STANDARD PLANS

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.

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SECTION 1

STREET IMPROVEMENTS

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), (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.

SECTION 1 (cont.)

STREET IMPROVEMENTS

Number	Description	Old Number

CURB AND GUTTER (CONT.)

*120-1	CURB AND GUTTER-BARRIER	28-01 (R)
*121-1	CURB AND GUTTER-MOUNTABLE	28-01 (R)
*122-1	CROSS AND LONGITUDINAL GUTTERS	28-01 (R), 52-01 (R) 52-05 (R), 52-06 (R)
*123-1	CROSS GUTTER AT T INTERSECTIONS	1120-0 (PW)

PAVEMENT

1010-0	PAVEMENT LEGEND	
1070-1	INVERTED A.C. SHOULDER STREET SECTION	04-02 (R),
1080-1	INVERTED P.C.C. SHOULDER STREET SECTION	

*130-1	ALLEY INTERSECTION	44-01 (R)
*131-1	CONCRETE BUS PAD	1160-0 (PW)
*132-1	CONCRETE PAVEMENT REPLACEMENT	40-01 (R), 1030-0 (PW)
*133-1	ASPHALT CONCRETE PAVEMENT REPLACEMENT	
*134-1	CONCRETE PAVEMENT JOINT DETAILS	40-02 (R), 1040-0 (PW)

MEDIAN

*140-2	MEDIAN TAPER	24-01 (R), 1050 (PW)
*141-1	MEDIAN FLARE	24-02 (R)

PARKWAY DRAINAGE

1150-1	PARKWAY EROSION PROTECTOR	

*150-2	CURB DRAIN	62-02 (R)
*151-1	PARKWAY DRAIN	62-01 (R), 3056-0 (PW)
*152-1	RECTANGULAR FRAME AND COVER	74-01 (R), 3057-0 (PW)

SECTION 1 (cont.)

STREET IMPROVEMENTS

GUARDRAILS AND MARKERS

Number	Description	Old Number
#A73A	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)	
#A77A	METAL BEAM GUARD RAILING	
#A77B	METAL BEAM GUARD RAILING-STANDARD HARDWARE	
#A77C	METAL BEAM GUARD RAILING-POSTS AND BLOCKS	
#A77D	GUARD RAIL FLARES	
#A77E	GUARD RAIL FLARES	
#A77F	METAL BEAM GUARD RAILING-MISCELLANEOUS DETAILS	
#A77G	GUARD RAIL END ANCHORS (BREAKAWAY)	
#A77H	GUARD RAIL END ANCHORS (BREAKAWAY HARDWARE)	
#A77I	BARRIER AND GUARD RAIL END ANCHORS	
#A77J	GUARD RAIL CONNECTIONS TO BRIDGE RAILS, RETAINING WALLS AND ABUTMENTS	
#A77K	GUARD RAIL CONNECTION TO BRIDGE SIDEWALK AND CURBS	

Note: For projects using the Metric International system of units use Caltrans Standard Plans in the July 1995 Edition. For projects using the U.S. Standard units use Caltrans Standard Plans in the July 1992 Edition.

SECTION 2

SEWERS AND SANITATION

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), (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.

SYMBOLS AND GENERAL

Number	Description	Old Number
2000-0	LEGEND FOR SANITARY SEWER PLANS AND PROFILES AND DISTRICT MAPS	S-1 (C)
2100-1	REQUIREMENTS FOR SANITARY SEWERS IN THE VICINITY OF PRESSURE WATER MAINS	S-C1 (C)

MANHOLES AND STRUCTURES

2002-1	PRECAST CONCRETE SHALLOW MANHOLE	S-32 (C)
2003-2	REINFORCED PRECAST CONCRETE MANHOLE	S-6 (C)
2004-1	RECTANGULAR SHALLOW MANHOLE	S-7 (C)
2005-2	SIPHON MANHOLE	S-8 (C)
2006-1	SPECIAL SQUARE BASE MANHOLE	S-9 (C)
2007-2	TRAP MANHOLE BASE	S-10 (C)
2008-2	LARGE GAS TRAP MANHOLE BASE	S-11 (C)
2009-1	RECONSTRUCTION OF BRICK MANHOLE TOPS	S-12 (C)
2011-2	SPECIAL MANHOLE BASES	S-14 (C)
*200-2	PRECAST CONCRETE SEWER MANHOLE	S-36 (C), 2001-0 (PW)
*203-0	BRICK SEWER MANHOLE	S-3 (C)
*205-1	SEWER MANHOLE ADJUSTMENT	
*206-1	MANHOLE RAISING RINGS	S-34 (C), 2012-0 (PW)
*207-1	PRECAST REINFORCED CONCRETE MANHOLE BASE	2013-0 (PW)
*208-1	BREAKING INTO EXISTING MANHOLES	S-13 (C), 2010-0 (PW)

Number	Description	Old Number

MANHOLE HARDWARE (Cont.)

2014-1	RECTANGULAR MANHOLE FRAME AND COVER	S-16 (C)
2015-1	STANDARD MANHOLE STEP	S-17 (C)
2016-1	TRAP MANHOLE CASTING	S-18 (C)
2017-1	LARGE GAS TRAP	S-19 (C)
2018-1	TEMPORARY SAND TRAP	S-20 (C)

*210-2	24-INCH MANHOLE FRAME AND COVER - LOCKING TYPE	S-35 (C)
*211-1	MANHOLE FRAME AND COVER - PRESSURE TYPE	3036-0 (PW)
*212-1	ANCHOR SYSTEM FOR PRESSURE COVER	

For other manholes see Section 6 - GENERAL FACILITIES

PIPE APPURTENANCES

2021-1	BEDDING FOR SEWER PIPE	S-21 (C)
2022-1	BEDDING FOR ABS AND PVC SEWER PIPE	S-21A (C)
2023-2	CRADLING AND ENCASEMENT	S-23 (C)
2024-1	WYE OR TEE SUPPORT	S-26 (C)
2025-2	SADDLES FOR HOUSE LATERALS	S-28 (C)
2026-1	EROSION PROTECTION IN STEEP SLOPES	S-31 (C)
2027-1	ALLOWABLE TRENCH WIDTHS	S-33 (C)
2028-1	JACKING STEEL CASING FOR SEWER PIPE	S-37 (C)

*220-2	CHIMNEYS	S-27 (C), 2020-0 (PW)
*221-1	PIPE ANCHORS AND BACKFILL STABILIZERS	S-24 (C)
*222-1	HOUSE CONNECTION SEWER	2-D250 (F), S-25 (C)
*223-1	HOUSE CONNECTION REMODELING	2-D250 (F), S-29 (C)
*224-1	SUPPORTS FOR CONDUITS ACROSS TRENCHES	2-D173.1 TO .3 (F), S-22 (C)
*225-1	BLANKET PROTECTION FOR PIPES	2-D251 (F)

INDUSTRIAL WASTE

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.

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Number	Description	Old Number
	CATCH BASINS	
3015-0	RURAL CATCH BASIN	
*300-2	CURB OPENING CATCH BASIN	2-D157 (F), 2-D160 (F), 2-D162 (F), 2-D163 (F)
*301-2	CURB OPENING CATCH BASIN WITH GRATING(S) AND DEBRIS SKIMMER	2-D109 (F)
*302-2	CURB OPENING CATCH BASIN WITH GRATING(S)	2-D170 (F)
*303-2	CURBSIDE GRATING CATCH BASIN	2-D101 (F)
*304-2	GRATING CATCH BASIN - ALLEY (LONGITUDINAL)	2-D164 (F)
*305-2	GRATING CATCH BASIN - ALLEY (TRANSVERSE)	2-D195 (F)
*306-2	CURB OPENING CATCH BASIN AT DRIVEWAY	2-D249.1 to .3 (F)
*307-2	CURB OPENING CATCH BASIN WITH MANHOLE IN STREET	2-D471 (F)
*308-1	MONOLITHIC CATCH BASIN CONNECTION	2-D224 (F)
*309-1	CATCH BASIN REINFORCEMENT	2-D172 (F)
*310-1	CATCH BASIN FACE PLATE ASSEMBLY AND PROTECTION BAR	2-D175 (F), 2-D232 (F), 2-D264 (F)
*311-2	FRAME AND GRATING FOR CATCH BASINS	2-D227 (F)
*312-2	CATCH BASIN MANHOLE FRAME AND COVER	2-D156 (F), 74-12 (R)
*313-1	LOCAL DEPRESSIONS AT CATCH BASINS	2-D88 (F), 2-D248 (F), 2-D415 (F), 66-03 (R), 68-01 (R), 68-02 (R), 68-04 (R), 68-05 (R), 68-06 (R), 68-07 (R), 68-08 (R)
*314-2	MODIFICATIONS FOR SIDE OPENING CATCH BASIN	2-D461 (F), 3014-0 (PW)

FLOOD CONTROL AND STORM DRAIN FACILITIES

FLOOD CONTROL AND STORM DRAIN FACILITIES

TRANSITION STRUCTURES

FLOOD CONTROL AND STORM DRAIN FACILITIES

Number	Description	Old Number
	MISCELLANEOUS DRAINAGE FACILITIES (CONT.)	
3085-1	BARRIER-RAIL AND TIMBER	2-D OC B 1.1 TO .10 (F)
3086-0	OPEN CHANNEL-REVETMENT DOUBLE PIPE AND WIRE	2-D OC R 2.1 TO .2 (F)
3087-2	SUBDRAINAGE SYSTEM FOR RC RECTANGULAR OPEN CHANNEL	2-D295.1 TO .3 (F)
3090-1	CRITERIA FOR THE DESIGN OF SHORING FOR EXCAVATIONS	2-D466 (F)
3091-1	SAMPLE SHEET FOR USE AS A GUIDE IN PREPARING CALCULATIONS FOR SHORING OF EXCAVATIONS	2-D400 (F)
3092-1	PIPE BEDDING FOR PRIVATE DRAINS (ALTERNATE METHOD TO STD. PLAN 3080)	D-54 (C)
3093-1	UNIFIED SOIL CLASSIFICATION SYSTEM	2-D413 (F)
3095-1	ADDITIONAL REINFORCEMENT FOR BELL END OF RCP	2-D395 (F)
3096-1	ADDITIONAL REINFORCEMENT FOR JACKED RCB	2-D465 (F)
*380-3	CONCRETE COLLAR FOR RCP 12 INCHES THROUGH 72 INCHES	2-D393 (F), 3088-0 (PW)
*381-1	ABANDONMENT SEALS FOR MANHOLES AND INLETS	3025-0 (PW)
*382-1	WINDOW DETAILS FOR MULTIPLE RCB STRUCTURES	2-D205 (F), 3094-0 (PW)
*383-1	VELOCITY CONTROL RING PRECAST RCP SECTION	2-D ED 1 (F), 3083-0 (PW)
*384-1	ENERGY DISSIPATOR - IMPACT BASIN WITH VERTICAL BAFFLE WALL	3097-0 (PW)

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STREET LIGHTING AND TRAFFIC SIGNALS

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), (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.

STREET LIGHTING AND TRAFFIC SIGNALS

Number	Description	Old Number
#ES-6RA	SIGNAL AND LIGHTING STANDARDS - CASE 5 ARM LOADING, WIND VELOCITY= (129 km/h), ARM LENGTH (15.2 m to 16.8 m)	
#ES-6S	SIGNAL AND LIGHTING STANDARDS - DETAILS NO. 1	
#ES-6T	SIGNAL AND LIGHTING STANDARDS - DETAILS NO. 2	
#ES-9A	SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS - CANTILEVER FLASHING BEACON TYPES 9, 9A, 9B	
#ES-9B	SIGNAL, LIGHTING AND ELECTRICAL SYSTEMS - CANTILEVER FLASHING BEACON TYPES 9, 9A, 9B	
Note:	For projects using the Metric International system of units use Caltrans Standard Plans in the July 1995 Edition. For projects using the U.S. Standard use Caltrans Standard Plans in the July 1992 Edition.	

AUXILIARY EQUIPMENT

*460-1	PULL BOXES	858 (R)
*461-1	PEDESTRIAN PUSH BUTTON MOUNTING	
*462-1	PUSH BUTTON POST ADAPTER BASE	851 (R)
*463-0	GENERAL PURPOSE RELAYS	854 (R)
*464-1	CONDUCTOR SPLICING DETAILS	860 (R)
*465-1	CONDUIT EXPANSION DETAILS	862 (R)

STREET NAME SIGNS

*490-1	MAST ARM SIGN DETAIL	810 (R)

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SECTION 5

LANDSCAPING AND IRRIGATION SYSTEMS

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), (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.

Number	Description	Old Number
*518-2	TREE STAKING	5001-0 (PW)
*519-3	TREE WELL	32-02 (R), 5002-0 (PW)
*520-2	TREE PLANTING	30-03 (R), 30-04 (R),
*523-1	ROOT PRUNING	5004-0 (PW)
*524-1	TEMPORARY TREE WELL COVER	32-03 (R), 5003-0 (PW)

SECTION 6

GENERAL 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), (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.

PROTECTIVE FACILITIES

Number	Description	Old Number
6000-1	TYPICAL FENCE POST EXTENSION DETAILS	2-D473 (F)
6001-0	BREAKAWAY FENCING	2-D447 (F)
6002-1	PORTABLE SECURITY FENCE FOR OPEN TRENCHES	2-D476 (F)
6003-2	EQUESTRIAN AND BICYCLE ENTRANCE	
6008-1	MINIMUM PUBLIC SAFETY REQUIREMENT FOR OPEN EXCAVATIONS	S-2 (C), W-49 (C)
6009-1	BARRICADE - TYPE III	85-03 (R)

*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 (PW)
*602-1	STANDARD PIPE GATE FOR ACCESS ROADS	2-D480 (F), 6007-0 (PW)
*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)	

Note: For projects using the Metric International system of units use Caltrans Standard Plans in the July 1995 Edition. For projects using the U.S. Standard use Caltrans Standard Plans in the July 1992 Edition.

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GENERAL FACILITIES

Number **Description** **Old Number**

BRIDGE FACILITIES

Note: For projects using the Metric International system of units use Caltrans Standard Plans in the July 1995 Edition. For projects using the U.S. Standard use Caltrans Standard Plans in the July 1992 Edition.

Number	Description	Old Number
	RETAINING STRUCTURES	
6201-1	GRAVITY RETAINING WALL	48-02 (R)
6203-1	CONCRETE SLOUGH WALL	48-05 (R)
6204-1	CANTILEVER SOLDIER BEAM RETAINING WALL WITH REINFORCED CONCRETE PANELS	
*610-1	REINFORCED CONCRETE RETAINING WALL TYPE 1	
*611-1	REINFORCED CONCRETE RETAINING WALL TYPE 2	48-01 (R)
*612-1	REINFORCED CONCRETE RETAINING WALL TYPE 3	
*613-1	REINFORCED CONCRETE RETAINING WALL TYPE 4	
*614-1	REINFORCED CONCRETE RETAINING WALL TYPE 5	
*615-2	REINFORCED CONCRETE RETAINING WALL TYPE 6	
*616-1	REINFORCED CONCRETE RETAINING WALL TYPE 7	
*617-1	REINFORCED CONCRETE RETAINING WALL DETAILS	
*618-1	MASONRY RETAINING WALL	48-03 (R)
*619-1	REINFORCED CONCRETE CRIB WALL	
*620-1	STEEL CRIB WALL	
*621-1	REINFORCED CONCRETE BLOCK WALL AND CHAIN LINK FENCE COMBINATION	D-63 (C), 6004-0 (PW)
*622-1	CONCRETE BLOCK SLOUGH WALL	48-04 (R), 6202-0 (PW)
	SUBSURFACE ACCESS	
*630-2	24-INCH MANHOLE FRAME AND COVER	2-D472 (F), 74-11 (R)
*631-2	27-INCH MANHOLE FRAME AND COVER	
*632-2	30-INCH MANHOLE FRAME AND COVER	
*633-3	36-INCH MANHOLE FRAME AND COVER	2-D427 (F), 6300-0 (PW)
*635-2	STEEL STEP	2-D96 (F)
*636-1	POLYPROPYLENE PLASTIC STEP	2-D96 (F)

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SECTION 6 (Cont.)

GENERAL FACILITIES

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SECTION 7

Waterworks Facilities

Standard Plan numbers are the Waterworks District Numbers.

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SECTION 7 (Cont.)

