONT.
305 mm
12"

1-#16 (5) CONT.
305 mm
12"

100 mm (4") Ø LIFTING HOLE
32 mm (1 1/4") FORMED ANCHOR BOLT HOLES, TWO PAIRS PER PANEL.

#16 (5) TOT. 2
(12"
305 mm
MIN.

#13 (4) 90° x 760 mm (2'6")
TOTAL 1 PER LIFTING HOLE

1-#16 (5) CONT.
305 mm
12"

#13 (4) STIRRUPS Ø 460 mm (18")
TOTAL 14 PER INTERMEDIATE PANEL

#13 Ø 460 mm STIRRUPS
(*4 Ø 18")

250 mm (10") RAD.

25 mm (1") RAD.

25 mm (1") RAD.

150 mm (6")

150 mm (6")

75 mm CL.

50 mm (2")

75 mm (3")

810 mm (2'-8")

480 mm (1'-7")

250 mm (10")

190 mm (7 1/2")

190 mm (7 1/2")

45 mm (1 3/4")

45 mm (1 3/4")

180 mm (7")

180 mm (7")

75 mm (3")

75 mm (3")

20 mm (3/4") CHAMFER

FOR NOTES SEE SHEET 2

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

TEMPORARY CONCRETE BARRIER RAILING

STANDARD PLAN
METRIC

6101-1

SHEET 1 OF 3

APPROVED

THOMAS O. DOUTHIT
5/31/1992

DATE

REVISIONS

1999
BOLT 32 mm (1 1/4") Ø x 610 mm (2'-0") W/HEX. HEAD AND NUT AND 2-PLATE WASHERS 10 mm x 75 mm (3/8' x 3") Ø.
IN COFFERDAM INSTALLATIONS, THE EYES MAY BE TIED TOGETHER WITH 3 WRAPS OF 3.76 mm (*9 GA.) WIRE.

SEE NOTE 4.

BOLT CONNECTION DETAIL

NOTES:

1. WHERE BARRIER RAILINGS ARE USED FOR TEMPORARY TRAFFIC CONTROL, THE LAYOUT SHALL BE APPROVED BY THE ENGINEER, INCLUDING END FLARES OR USE OF TERMINAL PANELS.

2. WHERE BARRIER RAILINGS ARE USED AS TEMPORARY CHANNEL INVERT COFFERDAMS, THE LAYOUT SHALL BE IN ACCORDANCE WITH PERMIT REQUIREMENTS OR AS APPROVED BY THE ENGINEER.

3. IF ANCHORAGE OF THE PANELS IS CALLED FOR BY THE PLANS OR SPECIFICATIONS THEY SHALL BE ANCHORED AT THE ANCHOR BOLT HOLES PER DETAILS APPROVED BY THE ENGINEER.

4. ALTERNATE CONNECTION DETAIL MAY BE USED AS APPROVED BY THE ENGINEER.

5. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.

SECTION B-B

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

TEMPORARY CONCRETE BARRIER RAILING

STANDARD PLAN

METRIC

6101-1

SHEET 2 OF 3
PLAN VIEW OF COFFERDAM

CONSTRUCT TRANSITION NOSE WITH CONCRETED SANDBAGS PILLED TO A HEIGHT OF 600 mm (2') TO BLOCK OPEN SPACE

CONCRETED SANDBAGS PILLED TO A HEIGHT OF 600 mm (2') TO BLOCK OPEN SPACE. SANDBAG FACE TO APPROXIMATE RAILING FACES.

DETAIL C

DETAIL D

CONCRETED SANDBAGS PILLED TO A HEIGHT OF 600 mm (2') TO BLOCK OPEN SPACE

SECTION C-C

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

TEMPORARY CONCRETE BARRIER RAILING

STANDARD PLAN METRIC

6101-1

SHEET 3 OF 3
SEE SHEET 4 FOR POST BASE AND ANCHORAGE DETAIL

NOTE:

1. SEE SHEETS 2, 3 & 4 FOR SECTION VIEWS AND DETAILS.
2. SEE SHEET 2 FOR NOTES.

SECTION B-B

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

PICKET RAILING

STANDARD PLAN METRIC

APPROVED

DIRECTOR OF PUBLIC WORKS

DATE

REVISIONS

SHEET 1 OF 4
PL 65 mm x 6 mm x 100 mm (PL 2 1/2”x1/4”x0’-4”)

UPPER L C75x6.1 (C3x4.1)

SLEEVE BENT PL

POST

E

rail

POST PIPE

PICKET ROD

SECTION D-D

NOTE – UNLESS OTHERWISE INDICATED:

1. SPACE POSTS TO CLEAR EXPANSION JTS. BY 230 mm (9”) MIN. TO Ø OF POST. AT EXPANSION JTS. IN DECK, RAIL JTS. SHALL PROVIDE SAME ALLOWANCE FOR MOVEMENT WITH CORRESPONDING INCREASE IN LENGTH OF SLEEVE.

2. RAILING SHALL CONFORM TO HORIZONTAL AND VERTICAL ALIGNMENT. POSTS AND BALUSTERS SHALL BE VERTICAL WITH A MAXIMUM DEVIATION NOT TO EXCEED 6 mm (1/4”) IN 3 m (10”).

3. RAILING AND ALL PARTS AND FITTINGS SHALL BE GALVANIZED AFTER FABRICATION.

4. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
PL 65 mm x 6 mm x 100 mm
(PL 2 1/2"x1/4"x0'-4")

22 mm Ø ROD
(7/8")

POST PIPE TO
6 mm (1/4")
PL AND CHANNEL
AND PL TO CHANNEL

5 mm
(3/16")

POST PIPE

150 mm
(6")

SLEEVE, 3.42 mm
(10 GA.) BENT PL

3 mm
(1/8")

SLEEVE TO CHANNEL

13 mm (1/2") Ø
VENT HOLE

SECTION E-E

65 mm Ø PIPE
(2 1/2")

C75x6.1
(C3x4.1)

5 mm
(3/16")

50 mm
(2")

50 mm
(2")

100 mm
(4")

(6")

SECTION F-F
PL 200x19x200 (8"x3/4"x0'-8") WITH 35 mm (1 3/8") Ø HOLES.

65 mm PIPE (2 1/2")

25 mm RADIUS (1")

POST BASE

10 mm (3/8") VENT

19 mm (3/4") POST BASE

JAM NUT & CUT WASHER

19x150 mm (*6x6")

TACK WELD

19 mm (3/4") U BOLTS, 75 mm (3") THREAD

5 mm (3/16") CUT WASHER

25± mm (1±") CLASS "E" MORTAR

ANCHORAGE DETAIL

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

PICKET RAILING

STANDARD PLAN METRIC

6102-1 SHEET 4 OF 4
**POST BASE**

- 5 mm (3/16")
- 65 mm (2 1/2")
- 65 mm (2 1/2")
- 25 mm (1") RADIUS

**ANCHORAGE DETAIL**

(SEE NOTE 9)

- 19 mm (3/4") U BOLTS, 75 mm (3") THREAD
- 5 mm (3/16") CUT WASHERS
- 25 mm± (1") CLASS "E" MORTAR
- 19 x 150 mm (*6 x 0'-6")

* FOR PIPE SPLICES 6 mm (1/4"). FOR PIPE EXPANSION JT. USE SAME DIMENSION AS EXPANSION JT. IN DECK OR WALL.

**SLEEVE FORMED OF 3.43 mm (10 GA.) SHEET METAL BENT, WELDED & GROUND SMOOTH FOR A SLIDING FIT WITH PIPE.**

**SPLICE OR EXPANSION JOINT DETAIL**

SEE SHEET 4 OF 4 FOR NOTES
NOTES:

1. RAILING ASSEMBLY EXCEPT CHAIN LINK FABRIC TO BE GALVANIZED AFTER FABRICATION.
2. POSTS SHALL BE VERTICAL.
3. RAILING SHALL CONFORM TO HORIZ. AND VERT. ALIGNMENT. WHEN RAILING IS PLACED ON A CURVED HORIZ. ALIGNMENT WITH RADIUS 45 m (150') OR LESS THREAD THE 8 mm (5/16") CABLE THRU 10 mm (3/8") WELDED EYE RODS EMBEDDED 100 mm (4") INTO THE TOP OF THE CONC. PARAPET AND EQUALLY SPACED TO LIMIT THE MIDORDINATE DISTANCE BETWEEN THE 8 mm (5/16") CABLE AND THE CURVE TO 25 mm (1") MAXIMUM. HORIZ. PIPE SHALL BE BENT TO CONFORM TO HORIZ. ALIGNMENT IF RADIUS IS 45 m (150') OR LESS AND MAY BE ON 3 m (10') CHORDS IF RADIUS IS OVER 45 m (150').
4. HORIZ. PIPE SHALL BE CONTINUOUS OVER NOT LESS THAN TWO INTERMEDIATE POSTS, EXCEPT THAT A STARTER LENGTH IS PERMITTED AT EXPANSION JOINTS, ELECTROLIERS, AND OTHER RAIL DISCONTINUITIES.
5. WHEN RAIL IS ON SLOPE, PLACE FABRIC PARALLEL TO SLOPE.
6. SECURE FABRIC TO INTERMEDIATE POSTS, HORIZ. PIPE, TENSION WIRE AND CABLE WITH 3.76 mm (9 GA.) WIRE TIES AT 305 mm (12").
7. PROVIDE THIMBLES AT ALL CABLE LOOPS.
8. SEE BRIDGE PLANS FOR LIMITS OF CHAIN LINK RAILING.
9. FOR REINF. STEEL NOT SHOWN SEE BRIDGE PLANS.
10. ALTERNATE DETAILS MAY BE SUBMITTED BY THE CONTRACTOR FOR APPROVAL BY THE ENGINEER.
11. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

CHAIN LINK RAILING

STANDARD PLAN
METRIC
6103-1
SHEET 4 OF 4
WINGWALL FENCING DETAIL

NOTE:
DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

BRIDGE FENCING DETAILS

STANDARD PLAN METRIC 6104-1

APPROVED 5/31/1992 1999
DIRECTOR OF PUBLIC WORKS DATE REVISIONS
ON-BRIDGE GUARDRAIL

NOTES:
1. FOR OFF-BRIDGE TEMPORARY GUARDRAIL, SEE APPLICABLE STATE OF CALIF. STD. PLANS.
2. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

BRIDGE GUARDRAIL, TEMPORARY

STANDARD PLAN METRIC

6105-1

APPROVED: THOMAS A. GILMAN
DIRECTOR OF PUBLIC WORKS

5/31/1992

1999

REVISIONS

SHEET 1 OF 1
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* WITH GRADE 40 ONLY, WHERE AVAILABLE DEPTH IS LIMITED. BARS MAY BE BENT WITH D=5d FOR *13 (*4) THROUGH *36 (*11).

NOTES:
DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
REFERENCE: "MANUAL OF STANDARD PRACTICE", AMERICAN CONCRETE INSTITUTE.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REINFORCEMENT DETAILS

APPROVED  Thomas A. Delmano  5/31/1992  1999
DIRECTOR OF PUBLIC WORKS  DATE  REVISIONS

STANDARD PLAN METRIC

6106-1  SHEET 1 OF 2
90° HOOK

135° HOOK

<table>
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<td>150 mm (6&quot;)</td>
<td>140 mm (5 1/2&quot;)</td>
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NOTE: 135° COLUMN TIE HOOKS MAY NOT BE BENT TO LESS THAN DIAMETER OF COLUMN VERTICAL BAR ENCLOSED IN HOOK.

STIRRUP HOOKS
(TIE BENDS SIMILAR)

REFERENCE: "MANUAL OF STANDARD PRACTICE", AMERICAN CONCRETE INSTITUTE.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REINFORCEMENT DETAILS
13 mm (1/2") CHAMFER ON EXPOSED SURFACE

TOP OF WALL

13 mm (1/2") EXPANSION JOINT FILLER

JOINT DETAIL

ELEVATION AS SHOWN ON PLAN

150 mm (6") MIN.

230 mm (9")

VERTICAL FACE

MAXIMUM SLOPE IV: 1.5H (1/2H = IV)

310A17 (320-A-2500) PCC

BATTER 2.67V: 1H (4/2H = 12V)

0.028 m3 (1 CF) OF NO. 3 CONCRETE AGGREGATE IN A BURLAP SACK SECURELY TIED.

75 mm (3") DIAMETER WEEP HOLE. 4.5 m (15") O.C.

SLOPE 4% (1/2" PER FT.)

13 mm (1/2") CHAMFER

### DIMENSION TABLE

<table>
<thead>
<tr>
<th>H (m)</th>
<th>F (mm)</th>
</tr>
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<tbody>
<tr>
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### SECTION

### NOTES:

1. EXPANSION JOINTS SHALL EXTEND THROUGH THE ENTIRE HEIGHT OF WALL AND BE SPACED AT A MAXIMUM DISTANCE OF 12 m (40') OR AS DIRECTED BY THE ENGINEER.
2. F = 460 mm (18") MINIMUM WHEN RETAINING WALL IS USED AS A CULVERT END WALL.
3. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.

### LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

**GRAVITY RETAINING WALL**

**STANDARD PLAN**

**METRIC**

**6201-1**

**APPROVED**

**5/31/1992**

**DIRECTOR OF PUBLIC WORKS**

**DATE**

**1999**

**REVISED**

**SHEET 1 OF 1**
SEE NOTE 7 FOR INSTALLATIONS WITH FENCE

ELEV. AS DETERMINED BY ENGINEER

50 mm (2") Ø WEEP HOLES 4.5 M (15") ON CENTER WHEN H = 460 mm (18") OR MORE

SLOPE 4% (1/2" PER FT.)