WATERWORKS FACILITIES

Number DESCRIPTION

WATER SERVICES

FIRE HYDRANTS

WELLS

FLUSHOUTS

BOOSTERS

SECTION 1

Street Improvements

ASPHALT CONCRETE PAVEMENT LEGEND

P1	SURFACE COURSE	C2-AR-4000
	BASE COURSE	B -AR-4000
P2	SURFACE COURSE	C2-AR-2000
	BASE COURSE	B -AR-4000
P3		C1 -AR-4000
P4		C2-AR-4000
P5		D1 -AR-4000
P6		D2-AR-4000
P7		D2-AR-2000

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

PAVEMENT LEGEND

STANDARD PLAN 1010-0

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

REVISIONS

SHEET 1 OF 1

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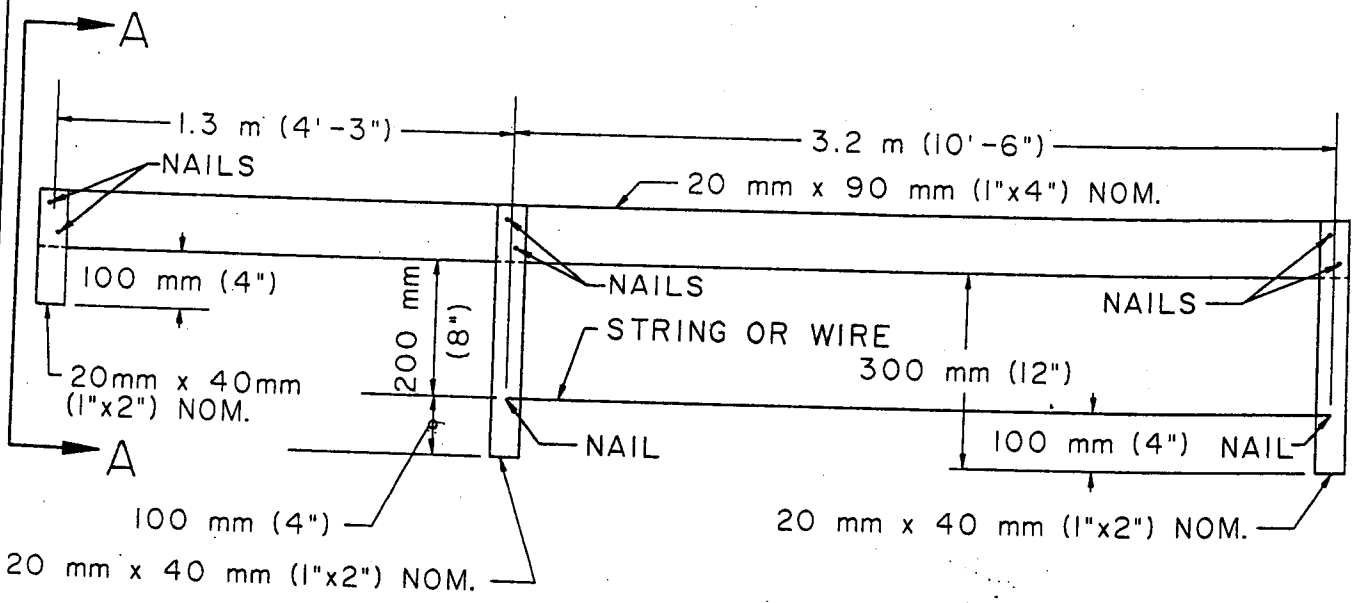
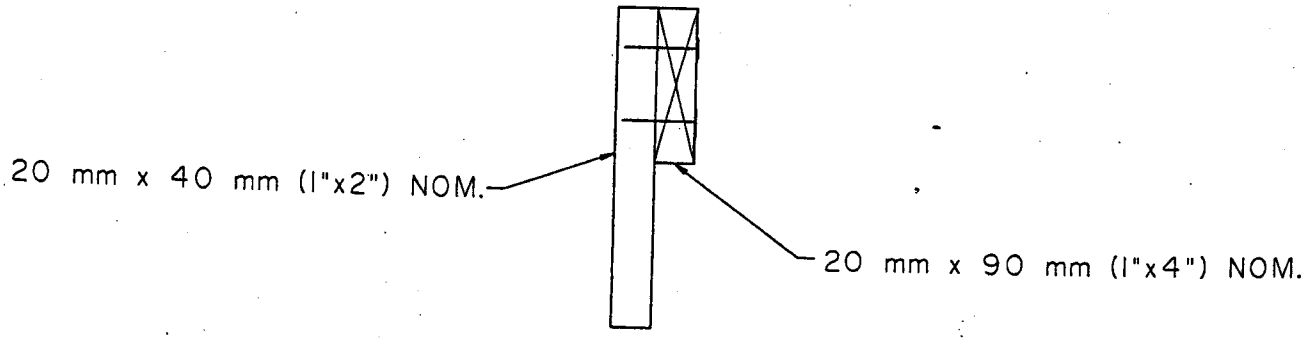


FRONT VIEW



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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

DRIVEWAY TEMPLATE

STANDARD PLAN
METRIC
1060-1
SHEET 1 OF 1

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

1999
REVISIONS

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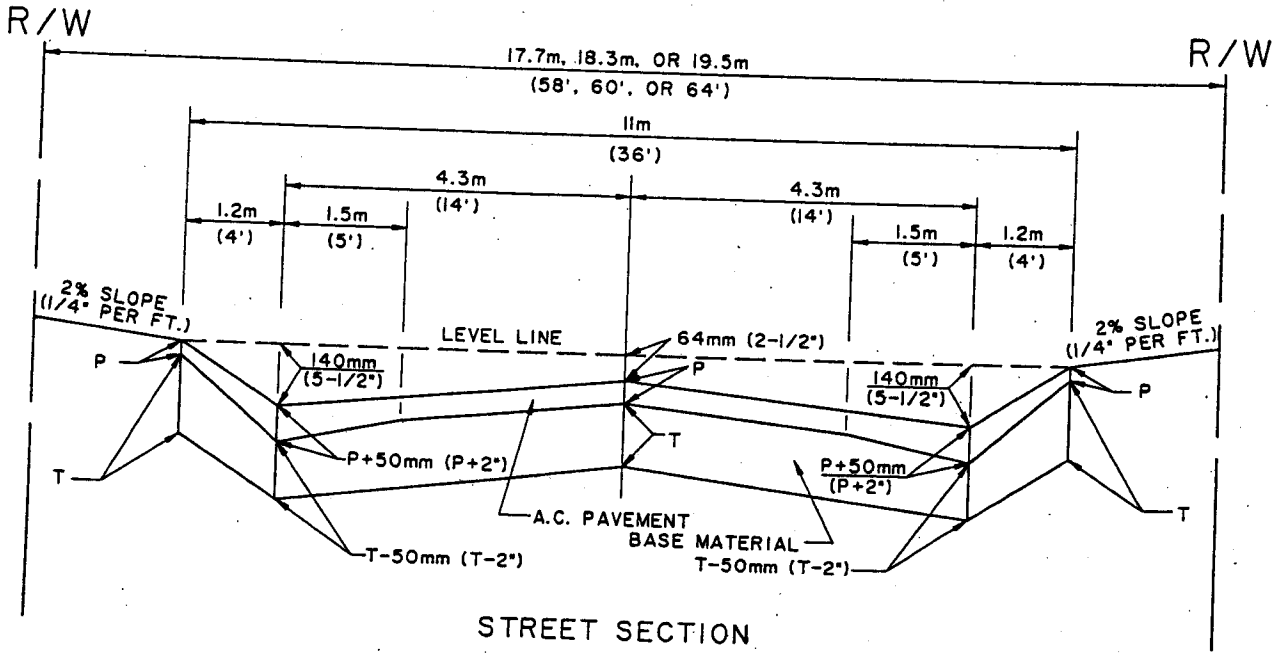


STREET SECTION

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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

INVERTED A.C. SHOULDER STREET SECTION

STANDARD PLAN
METRIC

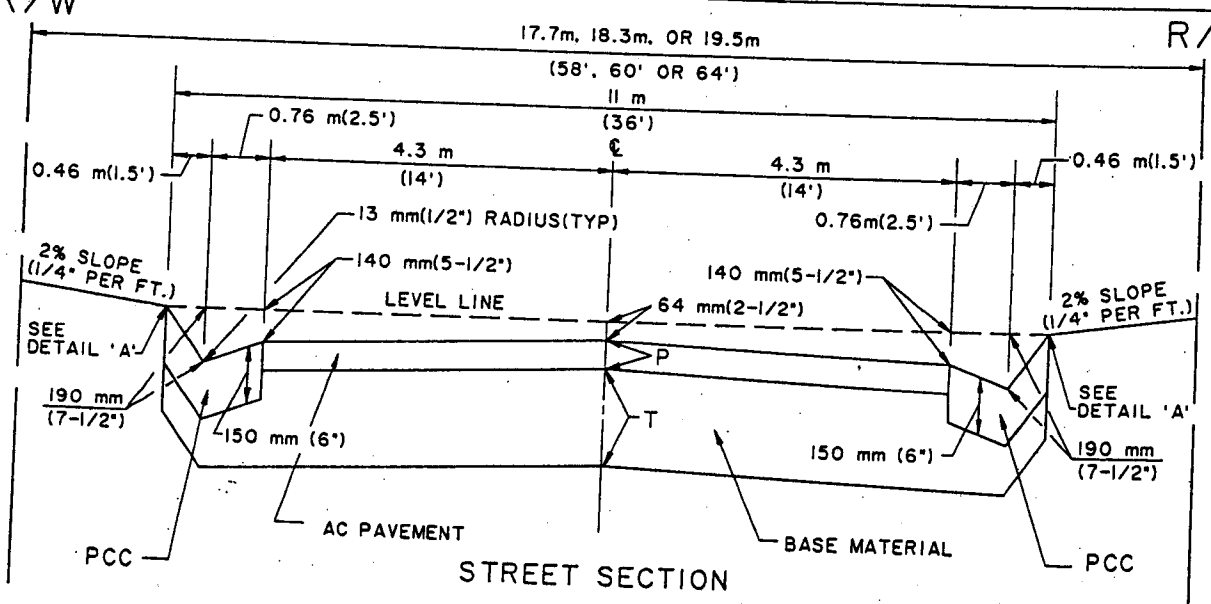
1070-1

APPROVED Thomas A. Tidemanson
DIRECTOR OF PUBLIC WORKS

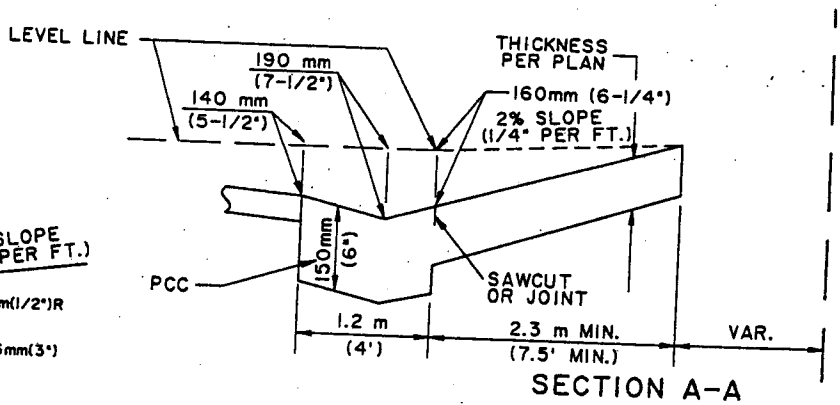
5/31/1992
DATE

1999
REVISIONS

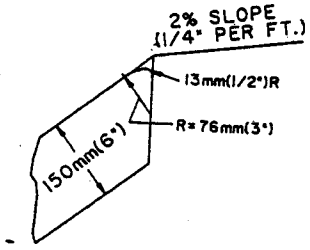
SHEET 1 OF 1



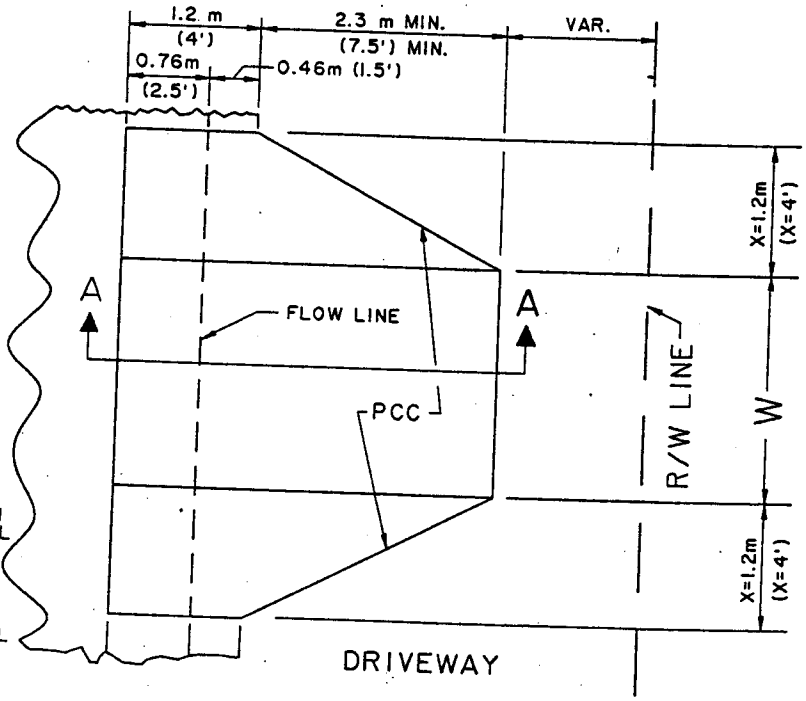
STREET SECTION



SECTION A-A



DETAIL "A"



DRIVEWAY

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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

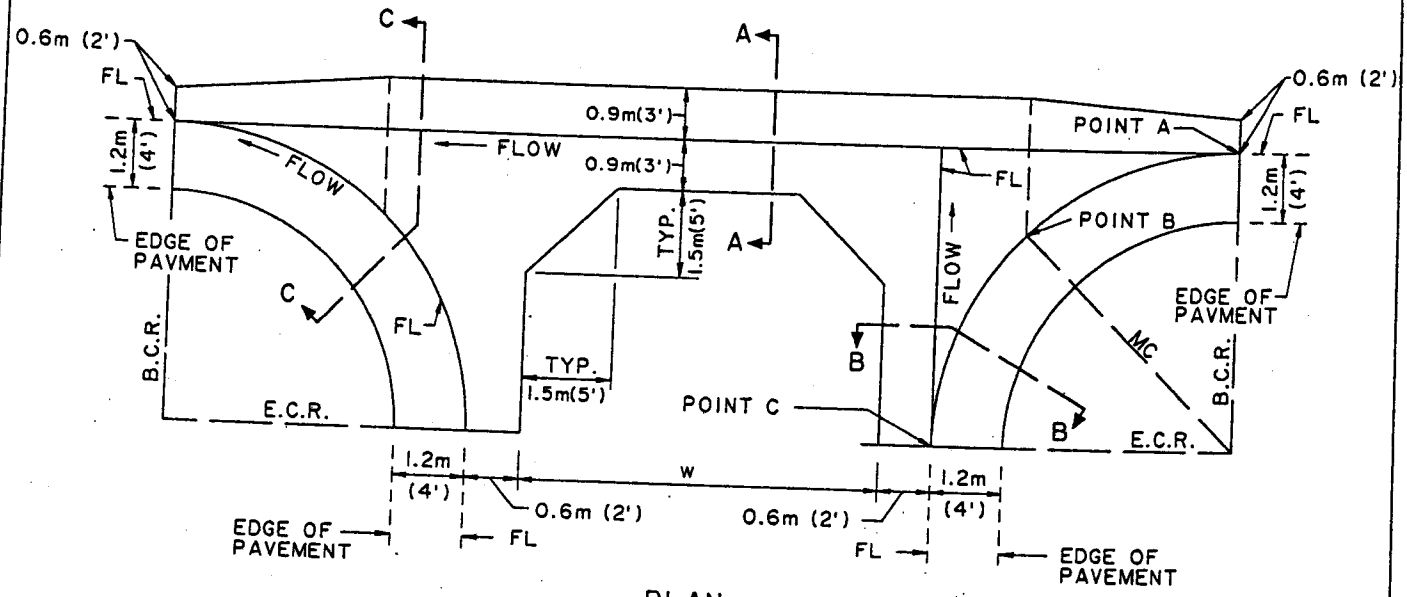
INVERTED PCC SHOULDER STREET SECTION

STANDARD PLAN
METRIC
1080-1
SHEET 1 OF 1

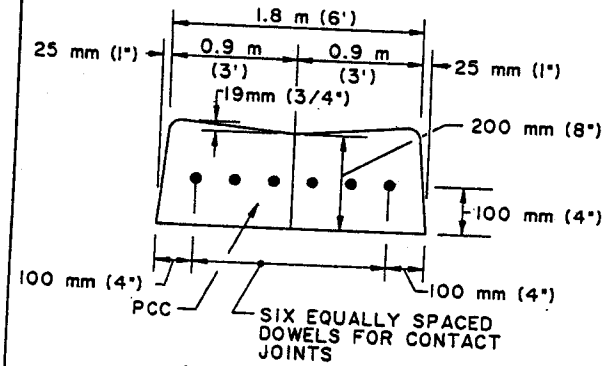
APPROVED Thomas A. Tidemanson
DIRECTOR OF PUBLIC WORKS
5/31/1992
DATE

1999
REVISIONS

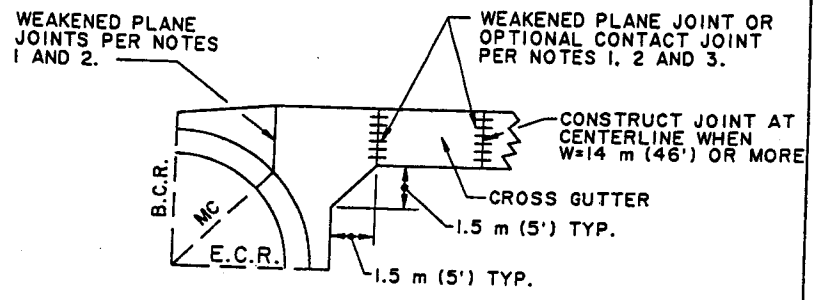
C4.FLD.894012.1080-0



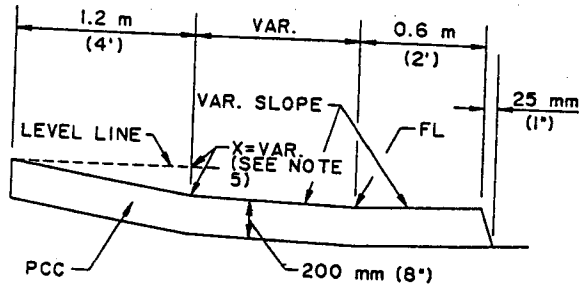
PLAN



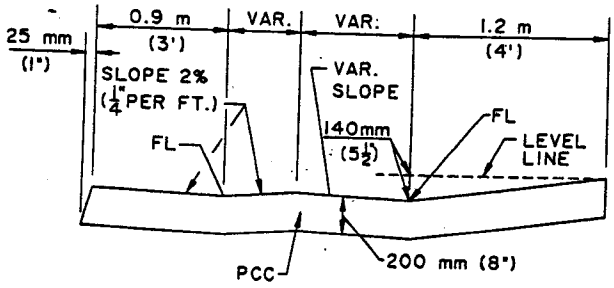
SECTION A-A



TYPICAL JOINT PLAN



SECTION B-B



SECTION C-C

NOTES:

1. WEAKENED-PLANE AND /OR CONTACT JOINTS SHALL BE PLACED IN GUTTER AT LOCATIONS SHOWN ON THE TYPICAL JOINT PLAN HEREON.
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 13 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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

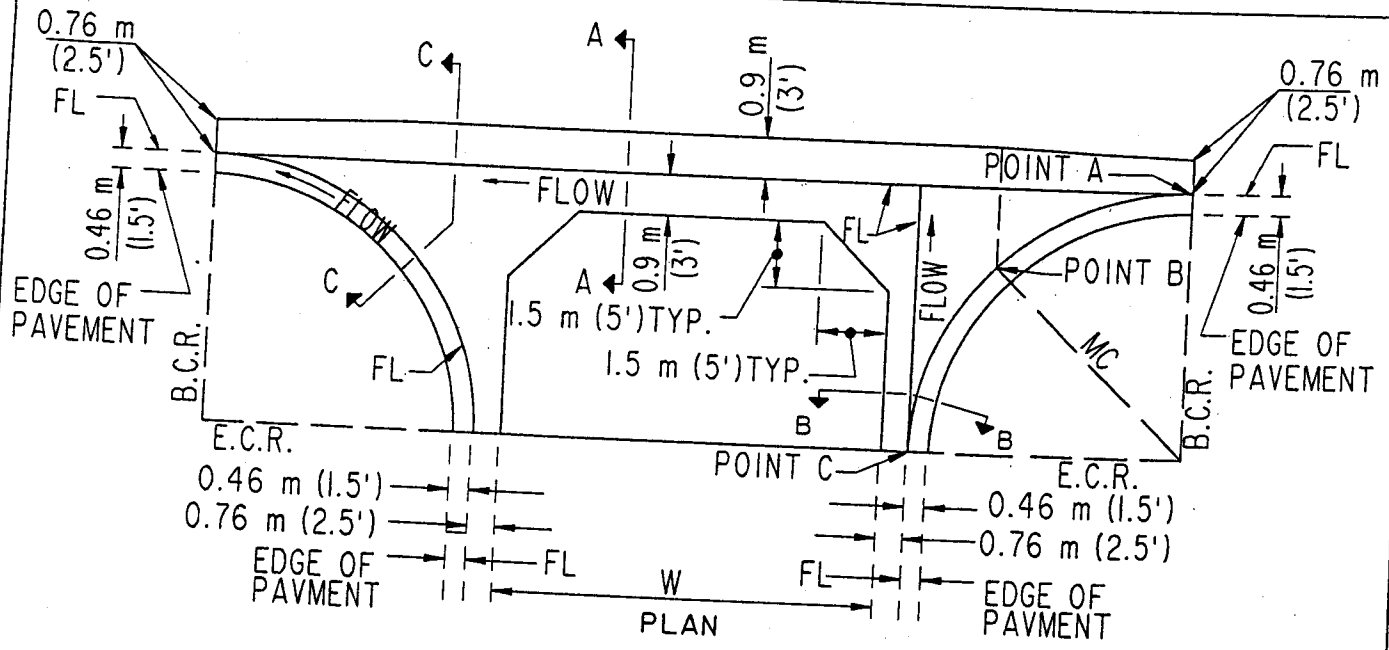
CROSS GUTTER FOR INVERTED AC SHOULDER STREET SECTION

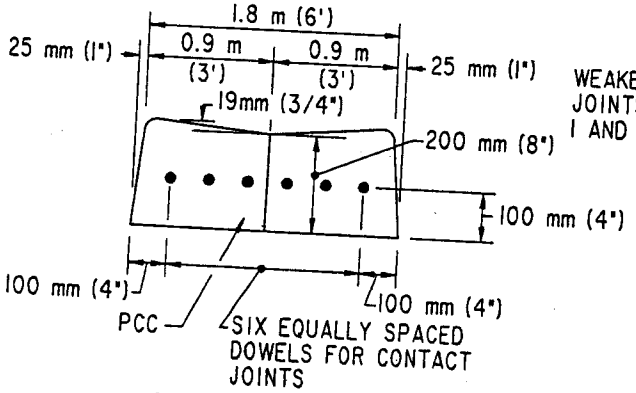
APPROVED Thomas A. Tidemanson 5/31/1992
DIRECTOR OF PUBLIC WORKS DATE

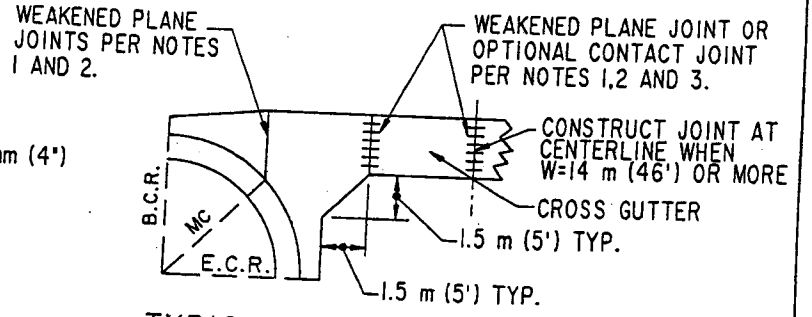
1999
REVISIONS

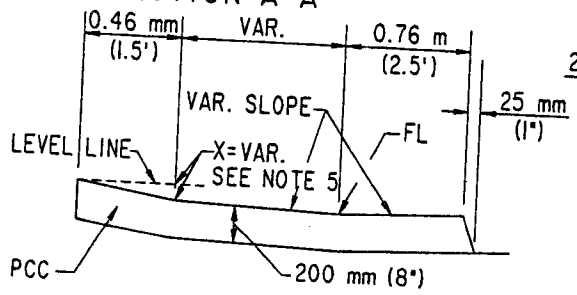
STANDARD PLAN
METRIC
1090-1
SHEET 1 OF 1

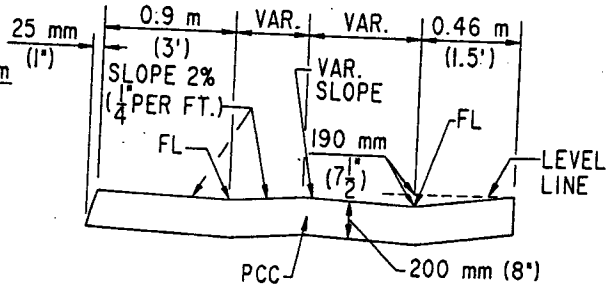
C4.FLD.894012.1090-0











NOTES:

1. WEAKENED-PLANE AND /OR CONTACT JOINTS SHALL BE PLACED IN GUTTER AT LOCATIONS SHOWN ON THE TYPICAL JOINT PLAN HEREON.
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 10M BARS 460 mm LONG (NO.4 BARS 18 INCHES LONG).
4. ALL EXPOSED CORNERS ON PCC TO BE ROUNDED WITH 13 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.

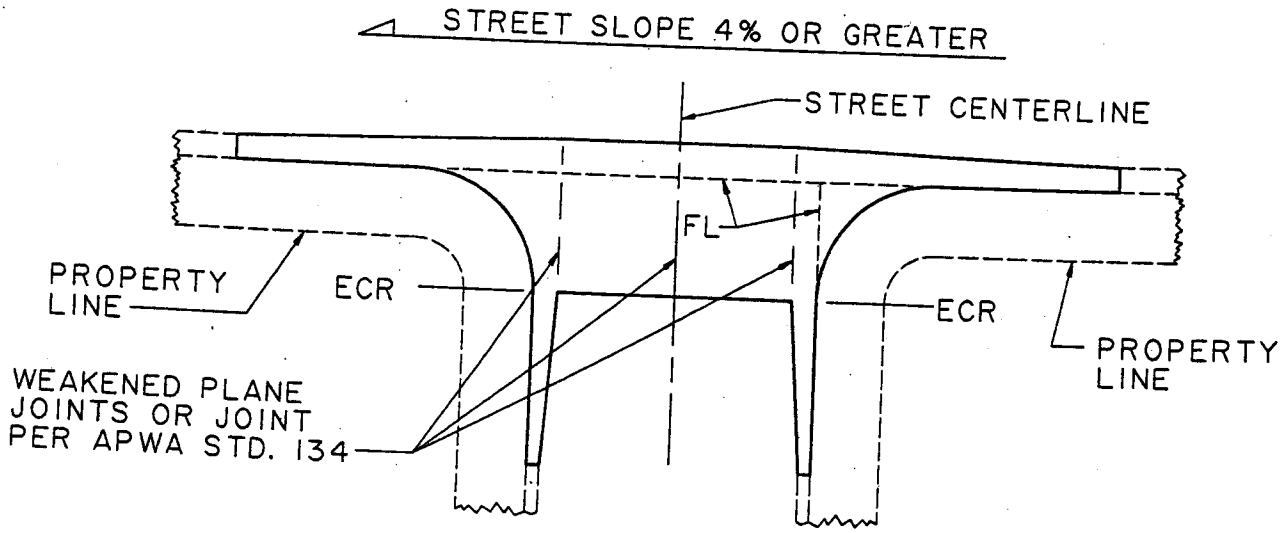
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

CROSS GUTTER FOR INVERTED PCC SHOULDER STREET SECTION

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

1999
REVISIONS

STANDARD PLAN
METRIC
1100-1
SHEET 1 OF 1



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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

CROSS GUTTER FOR STEEP INTERSECTIONS

STANDARD PLAN
METRIC
1110-2
SHEET 1 OF 1

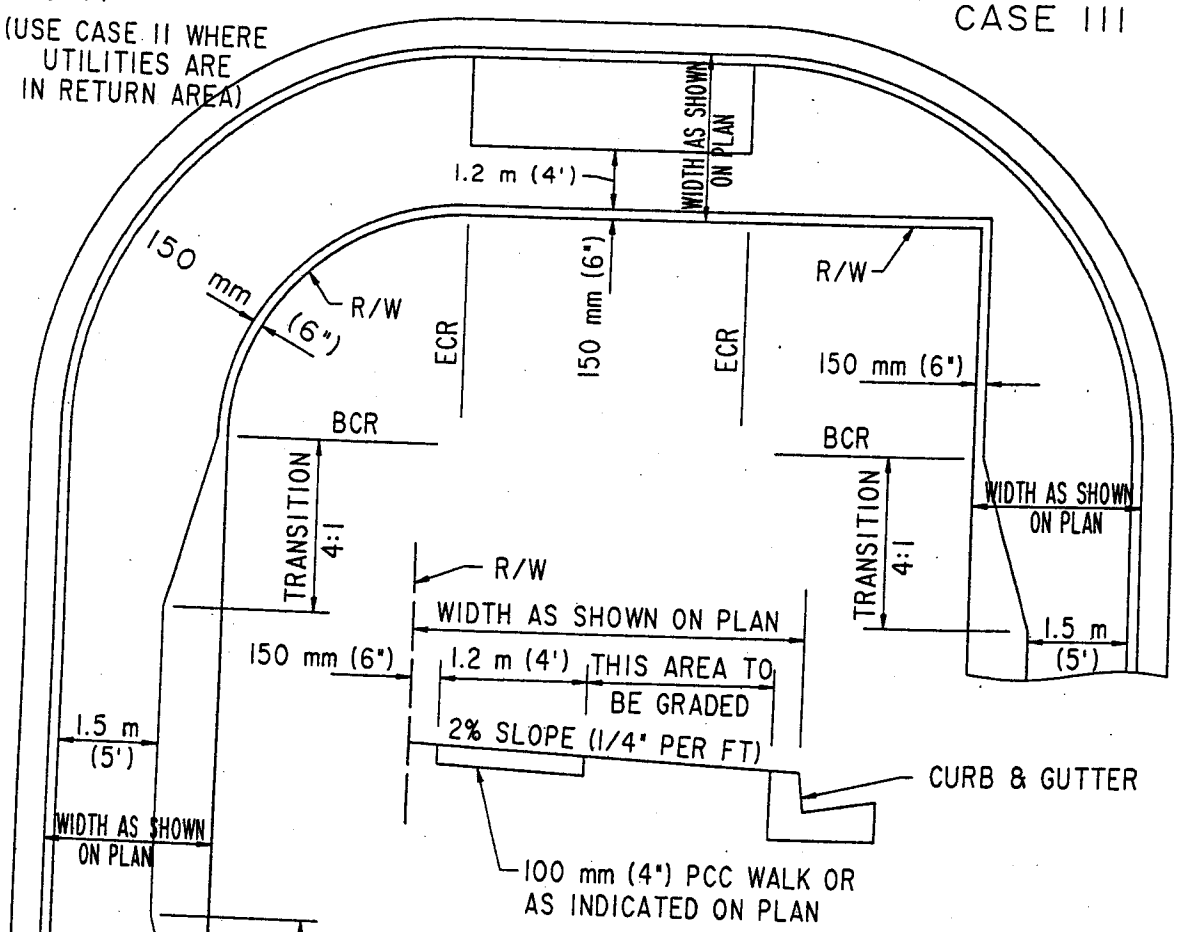
APPROVED Thomas A. Tidemanson
DIRECTOR OF PUBLIC WORKS

5/31/1992
DATE

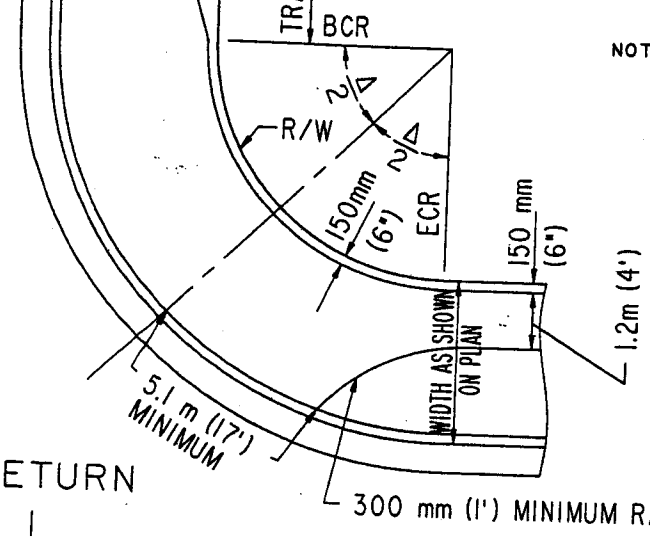
1995, 1999
REVISIONS

WALK RETURN
CASE II
(USE CASE II WHERE UTILITIES ARE IN RETURN AREA)

WALK RETURN
CASE III



TYPICAL SECTION
NO SCALE



WALK RETURN
CASE I

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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SIDEWALK DETAILS AT INTERSECTIONS