PCC SIDEWALK

CURB & GUTTER

310C17P (520-C-2500 PCC)

CASE I

FULL WIDTH SIDEWALK

SEE CASE I

PCC SIDEWALK

CURB & GUTTER

OPTIONAL 150 mm X 150 mm (6" X 6") KEYWAY SEE NOTE 6

1.2 m MIN. (4")

CASE II

PARTIAL WIDTH SIDEWALK

SLOPE IV: 3H (3H:IV) OR AS DETERMINED BY ENGINEER

HOUSEWALK OR DRIVEWAY

ELEVATION

SEE SHEET 3 FOR NOTES

WALL TRANSITION AT DRIVEWAY OR HOUSEWALK

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

CONCRETE SLOUGH WALL

STANDARD PLAN METRIC

6203-1

APPROVED

DIRECTOR OF PUBLIC WORKS

DATE

REVISIONS

5/31/1992

1999

SHEET 1 OF 3
<table>
<thead>
<tr>
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<th>W = mm (IN.)</th>
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<td>910 (36)</td>
<td>460 (18)</td>
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</table>

SEE SHEET 3 FOR NOTES

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

CONCRETE SLOUGH WALL

STANDARD PLAN
METRIC
6203-1
SHEET 2 OF 3
NOTES:

1. CONCRETE SHALL BE PER APWA "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION".

2. CONCRETE SLOUGH WALL TO BE USED ONLY IN CONJUNCTION WITH SIDEWALK ABUTTING THE WALL.

3. BACKFILL SHALL NOT BE PLACED BEHIND WALL UNTIL SIDEWALK IS IN PLACE.

4. NO MECHANICAL COMPACTION ON WALL BACKFILL SHALL BE PERMITTED.

5. EXPANSION JOINTS SHALL BE PLACED AT 15 m (50') INTERVALS OR AS DIRECTED BY ENGINEER.

6. HEIGHT LIMITS AS FOLLOWS:
   CASE I:
   MAXIMUM H = 910 mm (36 INCHES)
   CASE II:
   A. FOR SLOPES BETWEEN IV:3H (3H:IV) AND IV:1.5H (1-1/2H:IV)
      MAXIMUM H = 300 mm (12 INCHES)
   B. FOR SLOPES IV:3H (3H:IV) OR FLATTER
      MAXIMUM H = 460 mm (18 INCHES)
   C. WITH 150 mm x 150 mm (6"x6") KEYWAY, WALL HEIGHT MAY BE INCREASED 250 mm (10 INCHES)

7. WHERE FENCING IS INSTALLED AT TOP OF WALL THE MINIMUM WALL THICKNESS (W) SHALL BE 200 mm (8 INCHES) AND DEPTH (D) SHALL BE 300 mm (12 INCHES). FENCE POST SHALL BE SET PER APWA STD. 600.

8. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.
TYPICAL SECTION

NOTE:
Dimensions shown on the plan for metric and English units are not exactly equal values. If metric units are used, all values used for construction shall be metric values. If English units are used, all values used for construction shall be English values.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

CANTILEVER SOLDIER BEAM RETAINING WALL
WITH REINFORCED CONCRETE PANELS

6204-1

STANDARD PLAN
METRIC

12/21/1994 1999

SHEET 1 OF 5

DATE REVISIONS
PRECAST PANEL DETAIL E

CAST TOP OF TOP ROW OF PANELS WITHOUT KEY.
SEE DETAIL "B", SH.2 FOR DOWELS INTO CAP

165 mm
(6 1/2"

75 mm
(3"

FRONT FACE

50 mm (2"), CL.

16 (5) BARS, TOTAL 5

13 400 mm (4 16")

75 mm
(3"

CAST BOTTOM OF BOTTOM ROW OF PANELS WITHOUT KEY

* DIMENSIONS SHALL BE
610 mm (2'-0") MIN. AND
910 mm (3'-0") MAX.

50 mm TYP
(2"

970 mm (3'-2"

* Varies Top & Bottom Panels

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

CANTILEVER SOLDIER BEAM RETAINING WALL WITH REINFORCED CONCRETE PANELS

STANDARD PLAN METRIC

6204-1

SHEET 4 OF 5
SPECIFICATIONS

DESIGN:

A.A.S.H.T.O. STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES.

DESIGN STRESSES:

CONCRETE:

f'c = 25 MPa (3,250 psi)

STRUCTURAL STEEL A36M (A36):

fs = 140 MPa (20,000 psi)

REINFORCING STEEL GRADE 420 (60)

fy = 420 MPa (60,000 psi)

DESIGN DATA:

ACTIVE E.F.P.

CASE I IV:1.5H (1.5H: IV)

MAX. SLOPE W/O SURCHARGE = 13.7 kN/m3 (87 PCF)

CASE II LEVEL BACKFILL W/2' SURCHARGE = 7.1 kN/m3 (45 PCF)

PASSIVE E.F.P.

= 62.8 kN/m3 (400 PCF)

MAXIMUM PASSIVE PRESSURE

= 190 kPa (4,000 PSF)

PILE WIDTH FACTOR

= 2

CONSTRUCTION:

STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SCHEDULE

<table>
<thead>
<tr>
<th>DESIGN HEIGHT</th>
<th>STEEL SCHEDULE</th>
<th>REQUIRED EMBEDMENT ** IN BEDROCK</th>
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<tbody>
<tr>
<td>H = m (ft) *</td>
<td>CASE I</td>
<td>CASE II</td>
</tr>
<tr>
<td></td>
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<td>HP305x78.9 (HPI2x53)</td>
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<tr>
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<td>2.4 (8')</td>
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<td>1.8 (6')</td>
<td>3.6 (12')</td>
<td>3.0 (10')</td>
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<tr>
<td>2.4 (8')</td>
<td>4.8 (16')</td>
<td>4.0 (13')</td>
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<tr>
<td>3.0 (10')</td>
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<tr>
<td>3.6 (12')</td>
<td>7.6 (25')</td>
<td>5.5 (18')</td>
</tr>
</tbody>
</table>

* DESIGN H MAY BE EXCEEDED BY 150 mm (6") BEFORE GOING TO THE NEXT SIZE.
** TO BE VERIFIED BY SOIL ENGINEER

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

CANTILEVER SOLDIER BEAM RETAINING WALL WITH REINFORCED CONCRETE PANELS

STANDARD PLAN

METRIC

6204-1

SHEET 5 OF 5
SECTION 7

Waterworks
INDEX TO STANDARD PLANS

W-34  FLUSH-OUT - COMPLETE (200 PSI MAX. W.W.P., PARALLEL TO MAIN)
W-35  STEEL PIPE JOINT DETAILS
W-36  SERVICE TAP 2" AND SMALLER
W-37  (NOT USED)
W-38  CATHODIC PROTECTION - INSULATED JOINT TEST STATION
W-39  CATHODIC PROTECTION - SHALLOW Mg ANODE TEST STATION
W-40  (NOT USED)
W-41  (NOT USED)
W-42  (NOT USED)
W-43  STANDARD ELECTRICAL SYMBOLS
W-44  BOOSTER PUMP ELECTRICAL SCHEMATIC
W-45  BOOSTER CONTROLS
W-46  PIPE TRENCH
W-47  WELL COVER
W-48  CABLE TOOL WELL HEAD
W-49  MINIMUM PUBLIC SAFETY REQUIREMENTS
W-50  REQUIREMENTS FOR WATER MAINS IN THE VICINITY OF SANITARY SEwers
W-51  (NOT USED)
W-52  (NOT USED)
W-53  PUMP WELL
LOS ANGELES COUNTY WATERWORKS DISTRICTS
DEPARTMENT OF PUBLIC WORKS

INDEX TO STANDARD PLANS

W-1 (NOT USED)
W-2 (NOT USED)
W-3 LEGEND
W-4 FLUSH-OUT 2" BURIED
W-5 WATER SERVICE CONNECTION AND METER (2" AND SMALLER, 149 PSI MAX. W.W.P.)
W-6 BACKFLOW PREVENTION DETECTOR ASSEMBLY
W-7 WATER SERVICE CONNECTION AND METER (2" AND SMALLER, 150 TO 500 PSI W.W.P.)
W-8 FIRE HYDRANT - COMPLETE (200 PSI MAX. W.W.P., LATERAL AT RIGHT ANGLE TO MAIN)
W-9 FIRE HYDRANT - COMPLETE (200 PSI MAX. W.W.P., PARALLEL TO MAIN)
W-10 FIRE HYDRANT - COMPLETE (250 PSI MAX. W.W.P., LATERAL AT RIGHT ANGLE TO MAIN)
W-11 FIRE HYDRANT - COMPLETE (250 PSI MAX. W.W.P., PARALLEL TO MAIN)
W-12 (NOT USED)
W-13 BOOSTER PUMP SUCTION CAN
W-14 BARRICADES - FIRE HYDRANT AND OTHER
W-15 ADJUSTABLE VALVE BOX
W-16 AIR RELEASE AND VACUUM VALVE ASSEMBLY
W-17 ADJUSTABLE PIPE SUPPORT
W-18 FLEXIBLE COUPLING TIES (FOR ABOVEGROUND INSTALLATIONS OR IN VAULTS)
W-19 GRAVEL ENVELOPE WELL HEAD
W-20 WELL SLAB AND PEDESTAL
W-21 CONCRETE THRUST BLOCKS
W-22 CUTTING AND PLUGGING WATER MAINS
W-23 (NOT USED)
W-24 TANK - SPIRAL STAIRWAY
W-25 TANK - VERTICAL EXTERIOR LADDER
W-26 TANK - VERTICAL INTERIOR LADDER
W-27 TANK - ROOF ACCESS HATCH DETAILS
W-28 TANK - 36" MONOBOLT ACCESS HOLE
W-29 TANK - STILLING WELL DETAILS
W-30 TANK - CLEANOUT DOOR
W-31 TANK - ROOF VENT DETAILS
W-32 FLUSH-OUT - COMPLETE (200 PSI MAX. W.W.P., AT END OF MAIN)
W-33 FLUSH-OUT - COMPLETE (200 PSI MAX. W.W.P., LATERAL AT RIGHT ANGLE TO MAIN)
FLUSHOUT 2' BURIED

2' BLANK COVER
2' ANGLE STOP W/LOCKING EARS TO BE OFF UNTIL USED
#6 BOX AND LID
TYPE 'K' COPPER TUBING
2' COPPER 45° ELBOW
2' COPPER 90° ELBOW
2' CORP. STOP

STANDARD SERVICE CONNECTION - 2' COPPER

JONES F.H.
2 1/2" OUTLET
2' GALV PIPE
2' I.P. X COPPER ADAPTER
2' COPPER 90° ELBOW
2' COPPER METER FLANGE
2' COPPER NIPPLE

NOTE: SEE STANDARD DRAWING NOS. W-5, W-7, & W-36

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

STANDARD PLAN

W-4

APPROVED

Assistant Deputy Director

AUGUST 1993

SHEET 1 OF 1
WATER SERVICE CONNECTION AND METER
(2" AND SMALLER, 149 PSI MAX. W.W.P.)

METER BOX (SEE TABLE)
COVER WITH HINGED METAL READING LID

WATER METER
SEE NOTE 6 AND 7
ANGLE METER STOP W/LOCK WING.
DISTRICT TO FURNISH & INSTALL LOCK.
LEAVE STOP CLOSED. SEE NOTE 4

PROPERTY LINE

CUSTOMER BALL VALVE
SEE NOTE 8 AND 9

PROVIDE 2" X 2" BRICK SUPPORT
FOR 1 1/2" AND 2" METERS

1 1/2" & 2" COPPER ELBOW 90°

FLARED FITTING

COPPER WATER TUBING,
TYPE "K" SOFT

SEE TABLE
FOR JOINING TUBING, USE
COPPER CPLG. BRAZED WITH
SILVER BRAZING ALLOY

45° MIN.
60° MAX.

1 1/2" & 2" COPPER ELBOW 45°

SEE TABLE

MIN. CLR.

12" CLR.

MIN. CLR.

ANOTHER SUBSTRUCTURE-
CORPORATION STOP
I-P X COPPER FLARE
LEAVE STOP OPEN

SEE NOTES 2 & 3

WATER MAIN - FOR STEEL PIPE
& FOR RESTORATION OF PIPE
COATING SEE STD PLAN W-36

<table>
<thead>
<tr>
<th>METER VALVE SIZE</th>
<th>MAIN BALL VALVE SIZE</th>
<th>MIN. SIZE TUBING</th>
<th>MIN. RADIUS TUBING BEND</th>
<th>CONCRETE METER BOX NOMINAL INSIDE DIMENSION</th>
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<td>1&quot;</td>
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<td>18&quot;</td>
<td>13&quot;W X 24&quot;L X 12&quot;D</td>
</tr>
<tr>
<td>1 1/2&quot;</td>
<td>1 1/2&quot;</td>
<td>1/2&quot;</td>
<td>COPPER ELBOW</td>
<td>17&quot;W X 30&quot;L X 12&quot;D</td>
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<td>2&quot;</td>
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<td>2&quot;</td>
<td>COPPER ELBOW</td>
<td>17&quot;W X 30&quot;L X 12&quot;D</td>
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LOS ANGELES COUNTY WATERWORKS DISTRICTS
DEPARTMENT OF PUBLIC WORKS

APPROVED
ASSISTANT DEPUTY DIRECTOR

OCTOBER 1999
DATE

STANDARD PLAN
W-5

SHEET 1 OF 2
NOTES:

1. NO METER BOX SHALL BE INSTALLED CLOSER THEN 5 FEET FROM EDGE OF DRIVEWAY APRON. IN ABSENCE OF CURB, OR AS REQ'D., METER BOX IS TO HAVE A METAL TRAFFIC COVER WITH A HINGED METAL READING LID.

2. MINIMUM DISTANCE BETWEEN SERVICE TAPS ON MAIN OR TO A BELL, COUPLING, JOINT, OR FITTING IS 36".

3. USE MALLEABLE-IRON OR DUCTILE-IRON DOUBLE STRAP CLAMPS ON CAST IRON, DUCTILE-IRON, AND STEEL PIPE (LESS THAN 10 GA WALL THICKNESS). USE BRONZE DOUBLE STRAP CLAMPS ON A.C. PIPE. USE A WELDED THREADED OUTLET ON STEEL PIPE (WALL THICKNESS 10 GA AND GREATER). ON ALL METALIC MAINS, INSTALL AN INSULATING BUSHING BETWEEN CLAMP OR WELDED THREADED OUTLET AND STOP. CLAMP OR WELDED OUTLET SHALL HAVE OUTLET ONE SIZE LARGER THAN STOP TO ALLOW FOR BUSHING. (SEE STANDARD PLAN W-36.)

4. TEST AT SYSTEM PRESSURE AND FLUSH SERVICE LINE BEFORE LOCKING.

5. ONLY EXCAVATED SOIL OR CONSTRUCTION SAND APPROVED BY DISTRICT IS TO BE USED TO BACKFILL TRENCH. NO TRASH IS TO BE LEFT IN TRENCH.

6. FRONT EDGE OF METER BOX TO BE PLACED AGAINST REAR OF CURB EXCEPT WHEN THERE IS A 5-FOOT SIDEWALK ADJACENT TO REAR OF CURB. THEN, FRONT EDGE OF METER BOX TO BE PLACED AGAINST REAR OF 5-FOOT SIDEWALK.

7. ALL SERVICE CONNECTIONS SHALL BE INSTALLED FROM THE MAIN IN THE STREET FROM WHICH THE HOUSE IS NUMBERED, AT RIGHT ANGLES TO THE WATER MAIN, AS CLOSE AS POSSIBLE TO THE CENTER OF THE LOT, AND NOT CLOSER THAN 5 FEET TO ANY DRIVEWAY, WALKWAY, CURB RETURN, OR OTHER UTILITY UNLESS OTHERWISE NOTED ON PLAN.

8. ALL 1-INCH AND SMALLER STANDARD METERS SHALL BE SUPPLIED WITH ONE (1) BRONZE METER COUPLING, TAILPIECE, AND (2) UNTREATED RUBBER GASKETS. (NOTE: PAPER OR LEATHER GASKETS ARE NOT ACCEPTABLE.)

9. ALL 1½-INCH AND 2-INCH METERS SHALL HAVE FLANGE CONNECTIONS ON THE MAIN CASE. BE SUPPLIED WITH TWO BRONZE COMPANION FLANGES. AND ALL NECESSARY BOLTS, NUTS AND RUBBER GASKETS.
BACKFLOW PREVENTION DETECTOR ASSEMBLY

AS REQUIRED BY LOCAL AGENCY

TEE, VALVE AND VALVE BOX AS REQUIRED FOR CONNECTION AND APPROVED BY DISTRICT

BACK OF SIDEWALK

FLOW

INSTALLED PER PLANS AND SPECIFICATIONS, OWNED AND MAINTAINED BY L.A. COUNTY WATERWORKS DISTRICTS INCLUDING THE BYPASS METER ON THE DETECTOR ASSEMBLY

INSTALLED BY OWNER/DEVELOPER: MAINTAINED BY OWNER/DEVELOPER, EXCEPT BYPASS METER ON THE DETECTOR ASSEMBLY

EASEMENT TO L.A. COUNTY WATERWORKS DISTRICT.

PLAN VIEW

NTS

* THIS DIMENSION PER APPROVED PLANS.

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

STANDARD PLAN

W-6

APPROVED

DEAR O. EDOLE

ASSISTANT DEPUTY DIRECTOR

SEPTEMBER 1999

DATE

SHEET 1 OF 2
LIST OF MATERIALS

A. BACKFLOW PREVENTION DETECTOR ASSEMBLY FROM THE DISTRICT'S APPROVED LIST. LEVEL OF PROTECTION SHALL BE DETERMINED BY THE DISTRICT AND IS DEPENDENT ON THE TYPE OF WATER USE ON-SITE.

B. VICTUALIC NIPPLE, GROOVED END X FLANGED END, STEEL SCHEDULE 40, CLASS 150 FLANGE (6" LONG EACH), EPOXY LINED.

C. VICTUALIC COUPLING STYLE NO. 77 OR OTHER DISTRICT APPROVED COUPLING FOR GROOVED END PIPE.

D. SLIP-ON WELDING FLANGE, CLASS 150.

E. STEEL PIPE SCHEDULE 40, CML & CMC.

F. 90° FLANGED ELBOW: STEEL SCHEDULE 40, CLASS 150 FLANGE, CML & CMC.

G. CONCRETE THRUST BLOCK, PER STD DRAWING W-21.

H. 90° FLANGED ELBOW: STEEL SCHEDULE 40, CLASS 150 FLANGE, CML.

I. INSULATING GASKET KIT WITH BOLT SLEEVES FOR CLASS 150 FLANGE.

J. ADJUSTABLE PIPE SUPPORT PER STD DRAWING W-17. CONCRETE PIER REQUIRED FOR ASSEMBLIES INSTALLED WITHOUT CONCRETE SLAB.

K. CONCRETE SLAB: 4-INCH MINIMUM THICKNESS. TYPE S20-C-2500 CONCRETE WITH 6" X 6" WIRE MESH PLACED AT 1/3 FROM THE BASE OF THE SLAB. SLAB SHALL BE SLOPED TO DRAIN TO THE STREET AND HAVE A LIGHT BROOM FINISH.

L. CONCRETE BLOCK ENCLOSURE OR OTHER ENCLOSURE/SCREEN AS REQUIRED AND APPROVED BY THE LOCAL AGENCY. THE DISTRICT RESERVES THE RIGHT TO REQUIRE AN ENCLOSURE EVEN IF NOT REQUIRED BY THE PERMITTING AGENCY. SEE NOTE 5.

NOTES: 1. SIZES AS REQUIRED BY THE PLANS AND/OR SPECIFICATIONS.
   2. ALL MATERIALS SHALL COMPLY WITH THE SPECIFICATIONS AND/OR "GREENBOOK", AS APPLICABLE.

NOTES

1. THE BACKFLOW PREVENTION DETECTOR ASSEMBLY MUST BE ON THE DISTRICT'S CURRENT LIST OF APPROVED BACKFLOW PREVENTION ASSEMBLIES. WATER SERVICE SHALL BE CONTINGENT UPON TESTING AND CERTIFICATION OF THE ASSEMBLY BY A BACKFLOW TESTER CERTIFIED IN LOS ANGELES COUNTY. SUBSEQUENT TO THE INITIAL CERTIFICATION, THE PROPERTY OWNER SHALL BE RESPONSIBLE FOR SUBMITTING AN ANNUAL TEST CERTIFICATION TO THE DISTRICT. ALL TESTING PROCEDURES AND CERTIFICATION SHALL BE CONDUCTED AT OWNER'S EXPENSE.

2. BYPASS METER SHALL HAVE: AN ALL BRONZE MAIN CASE, REGISTER BOX, LID AND BOTTOM PLATE; A SEALED, TAMPER PROOF REGISTER, MEASURE IN CUBIC FEET AND BE APPROVED BY THE WATERWORKS DISTRICT. THE BYPASS METER SHALL BE PLACED ON THE SIDE OF THE DEVICE THAT IS CLOSEST TO THE ENTRANCE THROUGH THE ENCLOSURE.

3. ALL ABOVEGROUND PIPING, VALVES, AND FITTINGS SHALL BE PAINTED WITH TWO (2) COATS OF RUST-OLEUM NO. 1065 HEAVY-DUTY RED PRIMER, OR EQUIVALENT, AND TWO (2) COATS OF RUST-OLEUM NO. 0865 (DUNES TAN) OR NO. 1282 (FOREST GREEN), OR EQUIVALENT.

4. THE CONTRACTOR AND/OR OWNER IS RESPONSIBLE FOR INSTALLING AND MAINTAINING INSULATION ON ALL ABOVEGROUND PIPING AND FITTINGS IN AREAS SUBJECT TO FREEZING. THE INSULATION MUST NOT INTERFERE WITH ACCESS TO OR READING OF THE BYPASS METER.

5. IF THE BACKFLOW PREVENTION ASSEMBLY IS TO BE ENCLOSED/SCREENED, THEN THE ENCLOSURE/SCREEN MUST MEET THE FOLLOWING CRITERIA:
   A. THE CLEARANCE BETWEEN THE ENCLOSURE/SCREEN AND THE ASSEMBLY SHALL BE NO LESS THAN 2 FEET.
   B. IF A RETAINING WALL IS NECESSARY, IT SHALL BE LOCATED OUTSIDE OF THE DISTRICT EASEMENT.
   C. THE PROPERTY OWNER SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF ANY ENCLOSURE/SCREEN.
   D. THE ENCLOSURE/SCREEN SHALL BE CONSTRUCTED TO ALLOW UNRESTRICTED DRAINAGE TO THE STREET.
NOTES:

1. NO METER BOX SHALL BE INSTALLED CLOSER THEN 5 FEET FROM EDGE OF DRIVEWAY APRON. IN ABSENCE OF CURB, OR AS REQ'D., METER BOX IS TO HAVE A METAL TRAFFIC COVER WITH A HINGED METAL READING LID.

2. MINIMUM DISTANCE BETWEEN SERVICE TAPS ON MAIN OR TO A BELL. COUPLING, JOINT, OR FITTING IS 36”.

3. USE MALLEABLE-IRON OR DUCTILE-IRON DOUBLE STRAP CLAMPS ON CAST IRON, DUCTILE-IRON, AND STEEL PIPE (LESS THAN 10 GA WALL THICKNESS). USE BRONZE DOUBLE STRAP CLAMPS ON A.C. PIPE. USE A WELDED THREADED OUTLET ON STEEL PIPE (WALL THICKNESS 10 GA AND GREATER). ON ALL METALIC MAINS, INSTALL AN INSULATING BUSHING BETWEEN CLAMP OR WELDED THREADED OUTLET AND STOP. CLAMP OR WELDED OUTLET SHALL HAVE OUTLET ONE SIZE LARGER THAN STOP TO ALLOW FOR BUSHING. (SEE STANDARD PLAN W-36.)

4. TEST AT SYSTEM PRESSURE AND FLUSH SERVICE LINE BEFORE LOCKING.

5. ONLY EXCAVATED SOIL OR CONSTRUCTION SAND APPROVED BY DISTRICT IS TO BE USED TO BACKFILL TRENCH. NO TRASH IS TO BE LEFT IN TRENCH.

6. FRONT EDGE OF METER BOX TO BE PLACED AGAINST REAR OF CURB EXCEPT WHEN THERE IS A 5-FOOT SIDEWALK ADJACENT TO REAR OF CURB. THEN, FRONT EDGE OF METER BOX TO BE PLACED AGAINST REAR OF 5-FOOT SIDEWALK.

7. ALL SERVICE CONNECTIONS SHALL BE INSTALLED FROM THE MAIN IN THE STREET FROM WHICH THE HOUSE IS NUMBERED, AT RIGHT ANGLES TO THE WATER MAIN, AS CLOSE AS POSSIBLE TO THE CENTER OF THE LOT, AND NOT CLOSER THAN 5 FEET TO ANY DRIVEWAY, WALKWAY, CURB RETURN, OR OTHER UTILITY UNLESS OTHERWISE NOTED ON PLAN.

8. ALL 1-INCH AND SMALLER HIGH PRESSURE METERS SHALL BE SUPPLIED WITH ONE (1) BRONZE METER COUPLING, TAILPIECE, AND (2) UNTREATED RUBBER GASKETS. (NOTE: PAPER OR LEATHER GASKETS ARE NOT ACCEPTABLE.)

9. ALL 1½-INCH AND 2-INCH METERS SHALL HAVE FLANGE CONNECTIONS ON THE MAIN CASE, BE SUPPLIED WITH TWO BRONZE COMPANION FLANGES, AND ALL NECESSARY BOLTS, NUTS AND RUBBER GASKETS.
FIRE HYDRANT - COMPLETE
(200 PSI MAX. WWP, LATERAL AT RIGHT ANGLE TO MAIN)

2 1/2" TAPPED OUTLET
AND PLUG

6" X 4" X 2 1/2" FIRE
HYDRANT HEAD

SET F.H. OUTLETS:
AT 45° TO CURBLINE OF STREET
6" STEEL PIPE NIPPLE, THREADED BOTH ENDS,
SCH. 40-18" LONG, GALV. (SEE NOTE 8)
HOLLOW BOLTS WITH EXTRA LONG NUTS, (SEE NOTE 7)

36" X 36" X 12" CONC.
BLOCK W/ SIDEWALK
FINISH

6" SLIP-ON WELD
FLANGE, CL 150

WELD NUTS TO
BOTTOM FLANGE

6" SLIP-ON WELD
FLANGE, CL 150

ANCHOR
ROD

6" 90° FLG'D ELBOW,
O.L., PR 350
W/CL 125 DRILLING, CML
OR STL, SCH 40, FLG.
CL 150, CML & CMC

6" SLIP-ON WELD
FLANGE, CL 150

SEE NOTE 6

SEE NOTES 4 AND 5

10'-0" MINIMUM (SEE NOTE 9)

GENERAL NOTES:
1. IN THE ABSENCE OF A CURB, SET BOTTOM OUTLET 24-INCHES ABOVE CROWN OF ROAD AND PROVIDE STEEL PIPE BARRICADES AS DIRECTED BY DISTRICT. (SEE STD. DWG. W-14)
2. CENTERLINE OF RISER SHALL BE 2 FEET BEHIND CURB FACE EXCEPT WHERE 5-FOOT WIDE SIDEWALK IS ADJACENT TO CURB, IN WHICH CASE THE RISER SHALL BE AT 6 FEET OR AS SHOWN ON THE PLANS. (ALSO SEE NOTE 10)
3. NO FIRE HYDRANT SHALL BE INSTALLED CLOSER THAN FIVE FEET FROM EDGE OF ANY DRIVEWAY APRON
4. USE 2000 PSI MINIMUM CONCRETE FOR THRUST BLOCKS AND HYDRANT PAD. PLACE CONCRETE ON UNDISTURBED OR COMPACTED SOIL
5. SEE STD. DWG. W-21 FOR THRUST BLOCK REQUIREMENTS
6. ALL UNCOATED METAL SURFACES INCLUDING BOLTS INSTALLED UNDERGROUND ARE TO BE "DIAPERED" AND GROUTED WITH 900-
1000 PSI CEMENT MORTAR (1 CEMENT: 3 SAND: 1 LIME) TO PROVIDE A 2-INCH THICK COATING
7. THE BOLTS AND NUTS CALLED FOR AT THE TOP FLANGE CONNECTION ON THE RISER SHALL BE 3/4" HOLLOW BOLTS FURNISHED BY
THE DISTRICT
8. THE EXTERIOR OF THE ABOVE GROUND PORTION OF THE HYDRANT, EXCEPT FOR THE THREADS SHALL BE PAINTED WITH 2
COATS OF RED-PRIMER RUST-OLEUM #069 AND 2 COATS OF RUST-OLEUM YELLOW #944
9. INTERMEDIATE PIPE JOINTS IN LATERAL SHALL BE EITHER LAP OR BELL, WELDED OR FLANGED. PIPE SHALL BE INSTALLED HORIZON-
TAL OR SLOPING DOWNWARD FROM MAIN TO PROVIDE MINIMUM COVER
10. FOR FIRE HYDRANT LOCATION WITHIN THE CITY OF LANCASTER REFER TO THE CITY OF LANCASTER STANDARD PLAN PW-1
11. OUTLETS SHALL BE CAPPED WITH APPROVED PLASTIC CAPS