STANDARD PLAN
METRIC
1130-1
SHEET 1 OF 1

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

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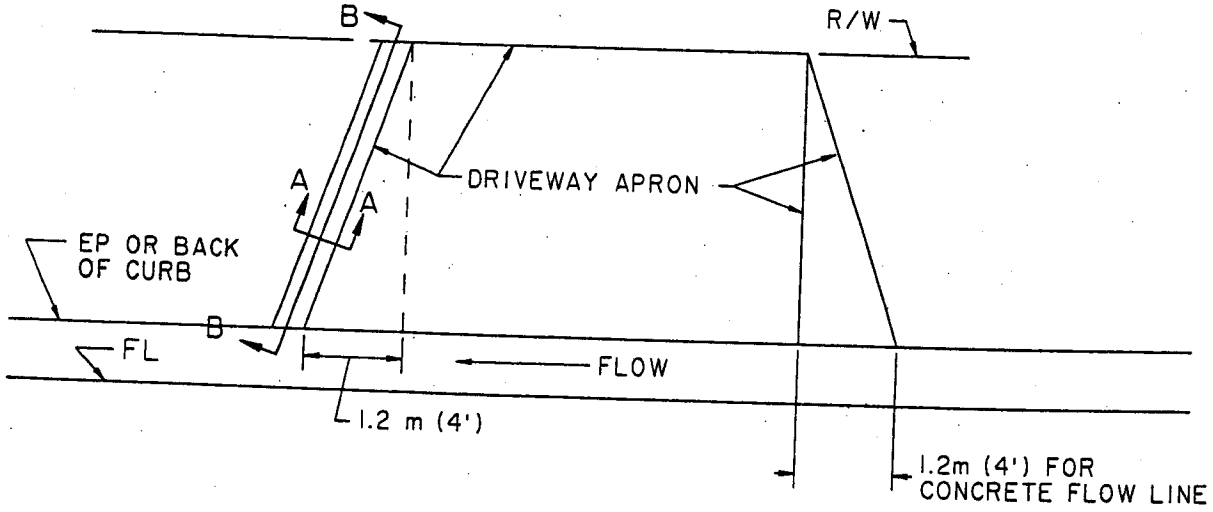
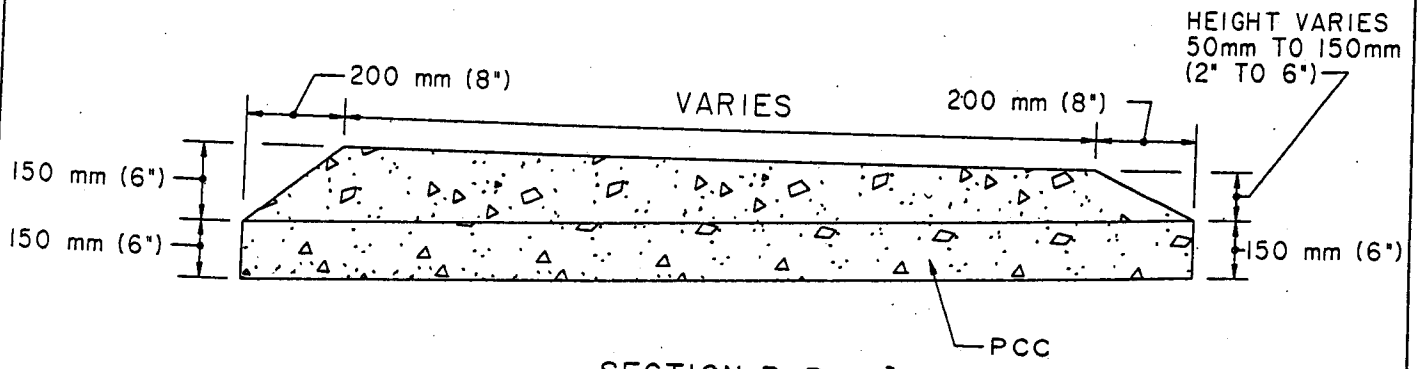
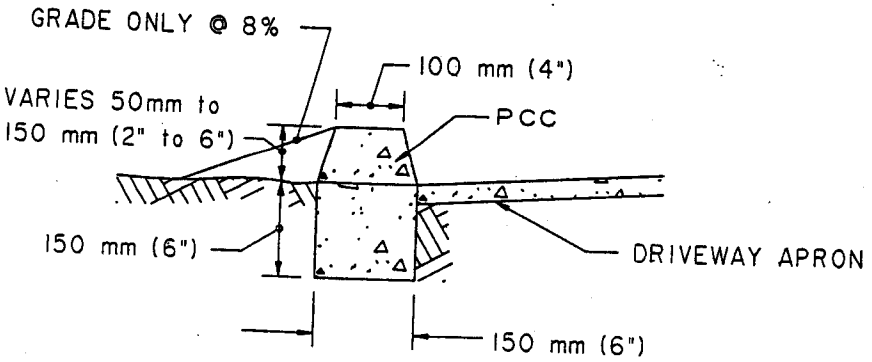
REVISIONS



PARKWAY PROTECTOR DETAIL



SECTION B-B



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
SHEET 1 OF 1

APPROVED Thomas A. Tidemanson
DIRECTOR OF PUBLIC WORKS

5/31/1992
DATE

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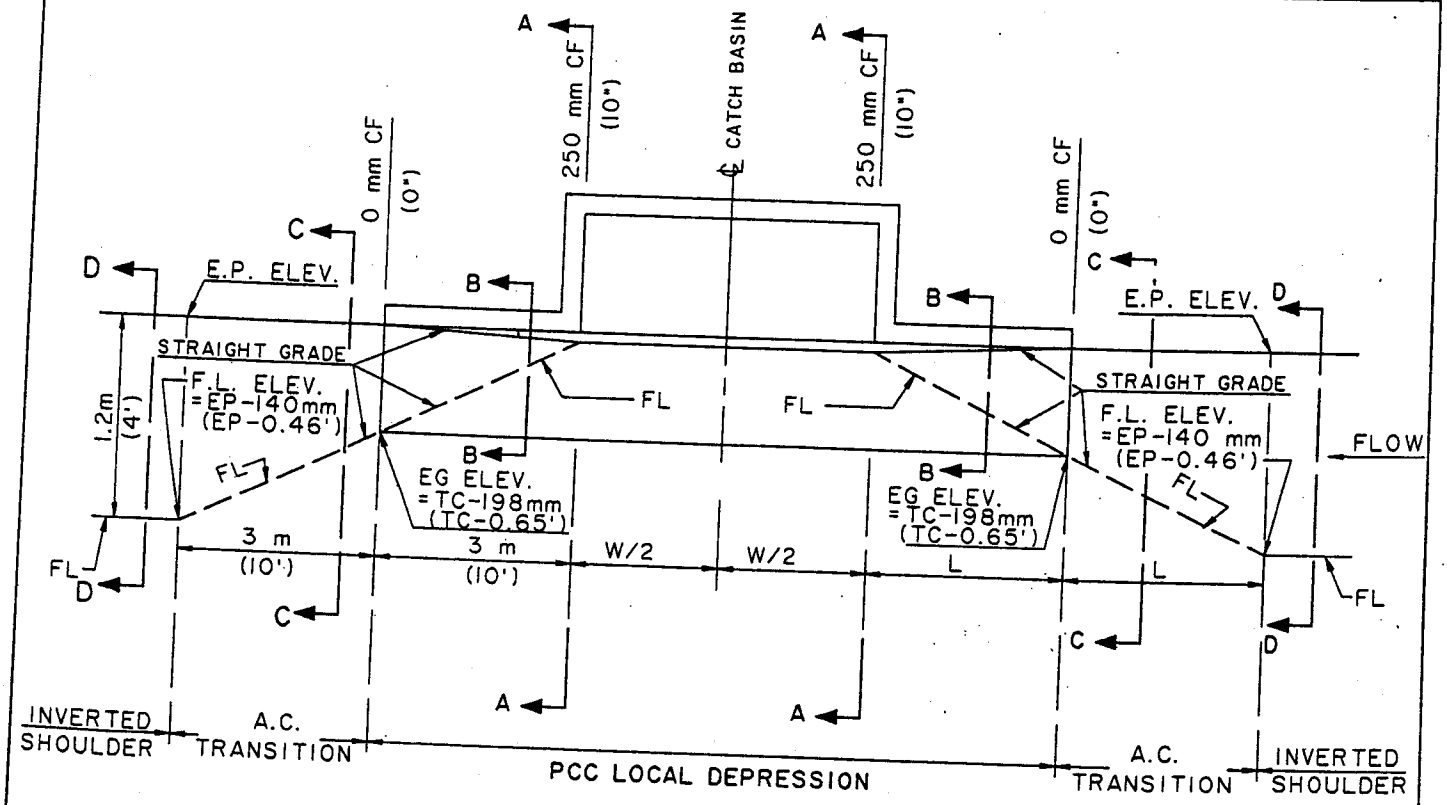
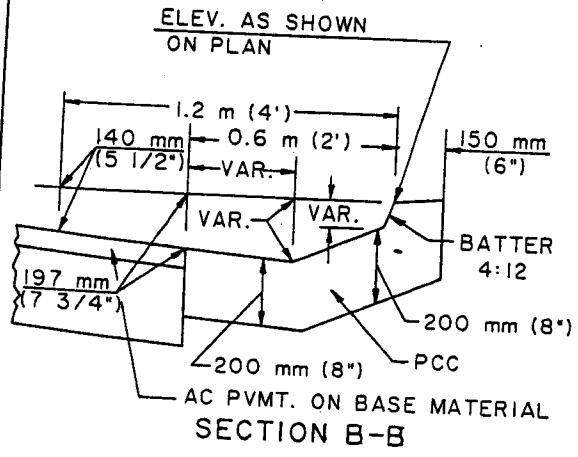
REVISIONS

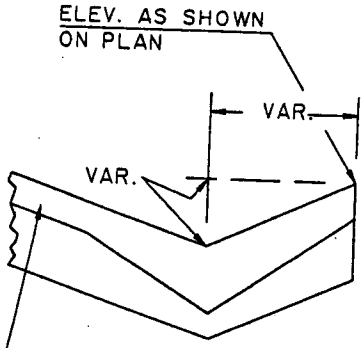


PCC LOCAL DEPRESSION

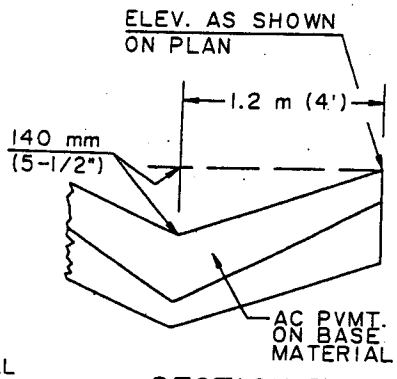
PLAN



SECTION B-B

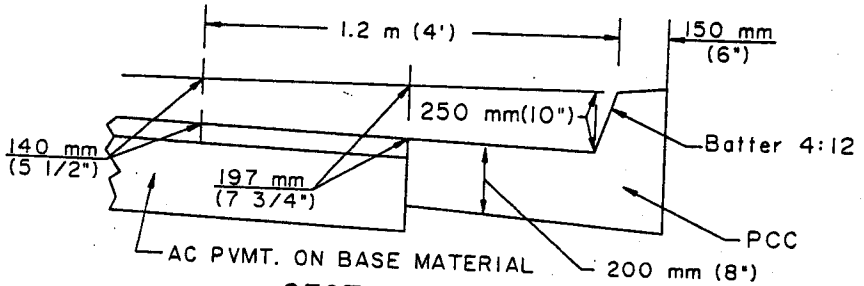


SECTION C-C



SECTION D-D

%Grade	L.
15 to 12	7.92 m (26')
<12 to 9	6.71 m (22')
<9 to 6	5.5 m (18')
<6 to 3	4.27 m (14')
<3	3.05 m (10')
Sag	3.05 m (10')



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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

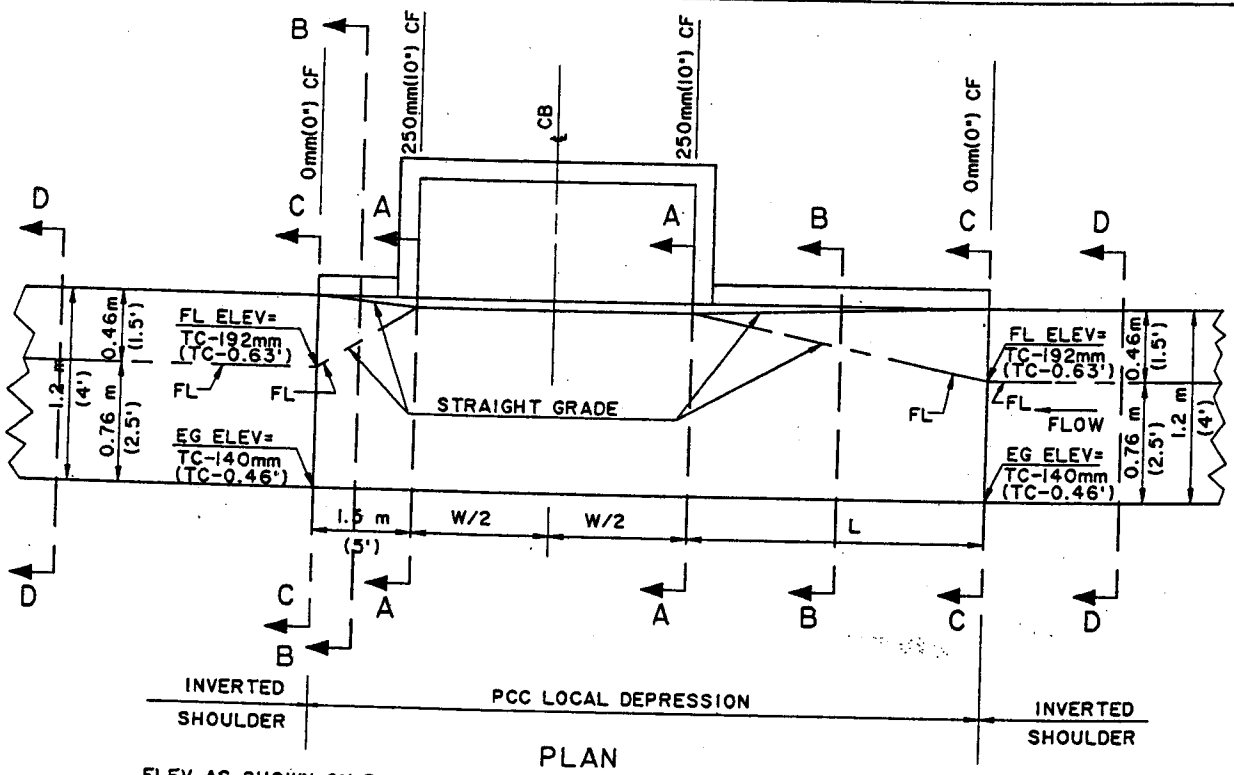
CATCH BASIN GUTTER TRANSITION FOR INVERTED AC SHOULDER STREET SECTION

STANDARD PLAN
METRIC
1170-1
SHEET 1 OF 1

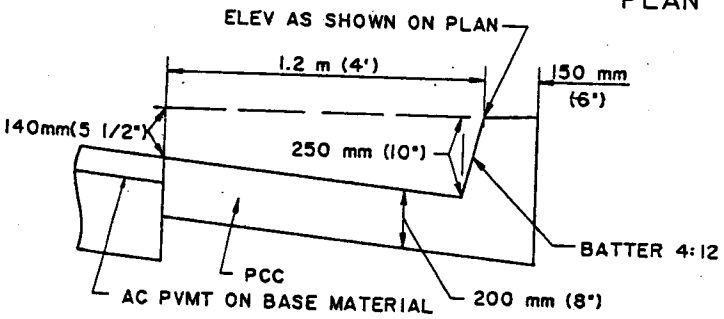
APPROVED Thomas A. Tidemanson
DIRECTOR OF PUBLIC WORKS
5/31/1992
DATE

1999
REVISIONS

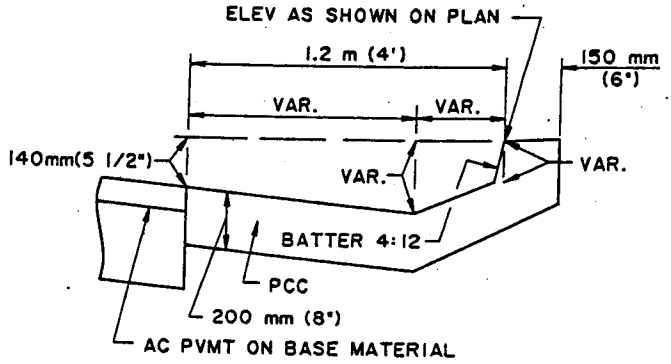
C4.FLD.894012.1170-0



PLAN

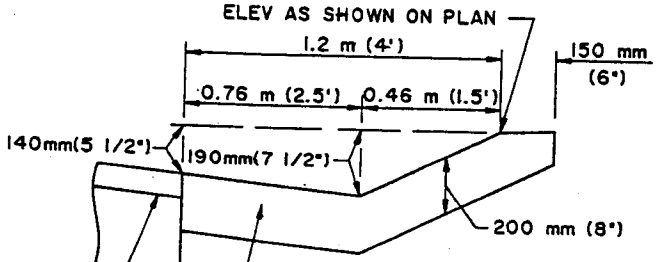


SECTION A-A

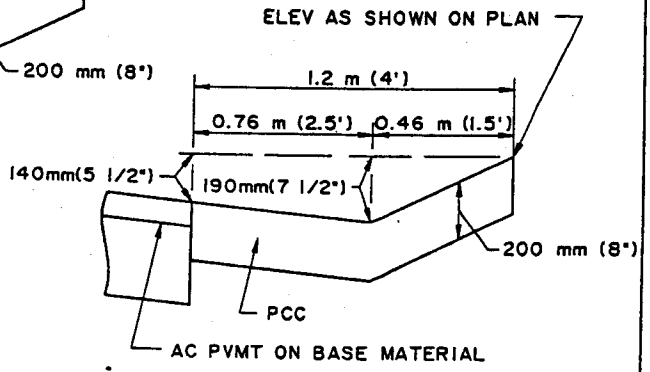


SECTION B-B

% GRADE	L
15 to 12	7.92 m (26')
<12 to 9	6.71 m (22')
<9 to 6	5.5 m (18')
<6 to 3	4.27 m (14')
<3	3.05 m (10')
SAG	1.5 m (5')



SECTION C-C



SECTION D-D

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. Tidemanson 5/31/1992
DIRECTOR OF PUBLIC WORKS — DATE

1999
REVISIONS

STANDARD PLAN
METRIC
1180-1
SHEET 1 OF 1

C4.FLD.894012.1180-0

AV AVD BL CIR
CYN CT DR HTS
HWY LN PK PKY
PL RD SQ ST
TER TR WAY

50 mm (2") SERIES "C" ABBREVIATIONS

ND RD
ST TH

115 mm (4 1/2") SERIES "E" ABBREVIATIONS
FOR USE WITH NUMBERED STREETS

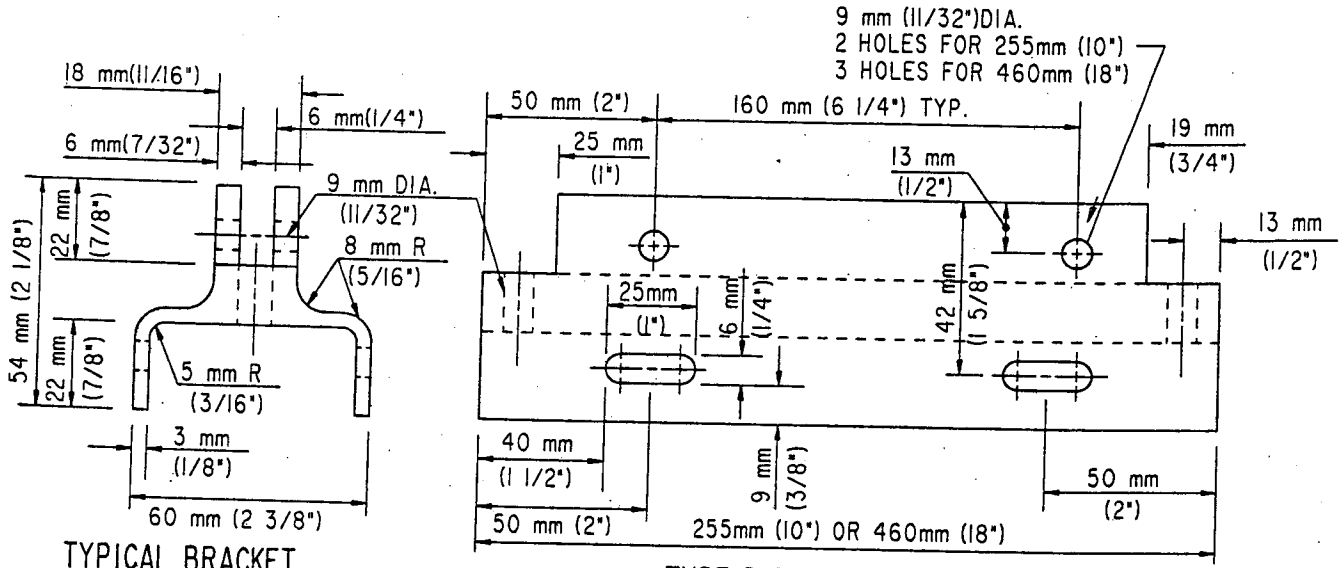
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

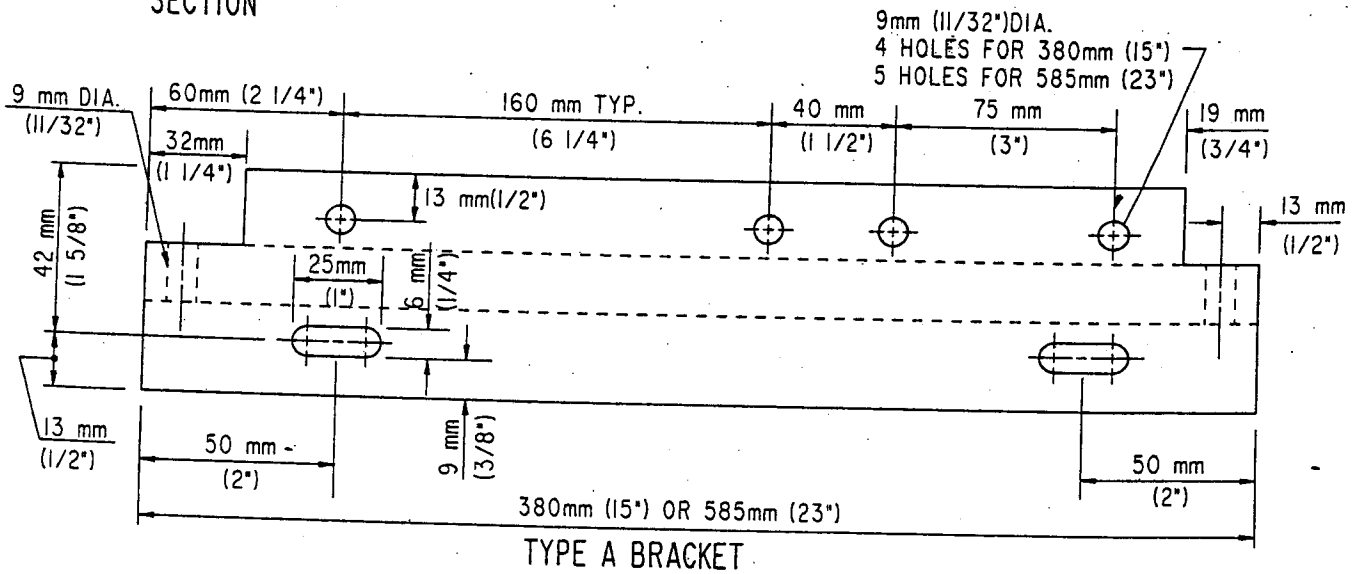
STREET NAME SIGN ABBREVIATIONS

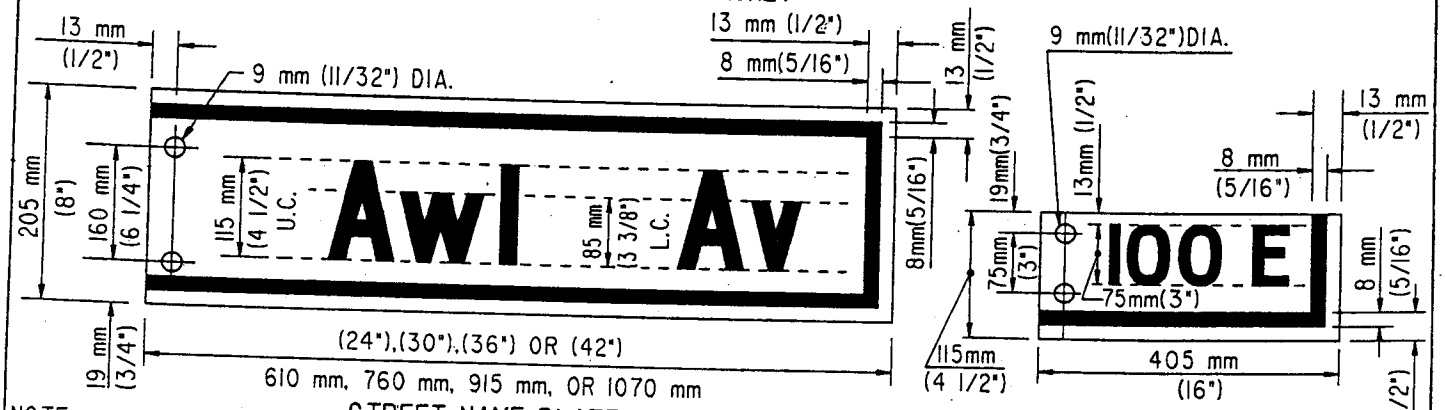
STANDARD PLAN
METRIC
1900-1
SHEET 1 OF 1

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

1999
REVISIONS







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

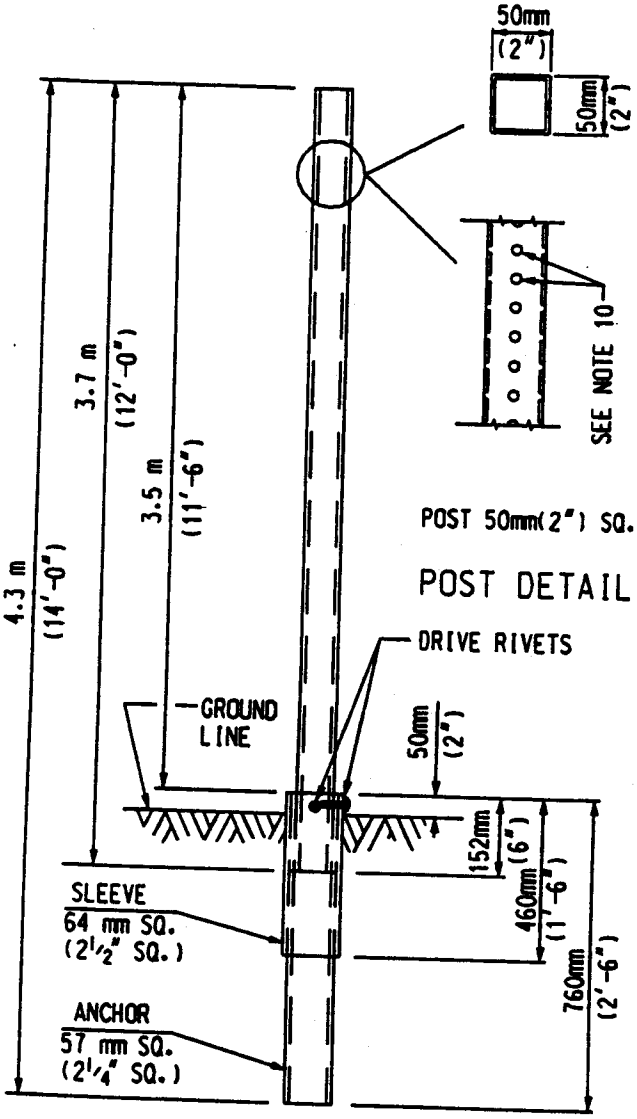
STREET NAME SIGN

STANDARD PLAN
METRIC
1910-1
SHEET 1 OF 1

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

1999
REVISIONS

C4.FLD.894012.1910-0



REFLECTIVE STREET SIGN
POST INSTALLATION

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 RELFECTIVE SHEETING.
3. STANDARD SHALL BE SILVER-WHITE LEGEND ON BLUE BACKGROUND.
4. STREET NAME SHALL BE 115 mm (4 1/2 INCH) UPPER CASE SERIES "C" LETTERS AND NUMBERS AND 85 MM (3 3/8 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 ACCOMODATE BLADE AND BLOCK NUMBER PLATE.
   585mm (23 INCHES) LONG TO ACCOMODATE 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 TELESCOPE 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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

STREET NAME SIGN POST

STANDARD PLAN
METRIC
1920-1
SHEET 1 OF 1

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

SECTION 2

Sewers and Sanitation

SANITARY SEWERS

—○— INDICATES SANITARY SEWERS AND MANHOLES TO BE CONSTRUCTED.

---○--- INDICATES EXISTING SANITARY SEWERS AND MANHOLES.

---○— INDICATES PROPOSED SANITARY SEWERS AND MANHOLES, OR SHOWN ON ANOTHER VIEW.

WYE's & TEE's

INDICATES WYE BRANCH ONLY.

INDICATES TEE OR WYE BRANCH. (OPTION)

HOUSE LATERALS

H.L.'s INDICATES HOUSE LATERALS.

INDICATES HOUSE LATERAL TO BE CONSTRUCTED.

INDICATES EXISTING HOUSE LATERALS.

INDICATES PROPOSED HOUSE LATERAL, OR SHOWN ON ANOTHER VIEW.

CHIMNEY PIPE

(PROFILE) -INDICATES CHIMNEY PIPE PER APWA STANDARD PLAN 220.

(PLAN) -INDICATES CHIMNEY BASE.

(PLAN) -INDICATES A SINGLE AND DOUBLE WYE BRANCH ON CHIMNEY PIPE.

CONCRETE CRADLE OR ENCASEMENT

(PROFILE) -INDICATES CONCRETE CRADLE PER STANDARD PLAN 2023, CASE I.

(PROFILE) -INDICATES CONCRETE ENCASEMENT PER STANDARD PLAN 2023, CASE II.

(PROFILE) -INDICATES SPECIAL CRADLE PER STANDARD PLAN 2023, CASE III.

(PROFILE) -INDICATES SPECIAL ENCASEMENT PER STANDARD PLAN 2023, CASE IV.

(PLAN) -INDICATES CRADLE OR ENCASEMENT PER STANDARD PLAN 2023, ALL CASES.

MANHOLES

INDICATES MANHOLE.

INDICATES MANHOLE WITH ADDITIONAL INLETS.

INDICATES SHALLOW MANHOLE.

GENERAL

ON PLANS INDICATES EXISTING BUILDING.

INDICATES BOUNDARY LINE OF DISTRICT.

INDICATES BOUNDARY LINE OF A CITY.

INDICATES EXISTING CURB.

INDICATES CURB LINE. (FUTURE)

UNDERGROUND UTILITIES

—W— WATER
—G— NATURAL GAS
—GASO— GASOLINE
—T— TELEPHONE
—E— ELECTRICAL

} INDICATES TYPE OF EXISTING UNDERGROUND UTILITIES.

NOTE

ABBREVIATIONS USED ON PLANS, MAPS AND OTHER DOCUMENTS SHALL BE PER SECTION 1-3 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

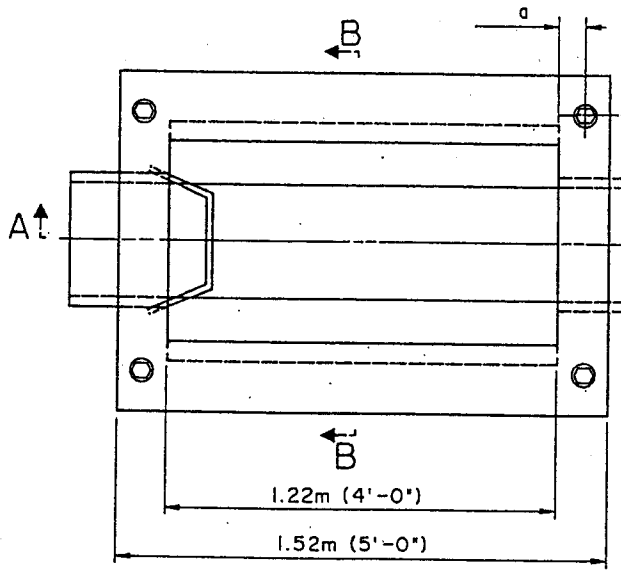
LEGEND FOR SANITARY SEWER PLANS AND PROFILES AND DISTRICT MAPS

STANDARD PLAN 2000-0

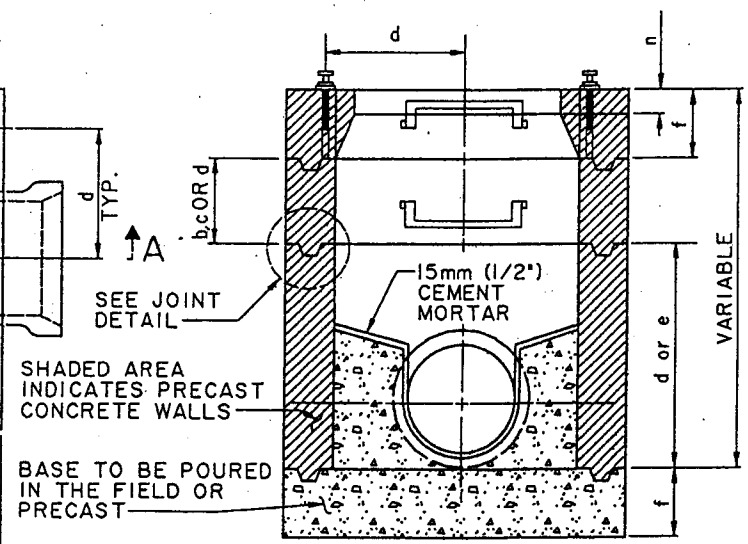
APPROVED Thomas A. Tidemanson 5/31/1992
DIRECTOR OF PUBLIC WORKS DATE