LOS ANGELES COUNTY WATERWORKS DISTRICTS
DEPARTMENT OF PUBLIC WORKS

APPROVED

ASSISTANT DEPUTY DIRECTOR

STANDARD PLAN
W-8

OCTOBER 1998
DATE

SHEET 1 OF 1
FIRE HYDRANT - COMPLETE
(200 PSI MAX WWP, PARALLEL TO MAIN)

PLAN VIEW

2 1/2' TAPPED OUTLET AND PLUG

6" x 4" x 2 1/2" FIRE HYDRANT HEAD

36" x 36" x 12" CONC. BLOCK W/ SIDEWALK FINISH

SET F.H. OUTLETS AT 45° TO CURB LINE OF STREET

6" STEEL PIPE NIPPLE, THREADED BOTH ENDS, SCH. 40-18" LONG, GALV. (SEE NOTE 10)
HOLLOW BOLTS WITH EXTRA LONG NUTS (SEE NOTE 1)

6" SCREWED FLANGE, STL., CL. 150

WELD NUTS TO BOTTOM FLG.
6" SLIP-ON WELD. FLANGE, CL. 150

SEE NOTES 5 AND 6

ANCHOR ROD

6" 90° FLG'D ELBOW, D.I., PR 350 W/CL 125 DRILLING, CML OR STL., SCH 40,
FLG. CL. 150, CML & CMC

SEE NOTE 7

10'-0" MIN. SEE NOTE 10

SECTION A-A

SECTION B-B

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

STANDARD PLAN

W-9

APPROVED  OCTOBER 1998
DEAN D. ESTEVICH  SHEET 1 OF 2
ASSISTANT DEPUTY DIRECTOR
GENERAL NOTES:

1. THE BOLTS AND NUTS CALLED FOR AT THE TOP FLANGE CONNECTION ON THE RISER SHALL BE 3/4" HOLLOW BOLTS FURNISHED BY THE DISTRICT.
2. IN THE ABSENCE OF A CURB, SET BOTTOM OUTLET 24-INCHES ABOVE CROWN OF ROAD AND PROVIDE STEEL PIPE BARRICADES AS DIRECTED BY DISTRICT. (SEE STD. DWG. W-14)
3. CENTERLINE OF RISER SHALL BE 2 FEET BEHIND CURB FACE EXCEPT WHERE 5 FOOT WIDE SIDEWALK IS ADJACENT TO CURB, IN WHICH CASE THE RISER SHALL BE AT 6 FEET OR AS SHOWN ON THE PLANS. (ALSO SEE NOTE 8)
4. NO FIRE HYDRANT SHALL BE INSTALLED CLOSER THAN FIVE FEET FROM EDGE OF ANY DRIVEWAY APRON.
5. USE 2000 PSI MINIMUM CONCRETE FOR THRUST BLOCKS AND HYDRANT PAD. PLACE CONCRETE ON UNDISTURBED OR COMPACTED SOIL.
6. SEE STD. DWG. W-21 FOR THRUST BLOCK REQUIREMENTS.
7. ALL UNCOATED METAL SURFACES INCLUDING BOLTS INSTALLED UNDERGROUND ARE TO BE "DIAPERED" AND GROUTED WITH 900-1000 PSI CEMENT MORTAR (1 CEMENT: 3 SAND: 1 LIME) TO PROVIDE A 2-INCH THICK COATING.
8. FOR FIRE HYDRANT LOCATION WITHIN THE CITY OF LANCASTER REFER TO THE CITY OF LANCASTER STANDARD PLAN PW-1.
10. INTERMEDIATE PIPE JOINTS IN LATERAL SHALL BE EITHER LAP OR BELL WELDED OR FLANGED. PIPE SHALL BE INSTALLED HORIZONTAL OR ELBOW DOWNWARD FROM MAIN TO PROVIDE MINIMUM COVER.
11. OUTLETS SHALL BE CAPPED WITH APPROVED PLASTIC CAPS.
GENERAL NOTES:

1. IN THE ABSENCE OF A CURB, SET BOTTOM OUTLET 24-INCHES ABOVE CROWN OF ROAD AND PROVIDE STEEL PIPE BARRICADES AS DIRECTED BY DISTRICT. (SEE STD. DWG. W-14)

2. CENTERLINE OF RISER SHALL BE 2 FEET BEHIND CURB FACE EXCEPT WHERE 5-FOOT WIDE SIDEWALK IS ADJACENT TO CURB, IN WHICH CASE THE RISER SHALL BE AT 6 FEET OR AS SHOWN ON THE PLANS. (ALSO SEE NOTE 10)

3. NO FIRE HYDRANT SHALL BE INSTALLED CLOSER THAN FIVE FEET FROM EDGE OF ANY DRIVEWAY Apron.

4. USE 2000 PSI MINIMUM CONCRETE FOR THRUST BLOCKS AND HYDRANT PAD. PLACE CONCRETE ON UNDISTURBED OR COMPACTED SOIL.

5. SEE STD. DWG. W-2 FOR THRUST BLOCK REQUIREMENTS.

6. ALL UNCOATED STEEL SURFACES INCLUDING BOLTS INSTALLED UNDERGROUND ARE TO BE "DIAPERED" AND GROUTED WITH 900-1000 PSI CEMENT MORTAR (II CEMENT: 3 SAND: 1 LIME) TO PROVIDE A 2-INCH THICK COATING

7. THE BOLTS AND NUTS CALLED FOR AT THE TOP FLANGE CONNECTION ON THE RISER SHALL BE 3/4" HOLLOW BOLTS FURNISHED BY THE DISTRICT.


9. INTERMEDIATE PIPE JOINTS IN LATERAL SHALL BE EITHER LAP OR BELL WELDED OR FLANGED. PIPE SHALL BE INSTALLED HORIZONTALLY OR ELBOW DOWNWARD FROM MAIN TO PROVIDE MINIMUM COVER.

10. FOR FIRE HYDRANT LOCATION WITHIN THE CITY OF LANCASTER REFER TO THE CITY OF LANCASTER STANDARD PLAN PW-1

11. OUTLETS SHALL BE CAPPED WITH APPROVED PLASTIC CAPS.
GENERAL NOTES:

1. THE BOLTS AND NUTS CALLED FOR AT THE TOP FLANGE CONNECTION ON THE RISER SHALL BE 3/4" HOLLOW BOLTS FURNISHED BY THE DISTRICT.
2. IN THE ABSENCE OF A CURB, SET BOTTOM OUTLET 24-INCHES ABOVE CROWN OF ROAD AND PROVIDE STEEL PIPE BARRICADES AS DIRECTED BY DISTRICT. (SEE STD. DWG. W-14)
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5. USE 2000 PSI MINIMUM CONCRETE FOR THRUST BLOCKS AND HYDRANT PAD. PLACE CONCRETE ON UNDISTURBED OR COMPACTED SOIL.
6. SEE STD. DWG. W-21 FOR THRUST BLOCK REQUIREMENTS.
7. ALL UNCOATED STEEL SURFACES INCLUDING BOLTS INSTALLED UNDERGROUND ARE TO BE "DIAPERED" AND GROUTED WITH 900-1000 PSI CEMENT MORTAR (I CEMENT: 3 SAND: 1 LIME) TO PROVIDE A 2-INCH THICK COATING.
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11. OUTLETS SHALL BE CAPPED WITH PLASTIC CAPS.
PUMP MOUNTING PLATE

1. HOLES FOR BOLTS. DRILL AND TAP TO STRADDLE C OF PLATE AS SHOWN.

2. THE STEEL PLATE IS TO BE MADE OF CARBON STEEL CONFORMING TO A.S.T.M. SPEC. A181 GRADE II.

STEEL BUTT-WELDING CAP
BARRICADES - FIRE HYDRANT & OTHER

PLAN
FIRE HYDRANT BARRICADES
(SEE NOTE 6)

CONCRETE CAP

6' OF 4' STD. STEEL PIPE,
SCH. 40 CONC. FILLED (FOR
HPFH, USE 6' STD. STL. PIPE)

CONCRETE

BARRICADE DETAILS

PLANT
OTHER BARRICADES
(SEE NOTE 7)

4' WIDE X 1/4" THICK
FLAT BAR HORIZ.
BRACES MAY BE REQ'D.
BRACES TO BE SET ABOVE
HYDRANT OUTLETS
(INSTALL REFLECTORS
AS REQUIRED)

3' 45° 45° 45°
36° MIN.
36° MIN.
30° MIN.

HYP DJL
45° 45° 45°
36° MIN.
30° MIN.

NOTES:

1. FOR METER BOX MARKERS, THE MARKING SHALL BE "METER" AND THE
   HOUSE NO. ON THE BARRICADE IN SAME MANNER AS FOR VALVE MARKERS.

2. FOR VALVE MARKERS, THE LETTERS "VALVE" AND DISTANCE TO VALVE IN
   FEET SHALL BE WELDED OR BRAZED VERTICALLY ON BARRICADE IN 2 INCH
   HIGH LETTERS BEFORE PAINTING. LETTERS TO BE ON SIDE OF BARRICADE
   FACING VALVE.

3. SEE PLANS FOR NUMBER OF BARRICADES TO BE USED AND IF BRACES ARE
   REQUIRED.

4. THE EXACT LOCATION OF BARRICADES MAY BE CHANGED BY THE DISTRICT
   IN THE FIELD.

5. THE STEEL PIPE ABOVE GROUND SHALL BE PAINTED A MINIMUM OF 2 FIELD
   COATS OF RED PRIMER RUST-OLEUM #069.

6. TWO FINISH COATS OF RUST-OLEUM #944 YELLOW SHALL BE USED FOR FIRE
   HYDRANT BARRICADES.

7. BARRICADES FOR FLUSHOUTS, AIR RELEASE VALVES, VAULT VENTS, MARKERS
   FOR VALVES AND METER BOXES SHALL BE GIVEN TWO FINISH COATS OF "FOREST
   GREEN" RUST-OLEUM #282.

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

STANDARD PLAN
W-14

APPROVED
DEAN EDELMAN
ASSISTANT DEPUTY DIRECTOR
OCTOBER 1998
DATE

SHEET 1 OF 1
ADJUSTABLE VALVE BOX

Provide heavy duty cast-iron valve box cap, marked as indicated. Paint per schedule.

Water

When valve box is in a dirt area, contractor to construct 2' x 2' x 4' a.c. pad around valve can.

PARKWAY GRADE OR PAVED SURFACE

FLANGE OR FLARE

TOP SLEEVE (SPLIT) NO. 20 GAGE STEEL, GALVANIZED.

9 3/4" DIA. MIN

12" MIN

8" DIA.

CUT BOTTOM SLEEVE TO PROVIDE 4" LAP (S.P. FIT)

BOTTOM SLEEVE (P.V.C. SCH. 40)

PAINT SCHEDULE

BLUE: H.B. FULLER APPLIED BY THE FUSION POWDERED EPOXY METHOD BY FUSECOTE CO., INC. OR DISTRICT APPROVED EQUAL

NOTES:

1. A REDWOOD 2" x 4" STAKE PAINTED RED IS TO BE PLACED IN VALVE BOX FOR ALL NORMALLY CLOSED VALVES. LENGTH TO BE DETERMINED BY DEPTH OF GATE VALVE.

2. VALVE NUT EXTENSIONS WILL BE REQUIRED WHERE THE DISTANCE FROM FINISHED GRADE TO THE VALVE NUT EXCEEDS FIVE (5) FEET.

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

APPROVED

JUNE 1997

STANDARD PLAN

W-15

SHEET 1 OF 1
NO. 14 GAGE STEEL COVER WITH 12 5/16" x 1" SLOTS CUT AT BOTTOM FOR DRAINAGE

6' x 6' DOOR WITH WELDED HINGES & PADLOCK HASP. PADLOCK TO BE SUPPLIED BY DISTRICT

18' MIN.
SEE PLAN FOR LOCATION
INSTALL BRASS INSECT SCREEN

SIDEWALK FINISH
EXISTING CURB AND GUTTER. IF NONE EXISTS, INSTALL BARRI-CADGES PER STD. DWG. W-14 AS REQ'D.

VALVE BOX AND CAP
SEE STD. DWG. W-15

SLOPE 1/4" PER FT.

3' x 3' x 1/4" L. 3" - LG.
WITH 9/16" DIA. HOLE WELDED TO STEEL COVER (4 REQUIRED)

ALL EDGES AGAINST OTHER CONCRETE TO HAVE PRE-FORMED JOINT FILLER

FOR JOINING TUBING, USE SILVER BRAZING ALLOY. "SILFLOS" WITH COPPER COUPLING. SOFT SOLDER IS UNACCEPTABLE.


FOR CONNECTION TO A.C., D.I., C.I., OR STEEL (LESS THAN 10 GA.) PIPE, SEE STD. DWG. W-5, NOTE 3 FOR DOUBLE-STRAP CLAMP TO BE USED FOR ITEM 12. CLAMP OUTLET SHALL BE SET VERTICALLY FACING UPWARD.

STEEL WATER MAIN, 10 GA. MIN.
AIR RELEASE AND VACUUM VALVE ASSEMBLY (CONTINUED)

NOTES:
1. THE HEIGHT AND DIAMETER OF THE STEEL COVER SHALL PROVIDE A 2' MINIMUM CLEARANCE AROUND THE VALVE ASSEMBLY.
2. IN AREAS SUBJECT TO FREEZING, ALL VALVES AND PIPING ABOVE GROUND SHALL BE INSULATED.
3. PAINT VALVE ASSEMBLY ABOVE GROUND, AND STEEL COVER, WITH TWO COATS OF RED PRIMER RUST-OLEUM #1069 AND TWO COATS OF RUST-OLEUM #1282 FOREST GREEN PAINT OR #865 DUNES TAN.
4. USE PROPER CLASS FITTINGS FOR WATER WORKING PRESSURE. (CLASS 150 MIN.)
5. IF BRONZE NIPPLE (ITEM NO. 3) IS OVER 12' LONG, ADD CORPORATION STOP NEXT TO MAIN. (LEAVE OPEN).
6. SEE PLANS FOR VALVE SIZES AND USE SAME SIZE FITTINGS, AND NIPPLE LENGTHS TO SUIT. (NO CLOSE NIPPLES).