REVISIONS

SHEET 1 OF 1

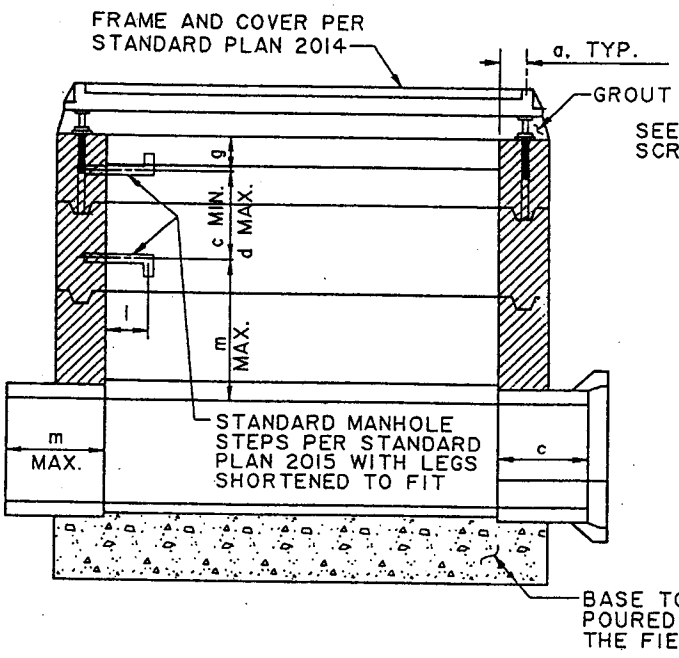


TOP VIEW

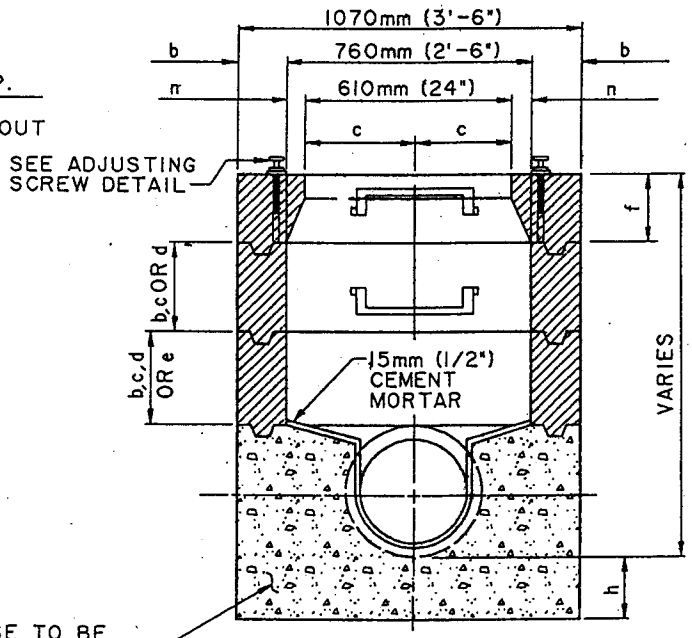


TYPE A
PRECAST BASE SECTION WITH OPENINGS PROVIDED

SECTION B-B



SECTION A-A



TYPE B
BASE AND CHANNELS POURED MONOLITHICALLY

SECTION B-B

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

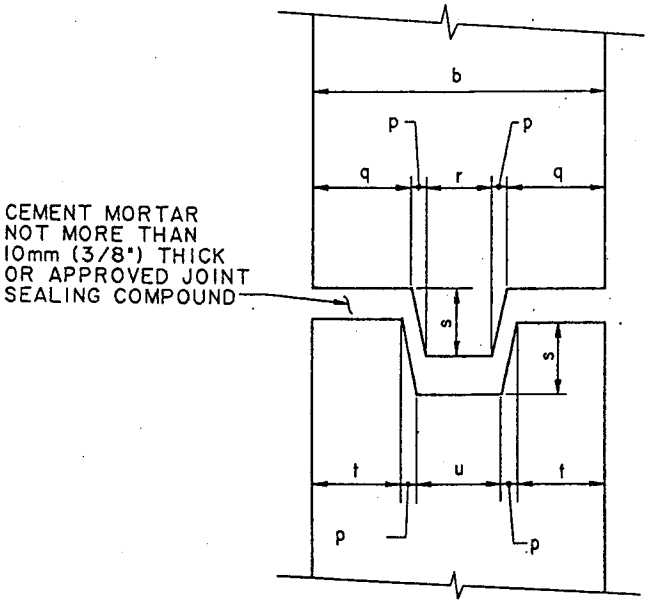
PRECAST CONCRETE SHALLOW MANHOLE

STANDARD PLAN METRIC
2002-1
SHEET 1 OF 3

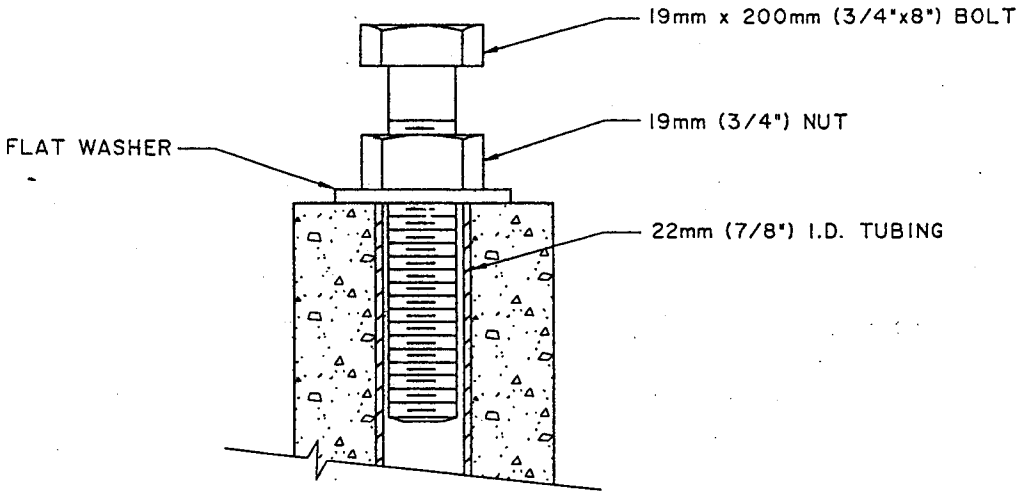
APPROVED Thomas A. Tidemanson 5/31/1992
DIRECTOR OF PUBLIC WORKS DATE

1999
REVISIONS

TABLE OF DIMENSIONS	
a	60mm (2 1/2")
b	150mm (6")
c	300mm (12")
d	405mm (16")
e	810mm (32")
f	230mm (9")
g	120mm (4 1/2")
l	130mm (5")
m	600mm (24")
n	80mm (3")
p	6mm (1/4")
q	53mm (2 1/8")
r	32mm (1 1/4")
s	35mm (1 3/8")
t	44mm (1 3/4")
u	50mm (2")



JOINT DETAIL



ADJUSTING SCREW DETAIL

NOTE:

TO BE USED FOR DEPTHS LESS THAN 1.675m (5'-6") FROM THE TOP OF THE MANHOLE TO THE TOP OF THE SEWER PIPE. DEPARTMENTAL APPROVAL REQUIRED.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

PRECAST CONCRETE SHALLOW MANHOLE

STANDARD PLAN
METRIC
2002-1
SHEET 2 OF 3

NOTES

1. 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.

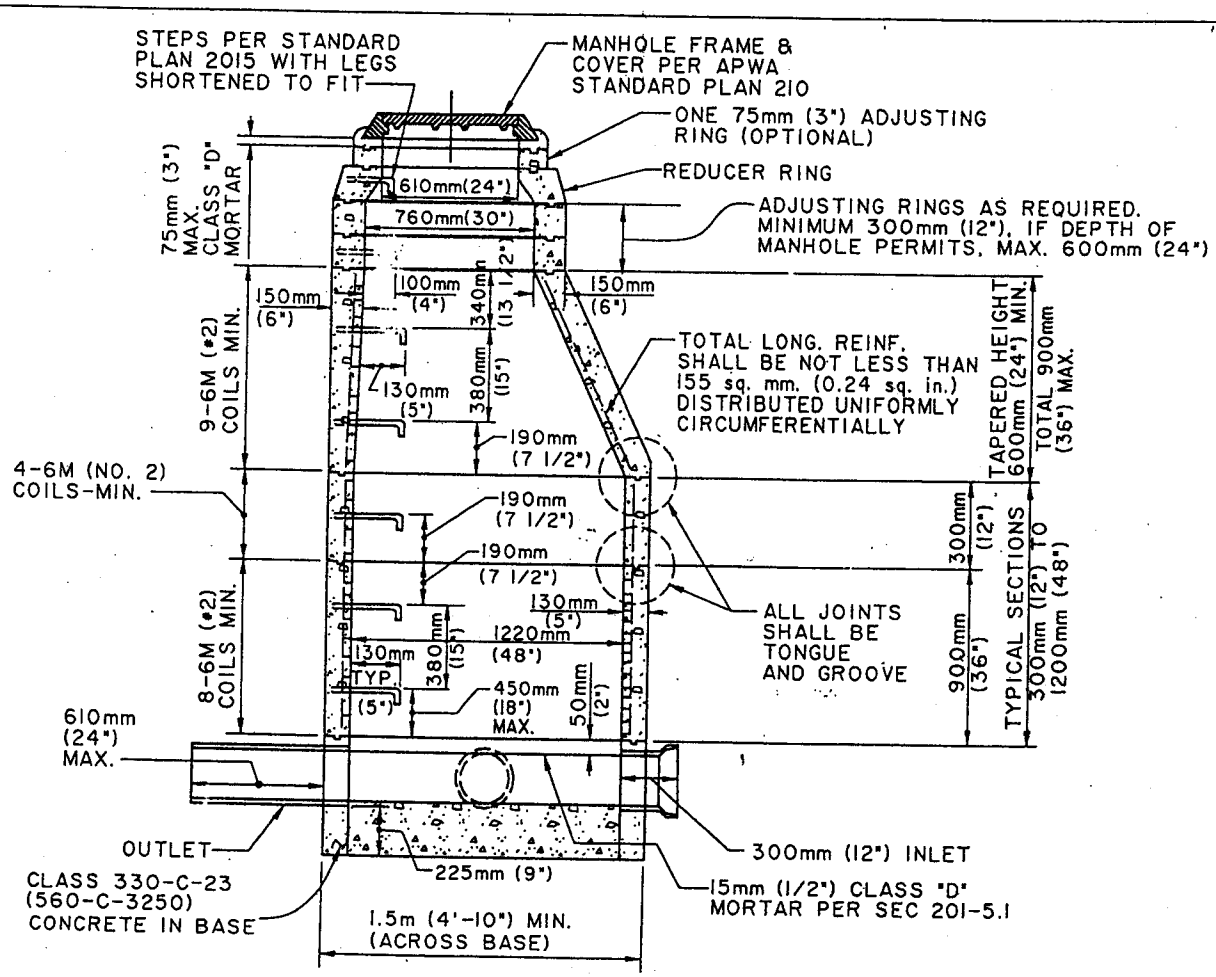
8. MANHOLE STEPS SHALL BE INSTALLED AS PER STANDARD PLAN 635.

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.

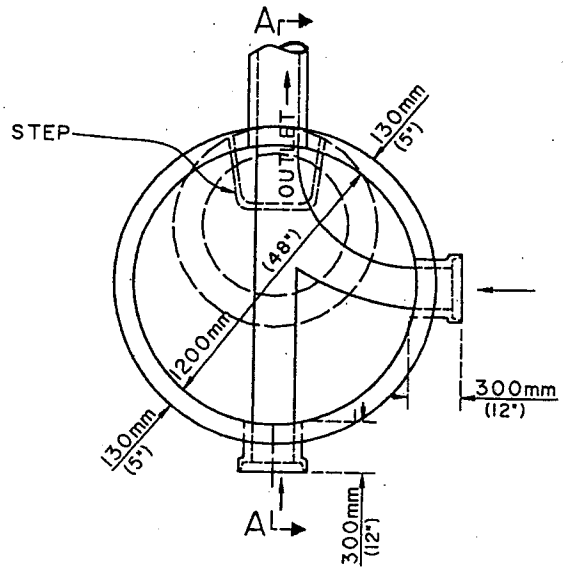
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

PRECAST CONCRETE SHALLOW MANHOLE

STANDARD PLAN
METRIC
2002-1
SHEET 3 OF 3



SECTION A-A



PLAN OF BASE

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REINFORCED PRECAST CONCRETE MANHOLE

STANDARD PLAN METRIC

2003-2

SHEET 1 OF 2

APPROVED Thomas A. Tidemanson 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

1995, 1999

REVISIONS

NOTES

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.

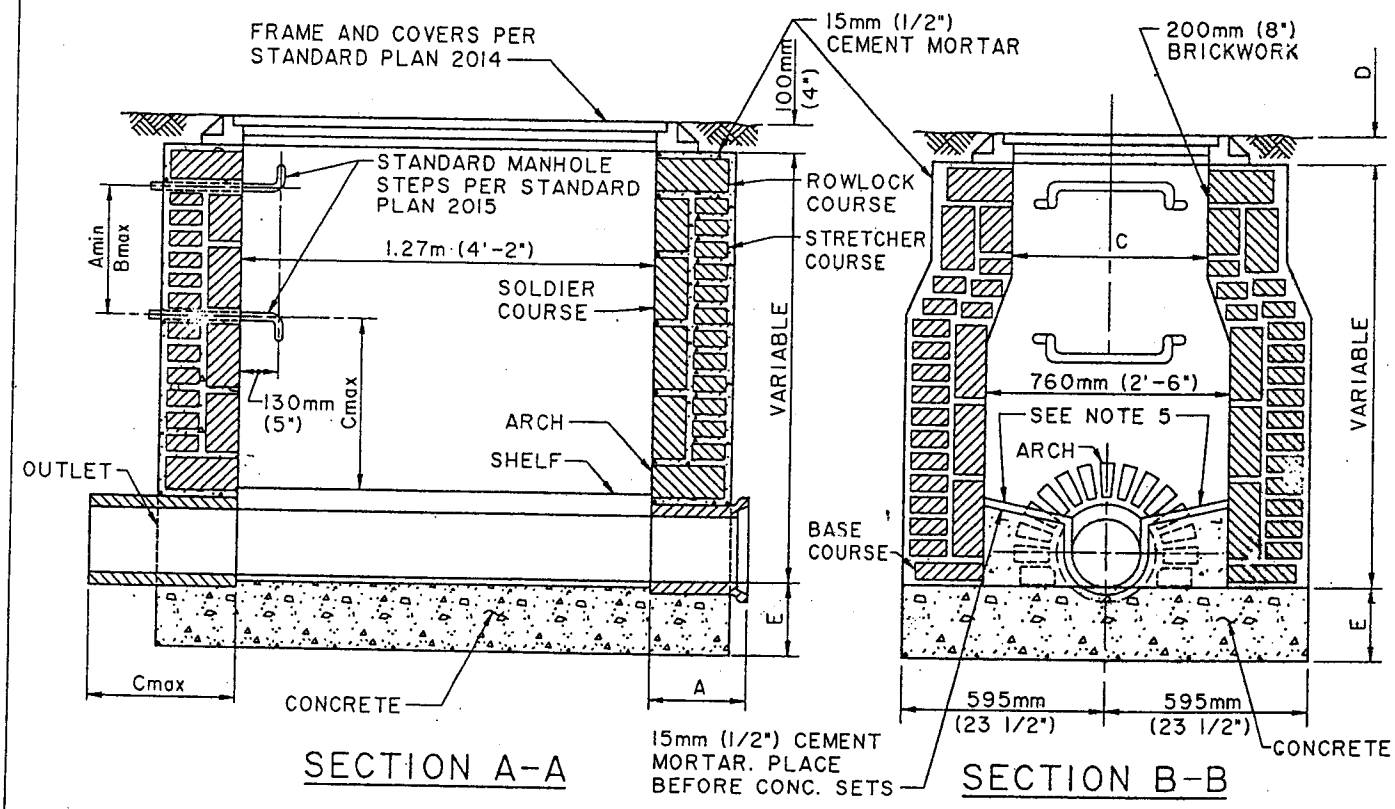
9. AT THE OPTION OF THE CONTRACTOR A REINFORCED PRECAST MANHOLE BASE MAY BE SUBSTITUTED CONFORMING TO APWA STANDARD PLAN 207.

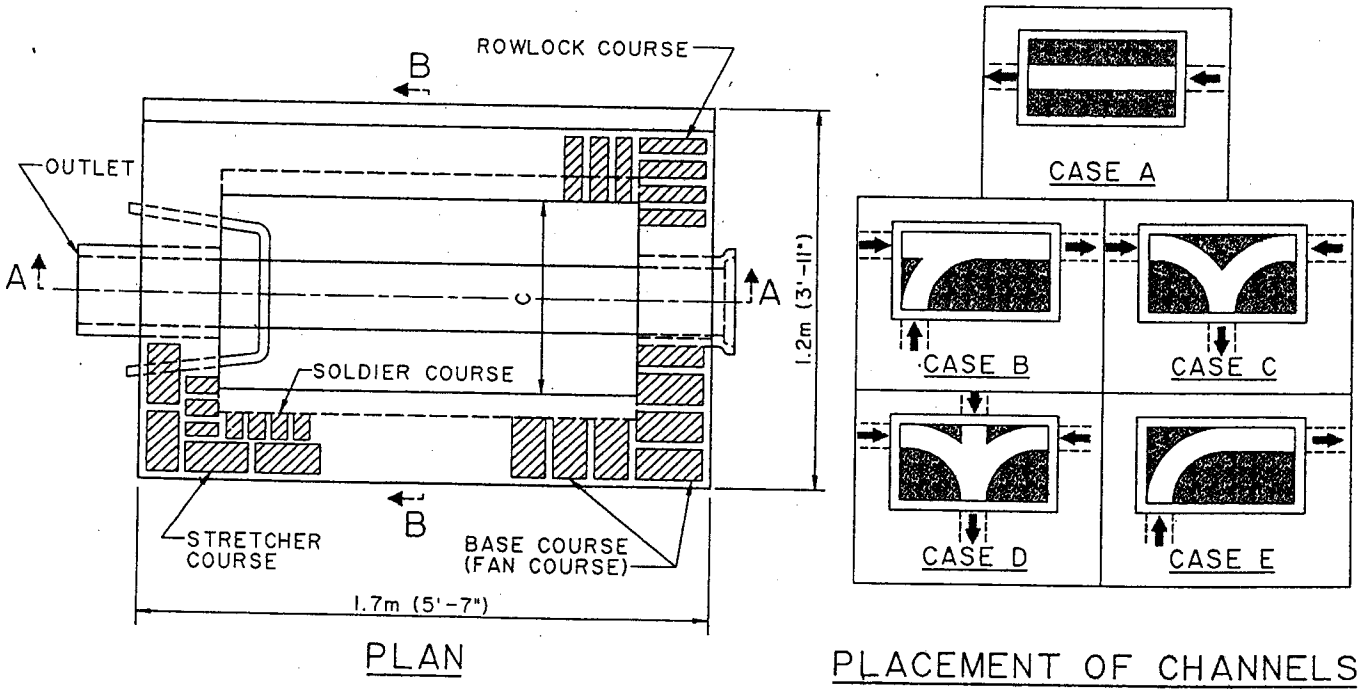
10. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL OVALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REINFORCED PRECAST CONCRETE MANHOLE

STANDARD PLAN
METRIC
2003-2
SHEET 2 OF 2





NOTE:
TO BE USED FOR DEPTHS LESS THAN 1.5m (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

STANDARD PLAN METRIC

2004-1

SHEET 1 OF 2

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

1999 REVISIONS

TABLE OF DIMENSIONS

A	300mm (12")
B	400mm (16")
C	600mm (24")
D	100mm (4")
E	230mm (9")