LIST OF MATERIALS

<table>
<thead>
<tr>
<th>NO.</th>
<th>DESCRIPTION (FOR 2&quot; VALVES)</th>
<th>ENGINEER'S EST. QUANTITY</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>2&quot; AIR RELEASE AND VACUUM VALVE</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2&quot; BALL VALVE, SCREWED, BRONZE</td>
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</tr>
<tr>
<td>3</td>
<td>2&quot; BRONZE NIPPLE, SHORT</td>
<td>1&quot; ±</td>
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<tr>
<td>4</td>
<td>2&quot; STD. STEEL PIPE, NIPPLE, GALV.</td>
<td>2&quot; ±</td>
</tr>
<tr>
<td>5</td>
<td>2&quot; COPPER TUBING, TYPE &quot;K&quot; SOFT</td>
<td>24&quot; ±</td>
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<tr>
<td>6</td>
<td>2&quot; 90° STREET ELBOW, SCREWED, BRONZE</td>
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<tr>
<td>7</td>
<td>2&quot; 90° ELBOW, SCREWED, GALV.</td>
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<tr>
<td>8</td>
<td>2&quot; ADAPTER, BRONZE, COPPER FLARED 1 I.P., MALE</td>
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<td>9</td>
<td>2&quot; 90° ELBOW, COPPER</td>
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<tr>
<td>10</td>
<td>2&quot; CURB STOP, BRONZE, COPPER FLARED 1 I.P., FEMALE, &quot;HAYS&quot; 5050 OR APPROVED EQUAL</td>
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<tr>
<td>11</td>
<td>2 1/2&quot; x 2&quot; INSULATING BUSHING</td>
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</tr>
<tr>
<td>12</td>
<td>2 1/2&quot; WELDED COUPLING</td>
<td>1</td>
</tr>
</tbody>
</table>
NOTE:
1. IF THE SUPPORT IS MOUNTED ON CONCRETE SLAB OR FLOOR, THE PIER IS NOT REQUIRED.
2. ALL EXPOSED METAL SURFACES SHALL BE PROTECTED IN ACCORDANCE WITH THE SPECIFICATIONS, EXCEPT THE THREADS.
FLEXIBLE COUPLING TIES
(FOR ABOVE GROUND INSTALLATIONS OR IN VAULTS)

USE FOR PRESSURE RANGES UP TO 600 PSI (SEE DETAIL "A")

NOTE:
WHERE INSULATED FLEXIBLE COUPLING IS SPECIFIED, USE INSULATING WASHERS AND BUSHINGS.

DETAIL "A"

SIZES CALCULATED USING F.S.=2 AND S=20,000 ALLOWABLE

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>600 PSI MAX.</th>
<th>400 PSI MAX.</th>
<th>200 PSI MAX.</th>
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<tbody>
<tr>
<td>TIE RODS</td>
<td>NO. DIA.</td>
<td>TIE RODS</td>
<td>NO. DIA.</td>
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<tr>
<td>4&quot;</td>
<td>2</td>
<td>3/4&quot;</td>
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<tr>
<td>6&quot;</td>
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<td>7/8&quot;</td>
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<tr>
<td>12&quot;</td>
<td>6</td>
<td>1/4&quot;</td>
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洛杉矶县水工区

公共事业部门

W-18

批准人：Dennis D. Barchinger

助理副署长

日期：AUGUST 93

第1页

第1页
TEMPORARY 1/4" THICK STEEL PLATE TO BE 2" PLUS O.D. OF CONDUCTOR PIPE.

PLAN

2" SCREWED RETURN BEND
2" SCREWED CAP W/ 6-1/8" HOLES
2" STD. STEEL PIPE

LOCKING HASP AND STAPLE, WELDED TO PIPE AND RETURN BEND, ACROSS COUPLING

TACK-WELD COVER PLATE TO CONDUCTOR PIPE

EXISTING GROUND SURFACE

CONDUCTOR PIPE TO EXTEND 100' MIN. BELOW EXISTING GROUND SURFACE

EXISTING GROUND SURFACE

GRAVEL

GROUT - SEAL TO 100' MIN. DEPTH. PUMP GROUT FROM BOTTOM OF HOLE UP TO SURFACE

NOTE:
SEE SPECIFICATIONS FOR CONDUCTOR PIPE AND WELL CASING DETAILS.

LOS ANGELES COUNTY WATERWORKS DISTRICTS
DEPARTMENT OF PUBLIC WORKS

STANDARD PLAN W-19

APPROVED

Assistant Deputy Director

AUGUST 93

SHEET 1 OF 1
GENERAL NOTES

1. All anchor and thrust blocks shall bear against undisturbed soil.
2. Minimum allowable water pressure for design of thrust blocks is 150 PSI. Bearing area increases directly with increase in pressure.
3. All concrete used in thrust blocks shall attain 2000 PSI strength.
4. All anchor rods shall be reinforcing steel and a minimum of 1/2 inch in diameter.
5. Use anchor blocks at vertical bends when pipe is above or below ground. Size of block and rod shall be as shown on the plans or as determined by the engineer in the field.
6. Use 30 pound felt to insure cold joint.
7. Concrete shall not come into direct contact with asbestos-cement pipe.
8. For pipe 14" in diameter or larger, engineer is to submit calculations.

TABLE I

<table>
<thead>
<tr>
<th>Minimum Bearing Areas in SQ. FT.</th>
<th>30° Bend</th>
<th>45° Bend</th>
<th>22 1/2° Bend</th>
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<tbody>
<tr>
<td>Main Size</td>
<td>Tee **</td>
<td>90° Bend</td>
<td>45° Bend</td>
</tr>
<tr>
<td>6'</td>
<td>4</td>
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</tr>
<tr>
<td>8'</td>
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</tr>
<tr>
<td>10'</td>
<td>5</td>
<td>12</td>
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</tr>
<tr>
<td>12'</td>
<td>12</td>
<td>16</td>
<td>9</td>
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</tbody>
</table>

** Based on 150 PSI W.P. pressure & soil bearing loads of 2000 PSF. The ratio of width to height shall not exceed 1 1/2 to 1.

** Tees, plugs, caps, and hydrants.

TABLE II

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Max. Allowable Soil Bearing Values (PSF)</th>
<th>Factors for Increasing Areas in Table I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loose Sand</td>
<td>500 PSF</td>
<td>4</td>
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<tr>
<td>Soft Sand Clay</td>
<td>1000 PSF</td>
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<tr>
<td>Adobe</td>
<td>1000 PSF</td>
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<tr>
<td>Compact Fine Sand</td>
<td>2000 PSF</td>
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</tr>
<tr>
<td>Compact Coarse Sand</td>
<td>2000 PSF</td>
<td>1</td>
</tr>
<tr>
<td>Medium Stiff Clay</td>
<td>2000 PSF</td>
<td>1</td>
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</tbody>
</table>

*** The contractor shall be responsible for determining the safe soil bearing values and the position and size of bearing areas.

**** Based on 2 feet minimum depth of cover over the pipe.

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

APPROVED  DEAN D. ETCHELSON  AUGUST 93

STANDARD PLAN  W-21  SHEET 1 OF 1

ASSISTANT DEPUTY DIRECTOR  DATE
CUTTING AND PLUGGING WATER MAINS

EXISTING HUB END FITTING OR VALVE

- MAIN TO REMAIN IN SERVICE
- MAIN TO BE ABANDONED (NO PRESSURE)
- SEAL MAIN WITH CONCRETE
- CUT AND REMOVE PORTION OF EXISTING MAIN
- INSTALL PLUG (RUBBER RING OR CAULKED)
- POUR CONC. THRUST BLOCK KEYED AGAINST UNDISTURBED EARTH (2000 PSI CONCRETE)

EXISTING STEEL MAIN

- MAIN TO REMAIN IN SERVICE
- MAIN TO BE ABANDONED (NO PRESSURE)
- SEAL MAIN WITH CONCRETE
- CUT AND REMOVE PORTION OF EXISTING MAIN
- WELD ON CAP OR PLATE, SEAL WITH 2000 PSI CONC.

EXISTING ASBESTOS-CEMENT OR CAST-IRON MAIN

- MAIN TO REMAIN IN SERVICE
- MAIN TO BE ABANDONED (NO PRESSURE)
- INSTALL CAP OR PLUG
- SEAL MAIN WITH CONCRETE
- CUT AND REMOVE PORTION OF EXISTING MAIN
- POUR CONCRETE THRUST BLOCK KEYED AGAINST UNDISTURBED EARTH (2000 PSI CONCRETE)

EXISTING FLANGED FITTING OR VALVE

- MAIN TO REMAIN IN SERVICE
- MAIN TO BE ABANDONED (NO PRESSURE)
- SEAL MAIN WITH CONCRETE
- BOLT ON BLIND FLANGE, ENCASE TEE IN 2000 PSI CONCRETE
- CUT AND REMOVE PORTION OF EXISTING MAIN

* NO CONCRETE TO BE PLACED ON A.C.P. OR C.I.P.

NOTE: SEE SPECIFICATIONS FOR FLUSHOUT REQUIREMENTS.

LOS ANGELES COUNTY WATERWORKS DISTRICTS
DEPARTMENT OF PUBLIC WORKS

STANDARD PLAN W-22

APPROVED BY:
ASSISTANT DEPUTY DIRECTOR

AUGUST 93
DATE

SHEET 1 OF 1
**TANK - SPIRAL STAIRWAY (CONTINUED)**

**SECTION A - A**

**SECTION B - B**

**PLATFORM**

<table>
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<td>10.</td>
</tr>
<tr>
<td>11.</td>
</tr>
<tr>
<td>12.</td>
</tr>
</tbody>
</table>

**NOTES:**

1. USE SPIRAL STAIRWAY ONLY FOR TANKS 15 FEET IN HEIGHT OR GREATER.
2. ALL RAILINGS, INCLUDING PLATFORM RAILINGS AND EXCEPTING STAIR RAILINGS SHALL HAVE A 4 x 1/4" STEEL TOE BOARD WELDED AT BOTTOM OF RAILINGS WITH A 1/4" GAP BELOW TOE BOARD.
3. FITTINGS FOR RAILINGS MAY BE EITHER MALLEABLE IRON BALL PATTERN OR ADJUSTABLE RAILING FITTINGS OR WELDING STEEL FITTINGS.
4. WELD 1/2" STEEL SHIM BETWEEN HINGE AND TANK SHELL.
5. IN AREAS OF PEDESTRIAN CONTACT, GRIND SMOOTH ALL SHARP CORNERS AND EDGES.
6. THIS DESIGN IS FOR GUIDE ONLY. TANK CONTRACTOR MAY SUBMIT ALTERNATE DESIGN FOR APPROVAL.
7. WELD 2 x 1/6" STEEL STRIPS ON BOTH SIDES OF ALL EXPOSED JOINTS OF THE EXPANDED STEEL SHEETS.
8. OUTSIDE EDGE OF STEPS SHALL BE 1/2" LOWER THAN INSIDE EDGE OF STEPS TO FACILITATE DRAINAGE.
9. INSTALL ALL ELECTRICAL CONDUITS ON TANK INSIDE STAIRWAY, ATTACH WITH BRACKETS WELDED TO TANK ALONG THE STEP.

**LOS ANGELES COUNTY WATERWORKS DISTRICTS**

**DEPARTMENT OF PUBLIC WORKS**

**APPROVED**

**DEAN D. BEETKER**

**ASSISTANT DEPUTY DIRECTOR**

**AUGUST 93**

**STANDARD PLAN**

**W-24**

**SHEET 2 OF 2**
NOTES:

1. NO PROJECTIONS, CROSS BARS OR OTHER POTENTIAL HAND OR TOE HOLDS SHALL BE PERMITTED ON THE EXTERIOR OF THE CAGE. EXTEND EXPANDED METAL CAGE TO TANK SHELL.

2. ALL STEEL MATERIAL TO BE UNCOATED AT TIME OF INSTALLATION.

3. PAINT ALL STEEL SURFACES AFTER INSTALLATION WITH ONE COAT OF PRIMER AND TWO COATS OF PAINT, MATCHING THE PAINT AND COLOR OF THE TANK.

4. THE CAGE SHALL BE ROLLED AT THE SHOP TO FIT THE DIMENSIONS AS SHOWN ON PLAN.

5. IN AREAS OF PEDESTRIAN CONTACT, GRIND SMOOTH ALL SHARP CORNERS AND EDGES.

6. CAGE SHALL BE FABRICATED FROM SINGLE SHEET OF 3/4" FLATTENED EXPANDED STEEL, NO. 10 GAGE.

7. WELD 2" x 1/8" STEEL STRIPS ON BOTH SIDES OF ALL EXPOSED JOINTS OF THE EXPANDED STEEL SHEETS.

8. INSTALL ALL ELECTRICAL CONDUITS INSIDE THE CAGE ALONG THE LADDER, ATTACH WITH BRACKETS WELDED TO TANK.
TANK - VERTICAL INTERIOR LADDER

NOTES:

1. GRIND ALL WELDS, EXPOSED SHARP EDGES AND CORNERS, SMOOTH AND EVEN.
2. SEE PLANS AND SPECIFICATIONS FOR TOTAL LENGTH OF INTERIOR LADDER.
3. LADDER AND PLATFORM FLOOR PLATES ONLY ARE TO BE GALVANIZED (9 GAGE MIN.). EVERYTHING ELSE TO BE COATED WITH SAME MATERIAL USED TO COAT INSIDE OF TANK.
4. MAKE PLATFORM FLOOR PLATES IN THREE PIECES TO FACILITATE HANDLING THROUGH ROOF HATCH.
5. ENDS OF STEEL PIPE USED FOR HANDRAILS TO BE SEAL WELDED.

SECTION A-A

THREE 1/4" DIAMOND TREAD PLATES, GALVANIZED, FASTEN WITH 3/8" GALVANIZED BOLTS

FRONT VIEW

SIDE VIEW

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

STANDARD PLAN W-26

APPROVED

Dated: AUGUST 93

Sheets 1 OF 1
NOTE ITEM 7:
REINFORCING PLATE PER API STANDARD 650 DEPENDS ON TANK SHELL THICKNESS. DETAILS & SIZE OF REINFORCING PLATE, IF NEEDED MUST BE DESIGNED BY A LICENSED CIVIL OR STRUCTURAL ENGINEER. DETAILS MUST BE SUBMITTED FOR APPROVAL WITH SHOP DRAWINGS.