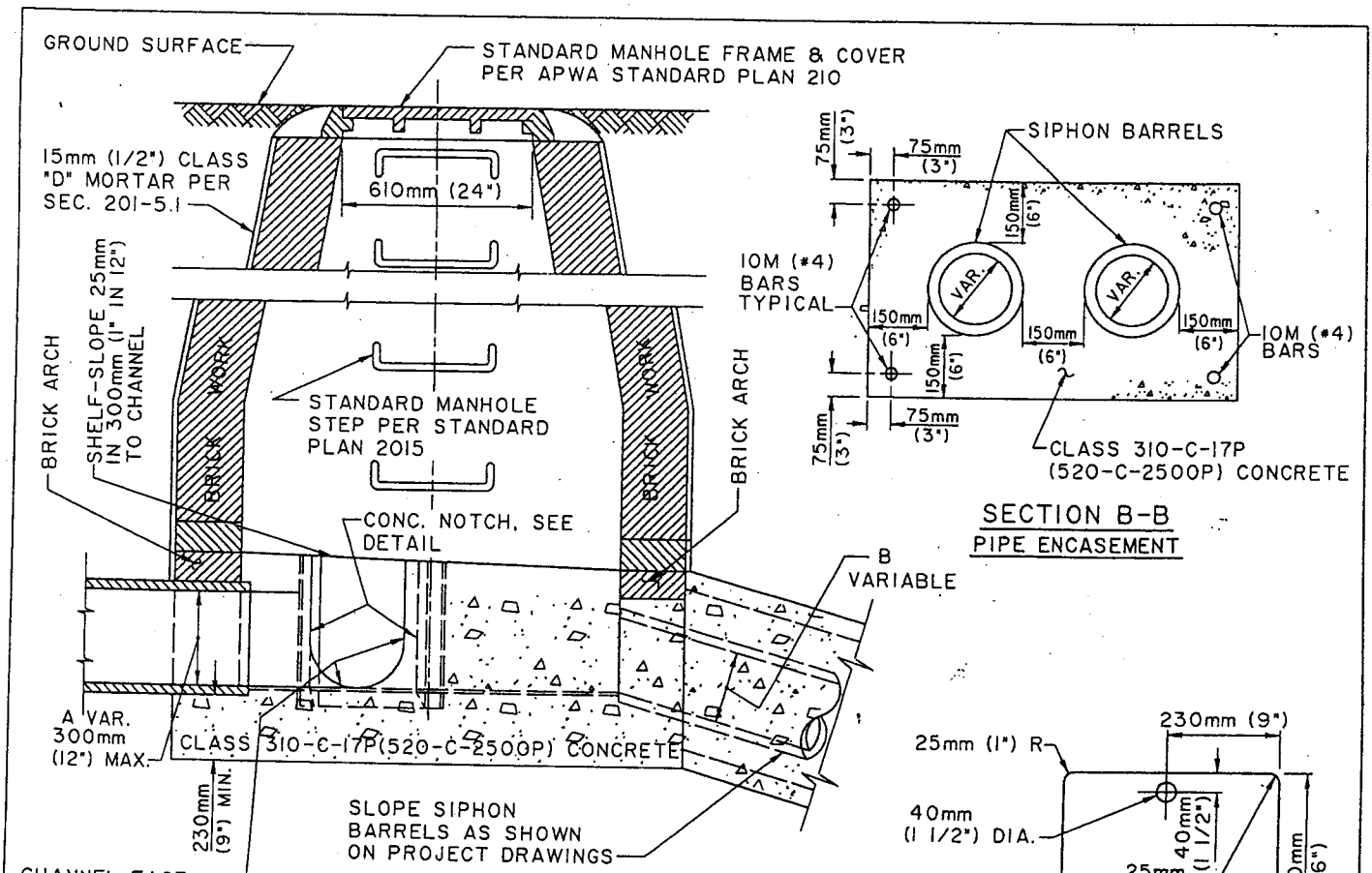
NOTES

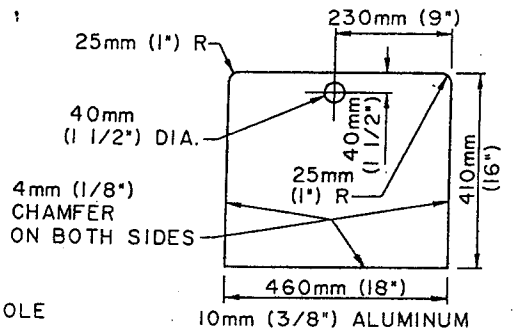
1. THE DEPTH OF CHANNELS SHALL EQUAL THE PIPE DIAMETER FOR ALL SIZES OF PIPE.
2. ALL CONCRETE TO BE CLASS 295-C-17 (500-C-2500).
3. ALL CEMENT MORTAR SHALL BE CLASS "D" PER SECTION 201-5.1.
4. TO BE USED ONLY UPON APPROVAL OF THE DEPARTMENT.
5. PITCH 6mm (1/4 INCH) IN 300mm (12 INCHES).
6. DIMENSIONS 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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

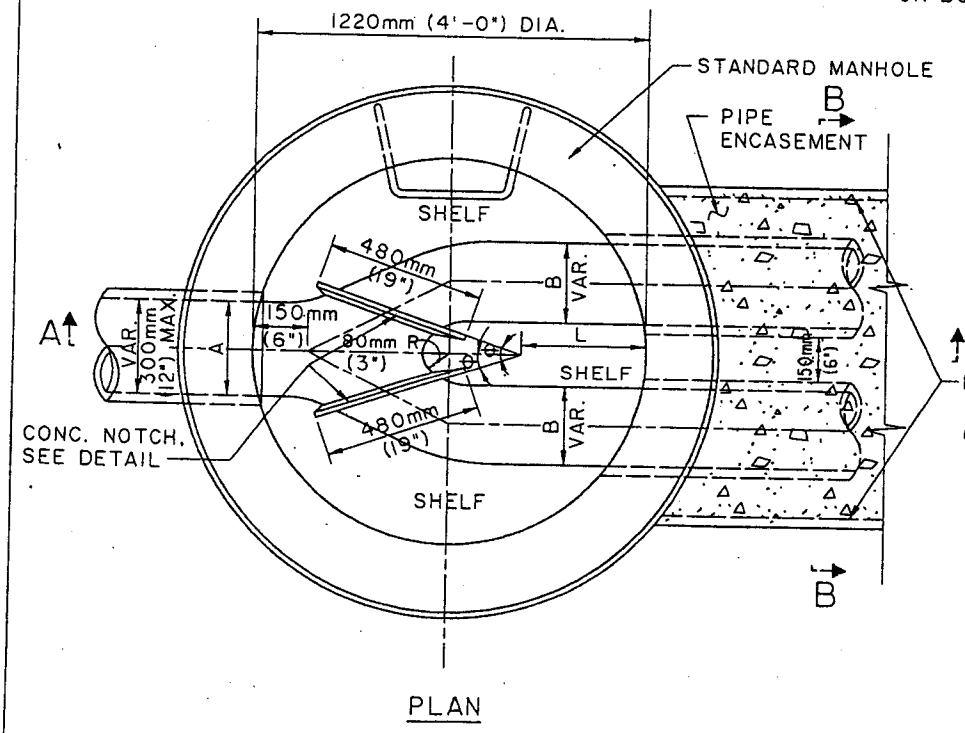
RECTANGULAR SHALLOW MANHOLE

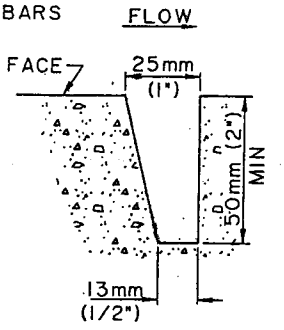
STANDARD PLAN
METRIC
2004-1
SHEET 2 OF 2





ALUMINUM GATE DETAIL





CONCRETE NOTCH DETAIL
SHOWING SIDES AND BOTTOM

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SIPHON MANHOLE

STANDARD PLAN METRIC

2005-2

SHEET 1 OF 2

APPROVED Thomas A. Gilmanson 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

1995, 1999

REVISIONS

TABLE OF DIMENSIONS

A	B	L	θ
200mm (8")	150mm (6")	318mm (12 1/2")	13°
200mm (8")	200mm (8")	318mm (12 1/2")	13°
250mm (10")	200mm (8")	318mm (12 1/2")	13°
250mm (10")	250mm (10")	388mm (15 1/4")	20°
300mm (12")	250mm (10")	388mm (15 1/4")	20°
300mm (12")	300mm (12")	466mm (18 3/8")	30°

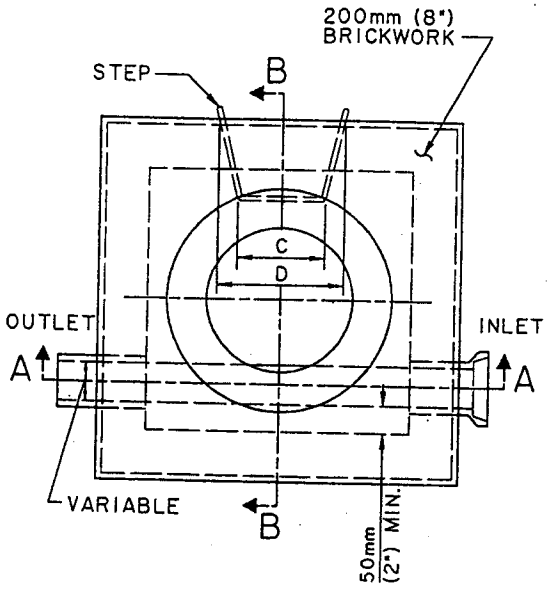
NOTES

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.

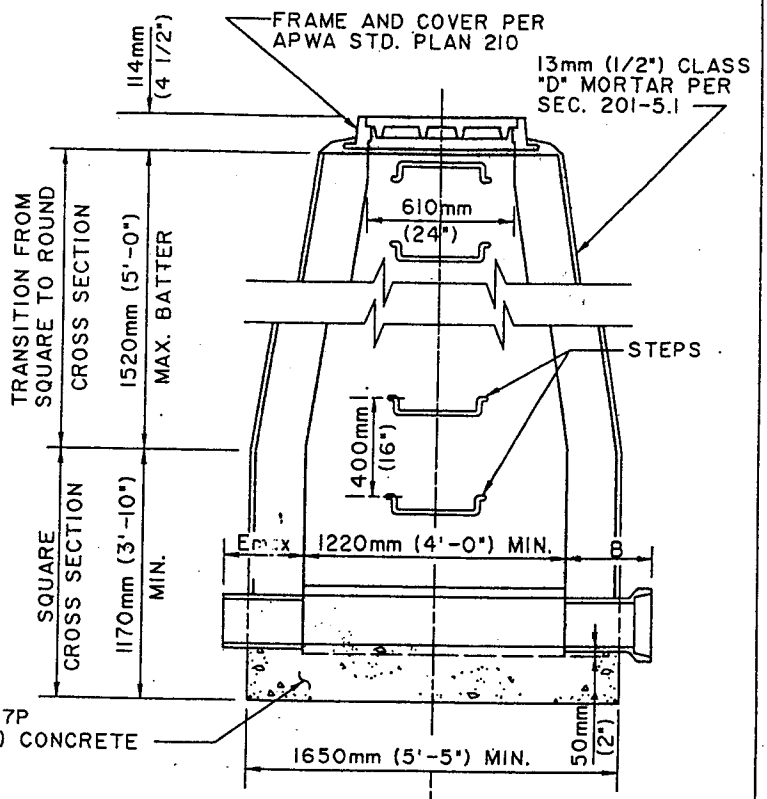
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SIPHON MANHOLE

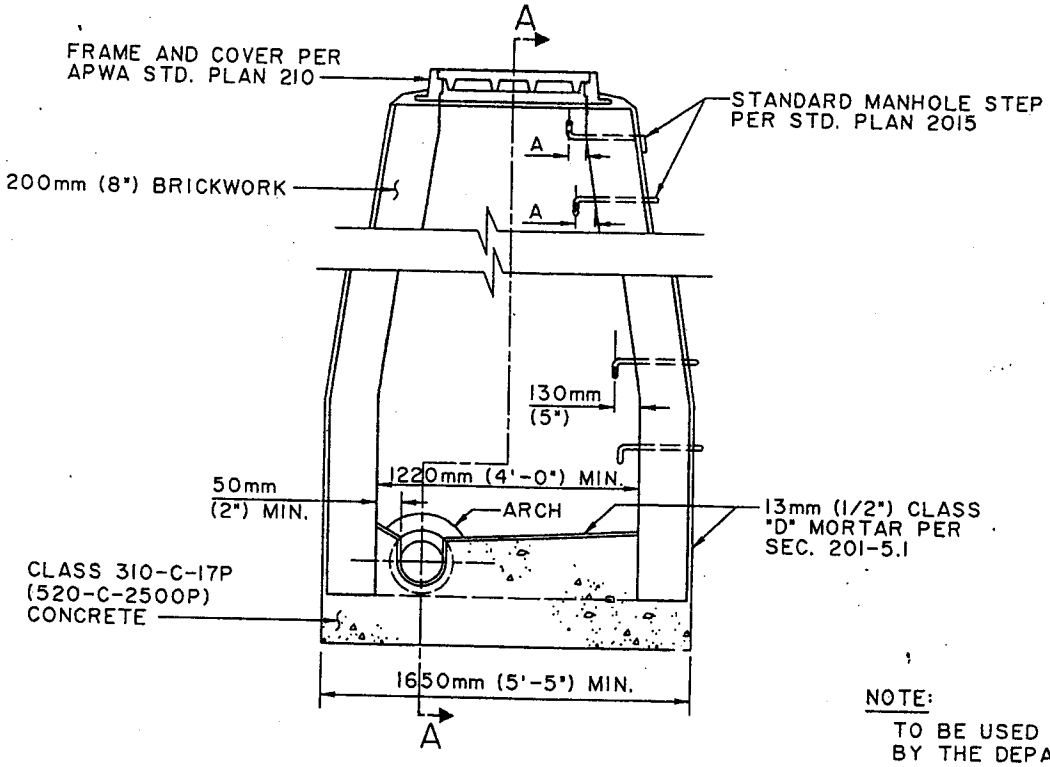
STANDARD PLAN
METRIC
2005-2
SHEET 2 OF 2



PLAN



SECTION A-A



SECTION B-B

NOTE:

TO BE USED ONLY UPON APPROVAL BY THE DEPARTMENT WHEN SEWER IS OFF CENTER.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SPECIAL SQUARE BASE MANHOLE

STANDARD PLAN
METRIC

2006-1

SHEET 1 OF 2

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

1999
REVISIONS

TABLE OF DIMENSIONS

A	B	C	D	E
100mm (4")	300mm (12")	400mm (16")	500mm (20")	600mm (24")

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.

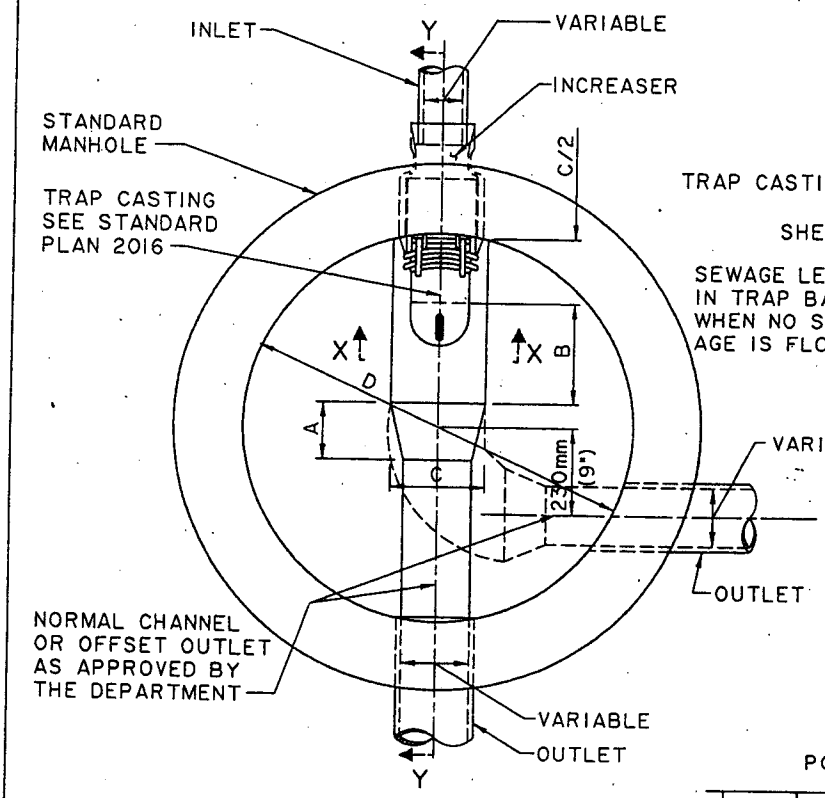
5. CONCRETE BASE: CONCRETE BASE TO BE CONSTRUCTED AS PER STANDARD PLAN 203, NOTES 1 & 10.

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.