---

DAVIT ARM & SUPPORT DETAILS

---

MATERIALS

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Mtl</th>
<th>PctWt LBS.</th>
<th>Reqd</th>
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<tr>
<td>1</td>
<td>FLAT BAR, 3/8&quot; x 2&quot; x 28&quot; LG.</td>
<td>SS304</td>
<td>6</td>
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<tr>
<td>2</td>
<td>NUT, 1/4&quot; HEAVY HEX &amp; WASHER</td>
<td>BRNZ</td>
<td>---</td>
<td>1</td>
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<td>3</td>
<td>FLAT BAR, 1/4&quot; x 2&quot; x 44 1/2&quot; LG.</td>
<td>SS304</td>
<td>7</td>
<td>1</td>
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<tr>
<td>4</td>
<td>EYE BOLT, 3/8&quot; x 3&quot; w/WASHER &amp; (2) NUTS</td>
<td>SS18-8</td>
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<td>ANGLE, 3&quot; x 3&quot; x 3/8&quot; x 2&quot; LG.</td>
<td>SS304</td>
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<td>HALF RING, 5/8&quot; x 2 1/4&quot;</td>
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<td>PLATE, 1&quot; x 8 1/2&quot; x 9 1/4&quot; x 9 1/4&quot; LG.</td>
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<td>DISHED (HAT) HEAD, 3/4&quot; x 32&quot; ID x 41 1/2&quot; OD X 32&quot; RAD.</td>
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<td>ROUND BAR, 3/4&quot; DIA. x 9&quot; LG. W/2&quot; NC T.O.E.</td>
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<td>TUBE, SQUARE, STRUCTURAL, 3&quot; x 3&quot; x 1/2&quot; x 7&quot; LONG</td>
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<td>PIPE, 3/4&quot; x STD. WT. x 3&quot; LG.</td>
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<td>BOLT, 1/2&quot;-13 NC x 1&quot; LG. w/NYLOCK NUT &amp; WASHER</td>
<td>SS304</td>
<td>---</td>
<td>2</td>
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<td>14</td>
<td>NYLON WASHER</td>
<td>NYLON</td>
<td>---</td>
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<td>15</td>
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<td>16A</td>
<td>OPTION &quot;A&quot;: C RING GASKET x 1/4&quot; x 35&quot; I.D. 50 Duro-Hard</td>
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<td>OPTION &quot;B&quot;: NEOPRENE GASKET, 1/4&quot; x 1/4&quot; x 35&quot; I.D. &amp;</td>
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<td>1/4&quot; x 1/2&quot; x 9.61/6&quot; BAR ROLLED TO 35&quot; I.D.</td>
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<td>REINFORCING PLATE PER API STANDARD 650 (SEE NOTE HEREON)</td>
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<td>18</td>
<td>STEEL HINGE, 1&quot; x 2 1/2&quot;</td>
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---

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

STANDARD PLAN W-28

APPROVED

ASSISTANT DEPUTY DIRECTOR

OCTOBER 1999

DATE

SHEET 2 OF 2
TANK - STILLING WELL DETAILS

SECTION B-B

3" BRASS BUTT HINGE
(3 REQUIRED) BOLT TO
COVER WITH 1/4" DIA.
STEEL BOLTS

1/4" x 2" x 2" STEEL
ANGLE 3' LONG,
WIDTH OF BOX

3/8" DIA. HANDLE
2 REQUIRED

INSTRUMENT BOX
3" SQUARE COVER
16 GA. STEEL

3/16" x 3" PLATE
2 REQUIRED

WELD ANGLES TO
TANK SHELL

TANK SHELL

1/8" DIA. TAPPING
SCREWS AT 4" O.C.

2" x 2" x 1/4" ANGLES
TOP AND 2 SIDES

STILLING WELL
CONTROL BOX

LOCKING HASP

HINGE

DOOR

PLAN

1/4" x 20" x 20" STEEL
REINFORCING PLATE

TANK SHELL

2 - 6'

STILLING WELL

USE CL. 150 SLIP-
ON WELD FLANGES
AS REQUIRED

12" DIA. 10 GA.
STEEL PIPE, CM

1" CEMENT MORTAR
COAT ON INSIDE OF
BASE

24" MIN.

24" MIN.

24" MIN.

1/2" X 18" X 18" STL. PLATED

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

STANDARD PLAN

W-29

APPROVED

DEAN D. ESTETHION

ASSISTANT DEPUTY DIRECTOR

AUGUST 93

DATE

SHEET 1 OF 2
TANK - STILLING WELL DETAILS (CONTINUED)

SECTION A-A

NOTES:

1. WELD 1/4" x 1/2" x 1 1/2" STEEL ANGLE ON TANK ROOF IN TWO PLACES, WHERE INSTRUMENT BOX COVER CONTACTS TANK ROOF, WHEN COVER IS OPEN.

2. PAINT INTERIOR OF COUNTERWEIGHT TUBE, AND EXTERIOR OF STILLING WELL BELOW ROOF THE SAME AS THE TANK INTERIOR.

3. PAINT INTERIOR AND EXTERIOR OF INSTRUMENT BOX, EXTERIOR OF COUNTERWEIGHT TUBE AND REINFORCING PLATE, AND EXTERIOR OF STILLING WELL ABOVE ROOF, THE SAME AS THE EXTERIOR OF THE TANK SHELL.

4. IMPORTANT FOR FABRICATOR TO NOTE LOCATION OF HINGE IN SECTION B-B.

MATERIAL LIST

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<tr>
<th>ITEM NO.</th>
<th>DESCRIPTION</th>
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<td>1</td>
<td>1&quot; BALL VALVE, BRONZE</td>
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<td>1&quot; PLUG, BRASS</td>
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<td>1&quot; TEE, BRASS</td>
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<td>1&quot; DIA. COPPER TUBING, TYPE K, SOFT</td>
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<td>1&quot; BRONZE COUPLING, COPPER - I.P.</td>
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<td>4&quot; x 1 1/2&quot; REDUCER, BRONZE</td>
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<td>14</td>
<td>4&quot; WELDING COUPLING, BRONZE</td>
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</table>
NOTES

1. THE DIMENSIONS OF REINFORCING PLATES, THICKNESS OF WELDS AND ALIKE ARE TO BE CALCULATED AND SUBMITTED FOR REVIEW. AMERICAN PETROLEUM INSTITUTE (A.P.I.) STANDARD 650 IS TO BE USED AS REFERENCE.

2. MANHOLE COVER BOLTS, NUTS, AND WASHERS SHALL BE CADMIUM PLATED.
**FLUSHOUT - COMPLETE**
(200 PSI MAX, WWP. AT END OF MAIN)

1. **GENERAL NOTES:**
   1. In the absence of a curb, set outlet 24 inches above crown of road.
   2. If no curb exists, provide steel pipe barricades (see std. dwg. W-14).
   3. No flushout shall be installed closer than five feet from edge of any driveway apron.
   4. Use 2000 psi minimum concrete for thrust blocks and flushout pad. Place concrete on undisturbed or compacted soil.
   5. See std. dwg. W-21 for concrete thrust block requirements.
   6. All angles or bends in 4" lateral are to be made with flanged and/or welded fittings.
   7. All uncoated metal surfaces (including bolts) installed underground are to be cement-mortar coated with 900-1000 psi cement mortar (I cement : 3 sand : 1 lime) to provide a 2 inch thick coating.
   8. The bolts and nuts called for at the top flange connection on the riser shall be 5/8" hollow bolts furnished by the district.
   9. The exterior of the above ground portion of the flush out, except for the threads, shall be painted with 2 coats of red primer RUST-OLEUM #069 and 2 coats of forest green paint, RUST-OLEUM #282.
   10. Intermediate joints shall be either lap welded or flanged.
   11. Outlet shall be capped with approved plastic cap.

**LOS ANGELES COUNTY WATERWORKS DISTRICTS**

**DEPARTMENT OF PUBLIC WORKS**

**APPROVED**

**DEAN D. EPHMAR**

**ASSISTANT DEPUTY DIRECTOR**

**OCTOBER 1998**

**STANDARD PLAN**

**W-32**

**SHEET 1 OF 1**
FLUSHOUT - COMPLETE
(200 PSI MAX. WWP. LATERAL AT RIGHT ANGLE TO MAIN)

4" STL. PIPE NIPPLE, THREADED BOTH ENDS, SCH. 40-18 LONG, GALV. (SEE NOTE 9)
36"x36"x12" CONC. BLOCK W/ SIDEWALK FINISH
HOLLOW BOLTS WITH EXTRA LONG NUTS (SEE NOTE 8)
4" SCREWED FLANGE, STL., CL. 150

4" SLIP-ON WELD FLANGE, CL 150
WELD NUTS TO BOTTOM FLANGE

4 1/2" O.D. STL. PIPE, 10 GA MIN., C.M.L. & C.M.C.
VALVE BOX AND CAP (SEE STD. DWG. W-15)

4" 90° FLG'D ELBOW, D.I. PR 350
W/CL. 125 DRILLING, CML OR STL., SCH. 40, FLG. CL. 150, CML & CMC

GENERAL NOTES:
1. IN THE ABSENCE OF A CURB, SET OUTLET 24 INCHES ABOVE CROWN OF ROAD.
2. IF NO CURB EXISTS, PROVIDE STEEL PIPE BARRICADES (SEE STD. DWG W-141).
3. NO FLUSHOUT SHALL BE INSTALLED CLOSER THAN FIVE FEET FROM EDGE OF ANY DRIVEWAY APRON.
4. USE 2000 PSI MINIMUM CONCRETE FOR THRUST BLOCKS AND FLUSHOUT PAD. PLACE CONCRETE ON UNDISTURBED OR COMPACTED SOIL.
5. SEE STD. DWG W-21 FOR CONCRETE THRUST BLOCK REQUIREMENTS.
6. ALL ANGLES OR BENDS IN 4" LATERAL ARE TO BE MADE WITH FLANGED AND/OR WELDED FITTINGS.
7. ALL UNCOATED METAL SURFACES (INCLUDING BOLTS) INSTALLED UNDERGROUND ARE TO BE CEMENT-MORTAR COATED WITH 900-1000 PSI CEMENT MORTAR (2 CEMENT : 3 SAND : 1 LIME) TO PROVIDE A 2 INCH THICK COATING.
8. THE BOLTS AND NUTS CALLED FOR AT THE TOP FLANGE CONNECTION ON THE RISER SHALL BE 5/8 HOLLOW BOLTS FURNISHED BY THE DISTRICT.
10. INTERMEDIATE JOINTS SHALL BE EITHER LAP WELDED OR FLANGED.
11. OUTLET SHALL BE CAPPED WITH APPROVED PLASTIC CAP.

LOS ANGELES COUNTY WATERWORKS DISTRICTS
DEPARTMENT OF PUBLIC WORKS
STANDARD PLAN
W-33
APPROVED
OCTOBER 1996
SHEET 1 OF 1
FLUSHOUT - COMPLETE
(200 PSI MAX WWP, PARALLEL TO MAIN)

PLAN VIEW

4" 2 1/2' FIRE HYDRANT HEAD. SET
FLUSHOUT OUTLET AT 90° TO STREET GUTTER

4" STEEL PIPE NIPPLE, THREADED BOTH ENDS.
SCH. 40-18" LONG, GALV. (SEE NOTE 6)

HOLLOW BOLTS WITH EXTRA LONG NUTS (SEE NOTE 5)

4" SCREWED FLANGE, STL., CL. 150

WELD NUTS TO BOTTOM FLG.

4" SLIP-ON WELD FLANGE, CL 150

SEE NOTES 3 AND 4

ANCHOR ROD

4" 90° FLD'D ELBOW, O.P. PR 350_W/CL 125
D.RY DRILLING, CMU OR STL.
SCH. 40, FLG
CL. 150, CMU & CMC

10'-0" MIN.

SECTION A-A

SECTION B-B

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

APPROVED  Dean D. Ephraim
ASSISTANT DEPUTY DIRECTOR

OCTOBER 1998
DATE

STANDARD PLAN
W-34

SHEET 1 OF 2
GENERAL NOTES:

1. IN THE ABSENCE OF A CURB, SET BOTTOM OUTLET 24-INCHES ABOVE CROWN OF ROAD AND PROVIDE STEEL PIPE BARRICADES AS DIRECTED BY DISTRICT. (SEE STD. DWG. W-14)
2. NO FLUSHOUT SHALL BE INSTALLED CLOSER THAN FIVE FEET FROM EDGE OF ANY DRIVEWAY APRON.
3. USE 2000 PSI MINIMUM CONCRETE FOR THRUST BLOCKS AND FLUSHOUT PAD. PLACE CONCRETE ON UNDISTURBED OR COMPACTED SOIL.
4. SEE STD. DWG. W-2I FOR THRUST BLOCK REQUIREMENTS.
5. THE BOLTS AND NUTS CALLED FOR AT THE TOP FLANGE CONNECTION ON THE RISER SHALL BE 5/8" HOLLOW BOLTS FURNISHED BY THE DISTRICT.
7. ALL UNCOATED METAL SURFACES INCLUDING BOLTS INSTALLED UNDERGROUND ARE TO BE CEMENT-MORTAR COATED WITH 1000 PSI CEMENT MORTAR (1 CEMENT : 3 SAND : 1 LIME) TO PROVIDE A 2 INCH THICK COATING.
8. INTERMEDIATE PIPE JOINTS IN LATERAL SHALL BE EITHER LAP WELDED OR FLANGED. PIPE SHALL BE INSTALLED HORIZONTAL OR ELBOW DOWNWARD FROM MAIN TO PROVIDE MINIMUM COVER.
9. CENTERLINE OF RISER SHALL BE NORMALLY 2 FEET BEHIND CURB FACE EXCEPT WHERE 5-FOOT WIDE SIDEWALK IS ADJACENT TO CURB, IN WHICH CASE THE RISER SHALL BE AT 6 FEET OR AS SHOWN ON THE PLANS.
10. OUTLET SHALL BE CAPPED WITH APPROVED PLASTIC CAP.
NOTES:

1. CEMENT MORTAR SHALL BE APPLIED TO WELDED JOINTS ONLY AFTER THE HEAT OF WELDING HAS DISSIPATED. JOINT WELDS SHALL NOT BE COOLED BY QUENCHING.

2. THE INTERIOR SURFACE OF JOINTS TO BE LINED WITH CEMENT MORTAR SHALL BE CLEANED, AND BRUSHED WITH APPROVED CEMENT ADHESIVE, IMMEDIATELY BEFORE THE MORTAR IS APPLIED.

3. CEMENT MORTAR FOR THE INTERIOR OF JOINTS SHALL CONSIST OF ONE PART CEMENT, ONE PART SAND, WATER, AND AN APPROVED CEMENT ADHESIVE ADDED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.

4. CEMENT MORTAR FOR THE EXTERIOR OF JOINTS SHALL CONSIST OF ONE PART CEMENT, ONE PART SAND, AND WATER, AND SHALL BE POURED INTO ONE SIDE OF FORM ONLY.

5. THE INTERIOR OF ALL JOINTS SHALL BE SWABBED BY MEANS OF A BALL AND ROD.

6. THE POINTING HANDBORE SHALL BE INSTALLED ADJACENT TO A RUBBER GASKET JOINT, OR CENTERED OVER A BUTT-STRAP JOINT, AND SHALL BE USED AS NOTED ON PLANS OR WHERE A BALL AND ROD SWAB CANNOT BE USED.

7. FOR POINTING HANDBORE, THE MINIMUM LENGTH OF THE BUTT STRAP SHALL BE 9 INCHES FOR ALL PIPE SIZES LISTED IN TABLE BELOW. WITHOUT HANDBORE, THE MINIMUM LENGTH OF STRAP SHALL BE AS SHOWN IN THE FOLLOWING TABLE:

<table>
<thead>
<tr>
<th>PIPE SIZES IN INCHES</th>
<th>MINIMUM LENGTH OF BUTT STRAP REQ'D. IN INCHES</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 THRU 18</td>
<td>4</td>
</tr>
<tr>
<td>20 THRU 36</td>
<td>6</td>
</tr>
</tbody>
</table>

8. A BOLTED FLANGED JOINT MAY BE USED AS AN ACCEPTABLE ALTERNATE TO THE RUBBER GASKET OR THE BUTT-STRAP JOINT.
SERVICE TAP
(2" AND SMALLER, STEEL WATER MAIN)

FOR STEEL OR CAST-IRON
OR DUCTILE-IRON PIPE
WRAP 24" OF COPPER
TUBE WITH PVC TAPE

TWO LAYERS WITH 50% LAP EACH, OF 10
MIL TAPE (PVC) WITH PRIMER. APPLY
AFTER PRESSURE TESTING ON HOT TAPS.

HEX HEAD MAYCO NYLON DIELECTRIC
BUSHING, WRAP WITH TEFLOM TAPE
TO OUTSIDE THREADS OF
BUSHING. SCREW BUSHING TIGHT IN
COUPLING (STEEL Pipe) OR IN CLAMP
ON (CAST-IRON OR DUCTILE-IRON PIPE)
AFTER INSERTING CORPORATION STOP.
BUSHING MUST BE COMPLETELY SCREWED
INTO COUPLING.

CORPORATION STOP SAME
SIZE AS COPPER TUBING
(TURN ON BEFORE TAPING)

EXIST. Pipe
COATING

2" MIN. LAP

PATCH COATING

PIPE LINING

WRAP THREADS OF CORP.
WITH TEFLOM TAPE. 50% LAP
SCREW CORP. STOP FULLY INTO
BUSHING AND MAKE-UP TIGHT
BEFORE INSTALLING BUSHING.

WELDING HALF COUPLING: DROP
FORGED: TAPERED, WITH IRON PIPE
THREAD AND SHAPED TO FIT WATER
MAIN O.D.: ONE SIZE LARGER THAN
CORPORATION STOP

STEEL CYLINDER PIPE. BACKFILL
IS TO PROVIDE A SAND ENVELOPE
6" MIN. AROUND MAIN TAP AND
ALONG FIRST 4' OF COPPER SERVICE

PATCH SOMASTIC, COAL-TAR
ENAMEL, OR HOT ASPHALT, W/
TYPE NO. 1750 HOT ASPHALT
PIPE COATING. PATCH CEMENT-
MORTAR W/ CEMENT-MORTAR
COATING PER AWWA C205.

IF LINING IS OTHER THAN CEMENT
MORTAR OR IF PIPE IS 1/2 GAGE OR
THINNER, USE MALLEABLE-IRON SERVICE
CLAMP AND STRAPS AND DIELECTRIC
BUSHING AS SHOWN.

FOR BARE PIPE (OTHER THAN ASBESTOS CEMENT
PIPE) COAT SURFACE OF PIPE IN AREA OF TAP
(ALL AROUND) WITH CEMENT-MORTAR COATING
PER AWWA C205

LOS ANGELES COUNTY WATERWORKS DISTRICTS
DEPARTMENT OF PUBLIC WORKS

APPROVED

STANDARD PLAN
W-36
AUGUST 93
DATE

SHEET 1 OF 1
CATHODIC PROTECTION - INSULATED JOINT TEST STATION

CORROSION CONTROL, WIRE TEST PROCEDURE

THE CONTRACTOR SHALL MAKE THE FOLLOWING ELECTRICAL TESTS BEFORE AND AFTER BACKFILL AND PAVING OPERATIONS:

1. EACH WIRE SHALL READ AT LEAST 100 MILLIVOLTS (100 MV) FROM THE WIRE TERMINAL TO GROUND (COPPER SULFATE 1/2 CELL).
2. EACH WIRE OF THE PAIR OF WIRES FROM DIELECTRIC COUPLING SHALL PASS ABOVE TESTS PLUS HAVE A DIFFERENTIAL OF 25 MV BETWEEN READINGS. IF 25 MV CANNOT BE REACHED, CALL INSPECTOR FOR FURTHER TEST PROCEDURES.

ALL OF THE ABOVE TESTS CAN BE MADE WITH A 'MILLER PIPE TO SOIL 1-A-04107', OR A 'TINKER-RAZOR PIPE TO SOIL CPV-2', OR EQUIVALENT INSTRUMENT.

COAT INSULATING FLANGE INCLUDING NUTS AND BOLTS WITH COAL-TAR PRIMER AND MINIMUM 3/16" THICK HOT COAL TAR FOLLOWED BY MINIMUM 1" THICK COATING OF CEMENT MORTAR. FLANGE MORTAR COATING TO OVERLAP PIPE COATING 1 1/2" MINIMUM.

CEMENT MORTAR SHALL BE 1 PART CEMENT, 3 PARTS SAND, AND 1 PART LIME.

BACKFILL FOR 6" ALL AROUND ENTIRE VALVE ASSEMBLY IN CONSTRUCTION SAND.

REQUIREMENTS HEREON SHALL APPLY IF INSULATING FLANGE IS INSTALLED ON A FITTING OR PAIR OF FLANGES.

LOS ANGELES COUNTY WATERWORKS DISTRICTS
DEPARTMENT OF PUBLIC WORKS

STANDARD PLAN
W-38

APPROVED

DEAN D. FITCH

ASSISTANT DEPUTY DIRECTOR

AUGUST 93

DATE

SHEET 1 OF 1
CATHODIC PROTECTION - SHALLOW Mg ANODE TEST STATION

CONC. METER BOX (APPROX. 10" x 12" x 12") WITH COVER (CONCRETE IN PARKWAY, METAL IN TRAFFIC)

4" CONDULET WITH 1" K.O.

1" 90° FACTORY ELBOW

PEA GRAVEL

JUMPER

WHITE

YELLOW

RED

"MILLER NO. M C M" TEST STATION WITH .01 Ω SHUNT

32 • Mg ANODE

FILL WITH MOIST NATIVE SOIL PUDDLED

12" Ø

LOCATION BY AGENCY

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

STANDARD PLAN

W-39

APPROVED

DEAN O. EPSTEIN
ASSISTANT DEPUTY DIRECTOR

AUGUST 93
DATE

SHEET 1 OF 1
# STANDARD ELECTRICAL SYMBOLS

## FOR SCHEMATIC CONTROL DIAGRAMS

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>SYMBOL</th>
<th>IN WORDS</th>
<th>OPERATION FUNCTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>RELAY</td>
<td><img src="relay.png" alt="Image" /></td>
<td>RELAY COIL</td>
<td>CLOSES INSTANTANEOUSLY WHEN COIL IS ENERGIZED</td>
</tr>
<tr>
<td></td>
<td><img src="relay.png" alt="Image" /></td>
<td>NORMALLY OPEN CONTACT</td>
<td>OPEN INSTANTANEOUSLY WHEN COIL IS ENERGIZED</td>
</tr>
<tr>
<td></td>
<td><img src="relay.png" alt="Image" /></td>
<td>NORMALLY CLOSED CONTACT</td>
<td></td>
</tr>
<tr>
<td>TIME DELAY RELAY</td>
<td>![Image](time_delay Relay.png)</td>
<td>RELAY COIL</td>
<td>ENERGIZED</td>
</tr>
<tr>
<td></td>
<td>![Image](time_delay Relay.png)</td>
<td>NORMALLY OPEN TIMED CLOSED</td>
<td>OPEN</td>
</tr>
<tr>
<td></td>
<td>![Image](time_delay Relay.png)</td>
<td>NORMALLY CLOSED TIMED OPEN</td>
<td>OPEN</td>
</tr>
<tr>
<td></td>
<td>![Image](time_delay Relay.png)</td>
<td>NORMALLY OPEN TIMED OPEN</td>
<td>OPEN</td>
</tr>
<tr>
<td></td>
<td>![Image](time_delay Relay.png)</td>
<td>NORMALLY CLOSED TIMED CLOSED</td>
<td>OPEN</td>
</tr>
<tr>
<td>LIMIT SWITCH</td>
<td>![Image](limit switch.png)</td>
<td>NORMALLY OPEN</td>
<td>CLOSES WHEN ACTUATED BY MECHANICAL FORCE</td>
</tr>
<tr>
<td>FLOW SWITCH</td>
<td>![Image](flow switch.png)</td>
<td>NORMALLY OPEN</td>
<td>CLOSES WHEN WATER STARTS TO FLOW</td>
</tr>
<tr>
<td></td>
<td>![Image](flow switch.png)</td>
<td>NORMALLY CLOSED</td>
<td>OPENS WHEN WATER STARTS TO FLOW</td>
</tr>
<tr>
<td>PRESSURE SWITCH</td>
<td>![Image](pressure switch.png)</td>
<td>NORMALLY OPEN</td>
<td>CLOSES AS THE PRESSURE INCREASES TO A SPECIFIC RANGE (IN PSI)</td>
</tr>
<tr>
<td></td>
<td>![Image](pressure switch.png)</td>
<td>NORMALLY CLOSED</td>
<td>OPENS AS THE PRESSURE INCREASES TO A SPECIFIC RANGE (IN PSI)</td>
</tr>
<tr>
<td>FLOAT SWITCH</td>
<td>![Image](float switch.png)</td>
<td>PUMP UP OPERATOR</td>
<td>CLOSES AS THE WATER LEVEL FALLS TO A SPECIFIC DEPTH</td>
</tr>
<tr>
<td></td>
<td>![Image](float switch.png)</td>
<td>PUMP DOWN OPERATOR</td>
<td>OPENS AS THE WATER LEVEL FALLS TO A SPECIFIC DEPTH</td>
</tr>
<tr>
<td>PUSH BUTTON SWITCH</td>
<td>![Image](push button switch.png)</td>
<td>NORMALLY OPEN</td>
<td>PUSH TO CLOSE, RELEASE TO OPEN</td>
</tr>
<tr>
<td></td>
<td>![Image](push button switch.png)</td>
<td>NORMALLY CLOSED</td>
<td>PUSH TO OPEN, RELEASE TO CLOSE</td>
</tr>
</tbody>
</table>

## FOR FLOOR PLANS

- ![Image](solenoid valve control.png)
- ![Image](selector switch.png)
- ![Image](time meter.png)
- ![Image](connected wires.png)
- ![Image](non-connected wires.png)
- ![Image](out-going terminal.png)
- ![Image](probe.png)
- ![Image](starter coil.png)

- ![Image](lighting fixture.png)
- ![Image](floodlight fixture.png)
- ![Image](fluorescent lighting fixture.png)
- ![Image](duplex outlet.png)
- ![Image](duplex outlet with built-in ground fault circuit.png)

## LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

APPROVED: [Signature]

STANDARD PLAN W-43

AUGUST 93

DATE
### STANDARD ELECTRICAL SYMBOLS (CONTINUED)

<table>
<thead>
<tr>
<th>For Floor Plans (continued)</th>
<th>For Hydraulic Flow Schematic Diagrams (cont.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>©  SPECIAL OUTLET AS INDICATED ON PLAN</td>
<td>T</td>
</tr>
<tr>
<td>© © JUNCTION BOX, CEILING / WALL MOUNTED</td>
<td>©</td>
</tr>
<tr>
<td>© © THERMOSTAT, + 3'-0'</td>
<td>©</td>
</tr>
<tr>
<td>© TELEPHONE CONDUIT SYSTEM, 3/4&quot; CONDUIT UNLESS OTHERWISE NOTED</td>
<td>©</td>
</tr>
<tr>
<td>© TELEPHONE OUTLET, + 4'-6' ON WALL</td>
<td>&lt;</td>
</tr>
<tr>
<td>© DISCONNECT SWITCH, SIZE AND POLE AS REQUIRED</td>
<td>1285</td>
</tr>
<tr>
<td>0.75 TOGGLE SWITCH, + 4'-0'</td>
<td></td>
</tr>
<tr>
<td>5.3 3-WAY SWITCH, + 4'-0'</td>
<td>46</td>
</tr>
<tr>
<td>© DISTRIBUTION SWITCH BOARD, SEE DETAIL ON PLAN</td>
<td>©</td>
</tr>
<tr>
<td>□ ELECTRICAL LIGHTING PANEL, + 6'-6&quot; TO TOP, SEE SCHEDULE</td>
<td>□</td>
</tr>
<tr>
<td>□ ELECTRICAL EQUIPMENT ENCLOSURE AS INDICATED, SEE DETAIL</td>
<td>□</td>
</tr>
<tr>
<td>© CONDUIT CONCEALED IN CEILING OR WALL</td>
<td>©</td>
</tr>
<tr>
<td>© CONDUIT IN OR BELOW FLOOR</td>
<td>©</td>
</tr>
<tr>
<td>© CONDUIT EXPOSED</td>
<td>©</td>
</tr>
<tr>
<td>© HOME RUN TO PANEL, LETTER DENOTES PANEL, NUMBER DENOTES CIRCUIT</td>
<td>©</td>
</tr>
<tr>
<td>© CONDUIT BEND UP OR DOWN</td>
<td>©</td>
</tr>
</tbody>
</table>

### For Hydraulic Flow Schematic Diagrams

- **∞** GATE VALVE
- **→** CHECK VALVE
- **→** HYDRAULICALLY OPERATED VALVE (DIAPHRAGM)
- **→** PISTON OPERATED VALVE
- **→** PRESSURE SWITCH
- **→** CONTROL WIRES
- **→** BOOSTER PUMP 'A'
- **©** WELL PUMP (NO. 15)
- © CHLORINATOR
- © PUMP DOWN
- © PUMP UP
- © FLOAT SWITCH
- © FLOAT VALVE
- © PRESSURE GAGE
- © PANEL "A" 22.SW

### For Single Line Power Diagrams

- **∞** WEATHER-HEAD FOR OVERHEAD POWER SERVICE. INDICATE POWER COMPANY AND SYSTEM TYPE (VOLTAGE, PHASE, WIRE AND FREQUENCY)
- © KILOWATT-HOUR METER PER POWER COMPANY'S REQUIREMENT
- © 100 A.F. 200 A.T. 3 P.
- © DISCONNECT SWITCH, SHOW SIZE AND POLES
- © TRANSFORMER, SHOW KVA RATING, PRIMARY AND SECONDARY VOLTAGE
- © SOLID NEUTRAL BLOCK
- © PUMP OR MOTOR, SHOW HORSEPOWER AND PULL LOAD AMPERES
- © PANEL DESIGNATION, LOAD CENTER OR ELECTRICAL EQUIPMENT AS INDICATED. SHOW CONNECTED LOAD AND PROVIDE SCHEDULE OR DETAIL

### Notes:

1. SEE STANDARD DRAWING "W-2" FOR ABBREVIATIONS
2. SEE STANDARD DRAWING "W-3" FOR OTHER SYMBOLS

---

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

APPROVED BY: [Signature]

ASSISTANT DEPUTY DIRECTOR

AUGUST 93

STANDARD PLAN

W-43

SHEET 2 OF 2
BOOSTER PUMP ELECTRICAL SCHEMATIC

(BASIC FOR EACH BOOSTER PUMP)

BOOSTER A

LI N
120V AC

LOW LEVEL SAFETY PS

REMOTE CONTROL

TDA 7

TDA 6

SOLA

STATUS PS

CLOSES ON RISE

TMA

MSA

O.L.'S

VR

MXA 3

MXA 7

LSA

MXA 8

3 PHASES VOLTAGE RELAY, RK ELECTRONICS, PVCL-400-AR. OR APPROVE EQUAL

TIME DELAY RELAY OCTAL 120 VAC POTTER BROMFIELD 0-180 SEC.

GENERAL PURPOSE OCTAL 120 VAC POTTER BROMFIELD KRPIIA

PRESSURE SWITCH MERCOID DA 2i

LIMIT SWITCH - ON CONTROL VALVE

SOLENOID - ON CONTROL VALVE

MAG STARTER

NOTE: 3 AMMETERS W/SELECTOR SWITCH TO INDIVIDUAL BOOSTER VOLTOMETER W/SELECTOR SWITCH TO INDIVIDUAL PHASE

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

STANDARD PLAN

W-44

APPROVED: 

ASSISTANT DEPUTY DIRECTOR

AUGUST 93

DATE
BOOSTER CONTROLS

(TYPICAL FOR EACH BOOSTER)

NOTE:
1. GAGE PANEL SHALL NOT BE INSTALLED ABOVE ELECTRICAL PANEL.

LEGEND
--- 1/4" COPPER TUBING IN PVC CONDUCTOR TUBING
① SUCTION GAGE
② DISCHARGE GAGE

LOS ANGELES COUNTY WATERWORKS DISTRICTS
DEPARTMENT OF PUBLIC WORKS

STANDARD PLAN W-45

APPROVED D. EPSTEIN
ASSISTANT DEPUTY DIRECTOR
AUGUST 93

DATE
1. The depth of cover over the pipe shall be measured vertically from the top of the pipe with reference to an approved, improved gutter flowline. Where there is no improved gutter flowline, use the elevation of a proposed adjacent flowline as the reference elevation.

2. Pavement shall be per the requirements of the local agency's permit but not less than the requirements of Standard Plan 132-1 for PCC pavement or Standard Plan 133-1 for AC pavement.

3. Bedding shall be sand per SSPWC 306-1.2.1 unless otherwise approved by agency.

Los Angeles County Waterworks Districts

Department of Public Works

Standard Plan

W-46

Approved

October 1999

Assistant Deputy Director

Sheel 1 of 1
WELL COVER

3' x 3' STEEL BUTT HINGE

LID

1/4' x 1' x 1 1/2' STEEL TABS WELDED TO LID ONLY
(2 REQUIRED)

STEEL LOCKING HASP AND STAPLE, HEAVY DUTY

20' DIA.

PLAN

SECTION A-A

10' DIA. HOLE

9 7/8' DIA. LID

1/4' THICK STEEL PLATE

3/4' HEX NUT
(3 REQUIRED)

12' DIA. 10 GA. STEEL PIPE

1' DIA. SOUNDING HOLE

1/4' THICK STEEL PLATE

3/4' DIA. 1 6' LONG HEX-HEAD STEEL BOLT, FULL THREADS W/ POINT (3 REQUIRED) EQUALLY SPACED

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

STANDARD PLAN

W-47

APPROVED

AUGUST 93

SHEET 1 OF 1
CABLE TOOL WELL HEAD

TEMPORARY 1/4" THICK STEEL PLATE TO BE 2" PLUS O.D. OF CONDUCTOR PIPE.

PLAN

2" SCREWED RETURN BEND
2" SCREWED CAP W/ 6-1/8" HOLES
2" STD. STEEL PIPE

LOCKING HASP & STAPLE, WELDED TO PIPE AND RETURN BEND, ACROSS COUPLING

TACK-WELD COVER PLATE TO CONDUCTOR PIPE

GROUT TO EXISTING GROUND LEVEL ONLY

EXISTING GROUND SURFACE

CONDUCTOR PIPE TO EXTEND 100' MIN. BELOW EXISTING GROUND SURFACE

GROUT - SEAL TO 100' MIN. DEPTH. PUMP GROUT FROM BOTTOM OF HOLE UP TO SURFACE

NOTE:
SEE SPECIFICATIONS FOR CONDUCTOR PIPE AND WELL CASING DETAILS.

SECTION X-X

LOS ANGELES COUNTY WATERWORKS DISTRICTS
DEPARTMENT OF PUBLIC WORKS

STANDARD PLAN W-48

APPROVED: D. E. T. D., AUGUST 93
ASSISTANT DEPUTY DIRECTOR

DATE
MINIMUM PUBLIC SAFETY REQUIREMENTS

PRIOR TO THE END OF EACH WORK DAY, THE CONTRACTOR SHALL EITHER BACKFILL THE TRENCH OR ERECT AND MAINTAIN FENCES OR COVERS. THE FOLLOWING ARE MINIMUM ACCEPTABLE MEASURES ONLY, AND COMPLIANCE WITH THIS STANDARD DOES NOT RELIEVE THE CONTRACTOR OF HIS OBLIGATION TO PROTECT THE PUBLIC BY ALL NECESSARY MEANS.

I. FENCES

CASE A

FENCES (SEE NOTE 4)

EXCAVATED MATERIAL

NORMAL TRENCH

BRACING AND JACKS

CASE B

FENCES (SEE NOTE 4)

EXCAVATED MATERIAL

NORMAL TRENCH

BRACING AND JACKS

CASE C

FENCE (SEE NOTE 5)

SHORING 8' C.C. (MAX.)

FENCE (SEE NOTE 5)

EXCAVATED MATERIAL

TRENCH OR EXCAVATION

BRACING AND JACKS

II. COVER

COVER (SEE NOTES 2 AND 3)

EXCAVATED MATERIAL

NORMAL TRENCH

BRACING AND JACKS

NOTES

1. EXCEPTIONS: FENCES OR COVERS WILL BE OPTIONAL WITH THE CONTRACTOR IF THE EXCAVATION IS EITHER:
   a. LESS THAN 3 FEET DEEP.
   b. LESS THAN 5 FEET DEEP WITH SUFFICIENT WARNING DEVICES SUCH AS LANTERNS, FLASHERS, OR BARRICADES.
   c. FOR CASE B, LESS THAN 3 FEET DEEP IN THE VERTICAL PORTION WITH UPPER SIDE SLOPES OF 1:3 OR FLATTER.
   d. IN AN AREA THAT IS NOT ACCESSIBLE TO THE PUBLIC OR THAT IS MORE THAN 1/2 MILE FROM ANY PLACE OF PUBLIC USE OR HABITATION.

2. COVERS MAY BE:
   a. 1/4" STEEL PLATES
   b. 2" PLANKS
   c. 3/4" PLYWOOD

3. WHEN STEEL PLATE COVER IS BEING USED FOR VEHICULAR TRAFFIC, IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE PROPER TRENCH BRACINGS AND STEEL PLATES WITH SUFFICIENT STRENGTH IN COMPLIANCE WITH THE WORK AREA TRAFFIC CONTROL HANDBOOK (MATERIAL).

4. FOR CASES 'A' AND 'B', FENCES MAY BE:
   a. WOOD PICKETS TIED WITH WIRE AND POSTS 6' C.C.
   b. 2' X 4' POSTS 8' C.C. AND WIRE MESH
   c. 2' X 4' POSTS 8' C.C. WITH TOP AND BOTTOM RAIL AND CHICKEN WIRE
   d. SAME AS NOTE 5 ITEM C.

5. FOR CASE 'C', FENCES MAY BE:
   a. WOOD PICKETS TIED WITH WIRE AND BOTTOM RAIL
   b. TOP AND BOTTOM RAIL WITH CHICKEN WIRE
   c. THREE RAILS EQUALLY SPACED WITH BOTTOM RAIL 6" ABOVE GROUND.

6. POST FOR FENCES SHALL BE 2' X 4' WOOD OR EQUIVALENT STEEL OR PIPE. IN PAVED AREAS, POSTS MAY BE FLUSH WITH SURFACE IF SUFFICIENTLY ANCHORED AND BRACED. RAILS SHALL BE 1' X 4' WOOD.

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

STANDARD PLAN W-49

APPROVED

Doris A. Peschke
ASSISTANT DEPUTY DIRECTOR

AUGUST 93

DATE

SHEET 1 OF 1
### Parallel Construction

- Zone "B" (Zone "A" is prohibited in this area)
- Special Pipe
- Special Permission

**Special Construction will be required if horizontal clearance between pressure water main and sewer line is less than 10 feet. See the zone above corresponding to construction requirements below.**

### Perpendicular Construction

- Zone "D" (Zone "F" is prohibited in this area)
- Special Pipe
- Special Permission

**Special Construction will be required if vertical clearance between pressure water main and sewer line at crossing is less than one foot. See the zone above corresponding to construction requirements below.**

### Water Main Construction Requirements

<table>
<thead>
<tr>
<th>Zone</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>No water mains parallel to sewers shall be constructed without approval from the health agency.</td>
</tr>
<tr>
<td>B</td>
<td>Use steel pipe, CML and CMC with welded joints.</td>
</tr>
<tr>
<td>C</td>
<td>No joints within 10 feet of either side of sewer line. Use ductile iron pipe, CML and polyethylene wrapped, or steel pipe, CML and CMC.</td>
</tr>
<tr>
<td>D</td>
<td>No joints within 4 feet of either side of sewer line. Use ductile iron pipe, CML and polyethylene wrapped, or steel pipe, CML and CMC.</td>
</tr>
<tr>
<td>P</td>
<td>Prohibited zone - no water mains are allowed to be installed within this zone.</td>
</tr>
</tbody>
</table>

### Additional Notes:
1. Water mains and sewer lines must not be installed in the same trench.
2. Separation distances specified shall be measured from the nearest edge of facilities.
3. Steel pipe shall be a minimum of 10 gage thickness.

The "California Waterworks Standards" sets forth the minimum separation requirements for water mains and sewer lines. These standards are contained in Section 64630, Title 22, California Administrative Code.

### Los Angeles County Waterworks Districts

#### Department of Public Works

**Approved: ** Dean

**Assistant Deputy Director: **

**Date: ** October 1999

**Standard Plan: ** W-50

**Sheet 1 of 1**
PUMP WELL

NOTE:
36" I.D. OPENING-GENERAL
USAGE MANHOLE FRAME AND
COVER FOR TRAFFIC

CONFIRM MARKING
AND LOCATION
WITH LACWWD

1/2" LIFTING SLOT

3/4" DRILLED VENT
HOLES 4-REQUIRED
EQUALLY SPACED

LOS ANGELES
COUNTY
WATERWORKS
DISTRICT

WATER

MANHOLE COVER DETAIL
NOT TO SCALE

ROADWAY SURFACE

GRavel

6" FLANGED
STEEL OUTLET,
CML & CMC

6" FLANGED
STEEL TRANSMISSION
MAIN, CML & CMC

a 6" BLIND FLANGE, STEEL, AWWA CL D
b 6" GATE VALVE, FLANGED, 200 PSI MIN. WWP. WITH HAND WHEEL
c 6" STEEL PIPE SPOOL, 0.25" THICKNESS MIN., CML & CMC
d 36" I.D. PRECAST CONCRETE GRADE RINGS
e 36" DIA. CAST IRON MANHOLE FRAME AND COVER PER DETAIL
f 6" STEEL SLIP-ON WELDING FLANGE, AWWA CL D

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

STANDARD PLAN
W-53

APPROVED
ASSISTANT DEPUTY DIRECTOR
OCTOBER 1999
DATE

SHEET 1 OF 1