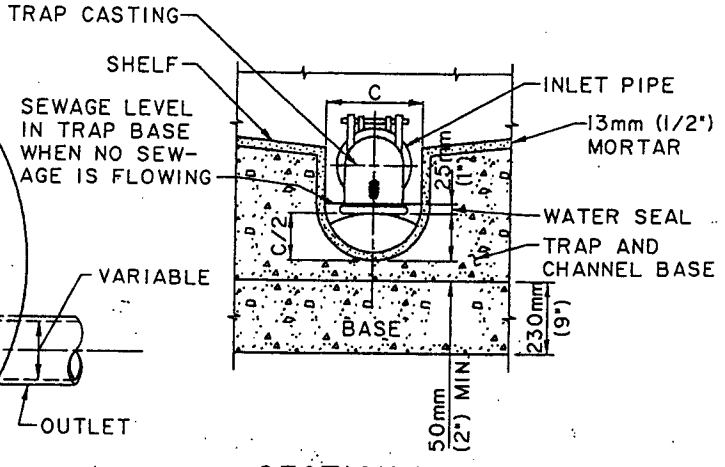
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SPECIAL SQUARE BASE MANHOLE

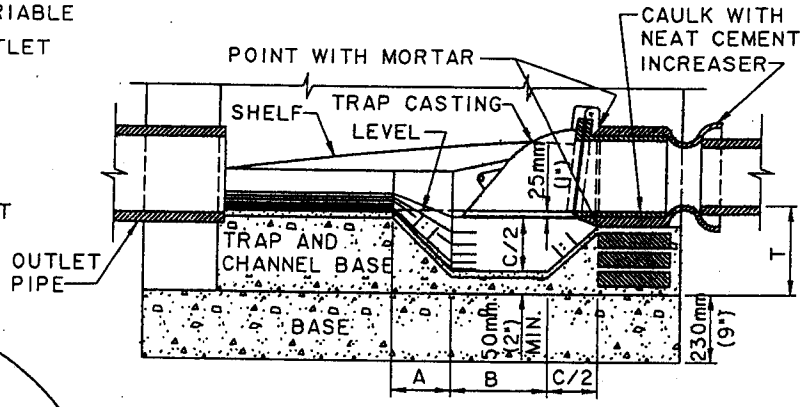
STANDARD PLAN
METRIC
2006-1
SHEET 2 OF 2



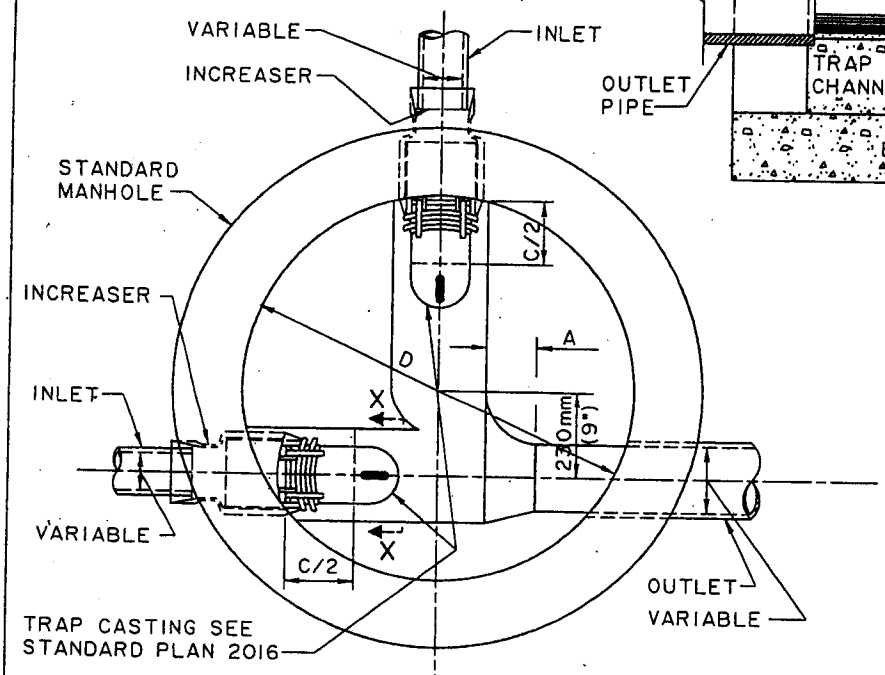
PLAN
SINGLE TRAP BASE



SECTION X-X



SECTION Y-Y



PLAN
DOUBLE TRAP BASE

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

TRAP MANHOLE BASE

STANDARD PLAN METRIC

2007-2

SHEET 1 OF 2

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

1995, 1999
REVISIONS

TRAP BASES

INLET DIA.	INLET INCREASER	TRAP SIZE	TRAP PER	DIA. OF MANHOLE BASE (D)		
				OUTLET DIAMETER		
				200mm (8")	250mm (10")	300mm (12")
200mm (8")	200mmx250mm (8"x10")	250mm (10")	2016	1220mm (4')	1220mm (4')	1220mm (4')
250mm (10")	250mmx300mm (10"x12")	300mm (12")	2016		1220mm (4')	1220mm (4')
300mm (12")	300mmx300mm (12"x12")	380mm (15")	SEE STANDARD PLAN 2008			

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

BASE DIMENSIONS					
TRAP DIAMETER	A	B	C	A+B+C/2	T MIN.
250mm (10")	190mm (7 1/2")	370mm (14 1/2")	330mm (13")	725mm (28 1/2")	230mm (9")
300mm (12")	220mm (8 1/2")	420mm (16 1/2")	380mm (15")	830mm (32 1/2")	250mm (10")
380mm (15")	SEE STANDARD PLAN 2008-2				

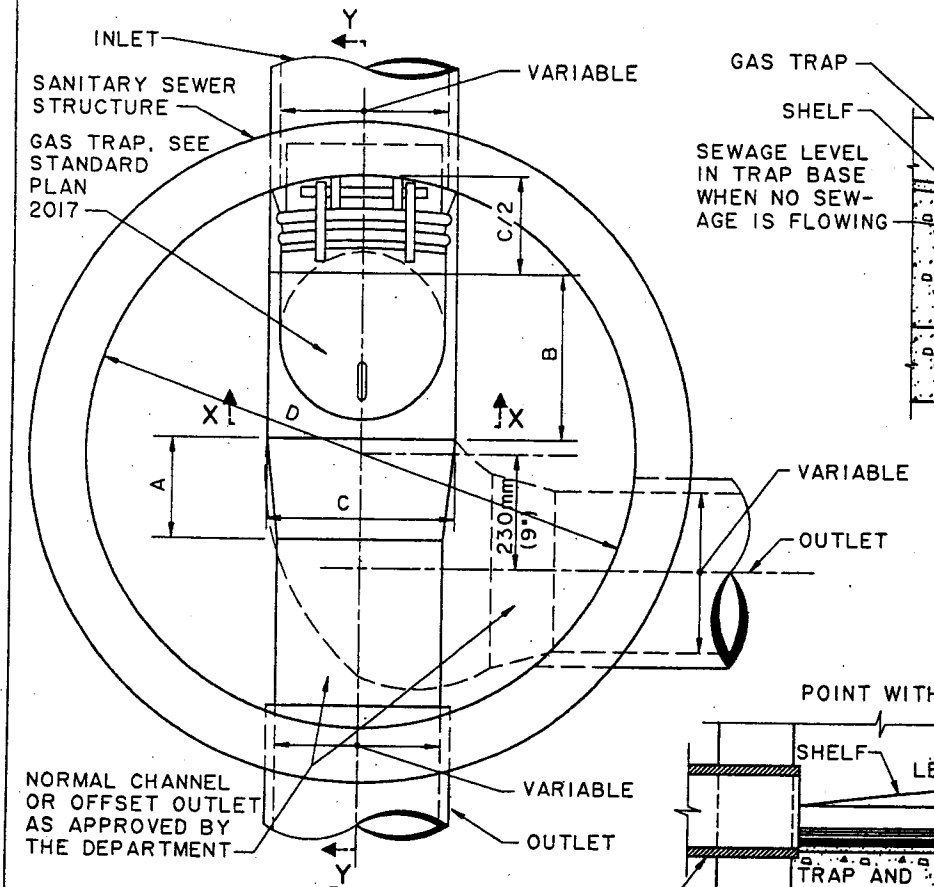
NOTES

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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

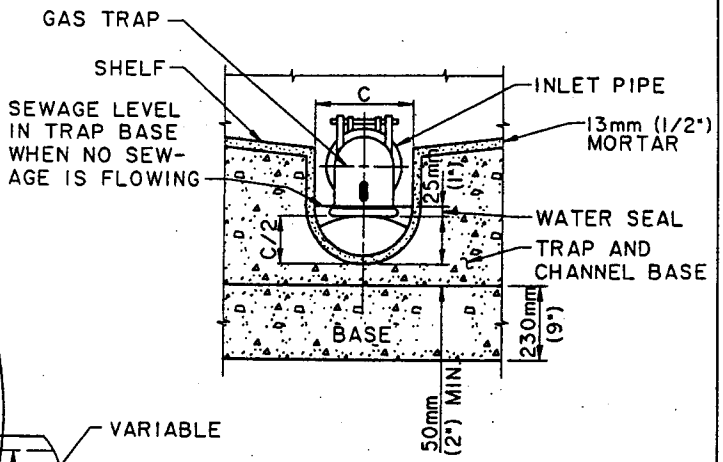
TRAP MANHOLE BASE

STANDARD PLAN
METRIC
2007-2
SHEET 2 OF 2

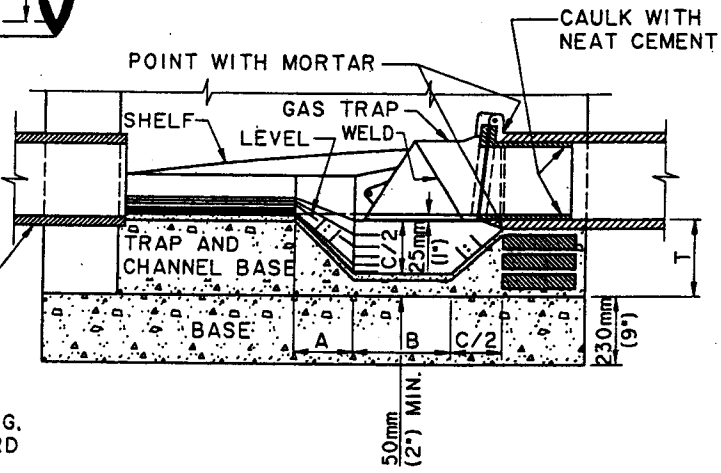


PLAN

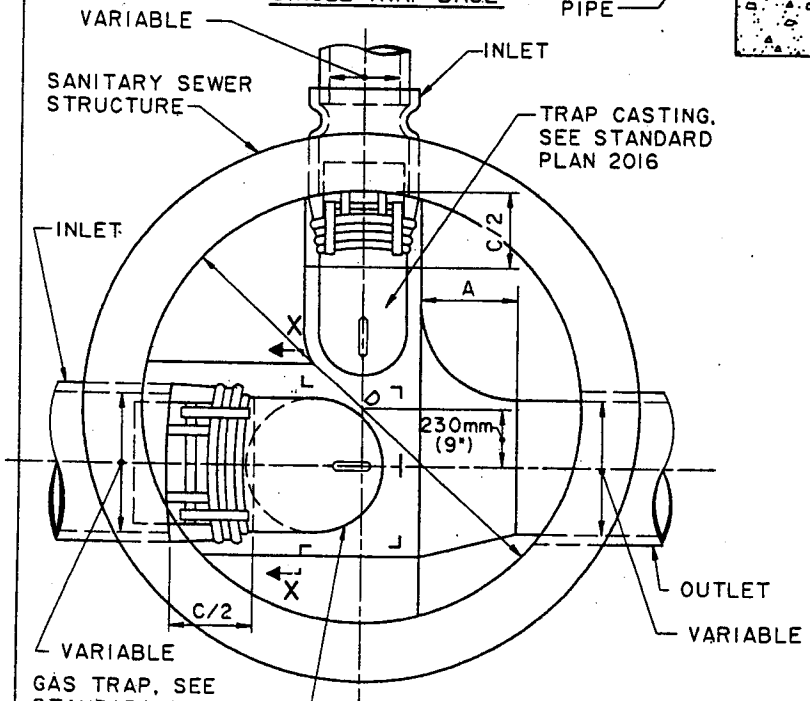
SINGLE TRAP BASE



SECTION X-X



SECTION Y-Y



PLAN

DOUBLE TRAP BASE

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

LARGE GAS TRAP MANHOLE BASE

STANDARD PLAN METRIC

2008-2

SHEET 1 OF 2

APPROVED Thomas A. Tidemanson
DIRECTOR OF PUBLIC WORKS

5/31/1002
DATE

1995, 1999
REVISIONS

BASE & COVER DIMENSIONS					
INLET DIAMETER	A	B	C	T MIN.	FRAME & COVER
380mm (15")	250mm (10")	445mm (17 1/2")	460mm (18")	280mm (11")	PER APWA 210
460mm (18")	290mm (11 1/2")	495mm (19 1/2")	530mm (21")	330mm (13")	740mm (29") CLEAR OPENING MIN. OF A TYPE APPROVED BY THE DEPARTMENT
530mm (21')	330mm (13")	545mm (21 1/2")	610mm (24")	355mm (14")	

TRAP BASES

INLET DIA. & TRAP SIZE	DIAMETER OF MANHOLE BASE (D)			
	OUTLET DIAMETER			
	380mm (15")	460mm (18")	530mm (21")	610mm (24")
380mm (15")	1220mm (4')	1525mm (5')	1525mm (5')	1525mm (5')
460mm (18")	—	1525mm (5')	1525mm (5')	1525mm (5')
530mm (21")	—	—	1830mm (6')	1830mm (6')

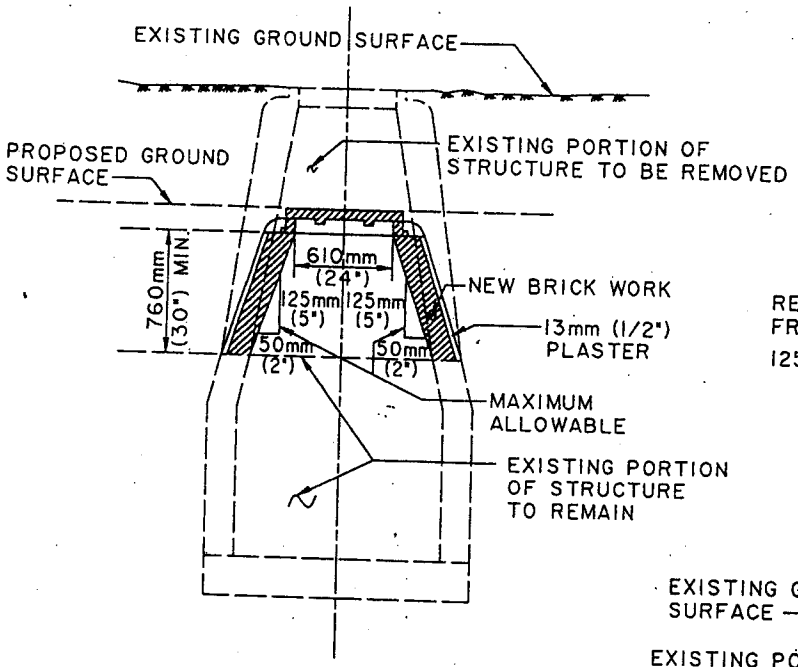
NOTES

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 (21") GAS TRAPS. SEE STANDARD PLAN 2017.
3. WATER SEAL SHALL BE 25mm (1") MINIMUM.
4. FOR TRAP INLETS LARGER THAN 530mm (21") 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 UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

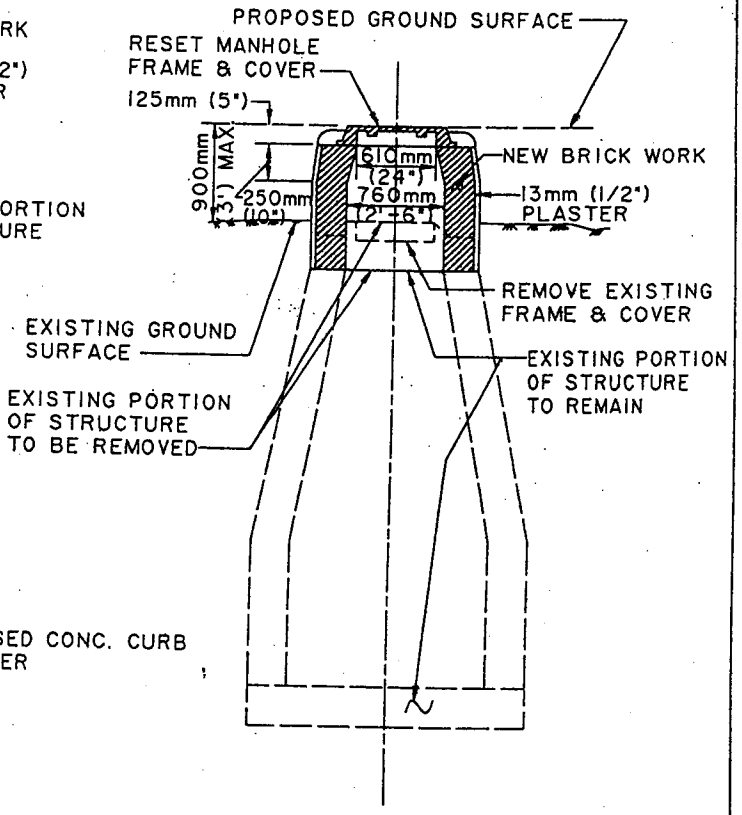
LARGE GAS TRAP MANHOLE BASE

STANDARD PLAN
METRIC
2008-2
SHEET 2 OF 2



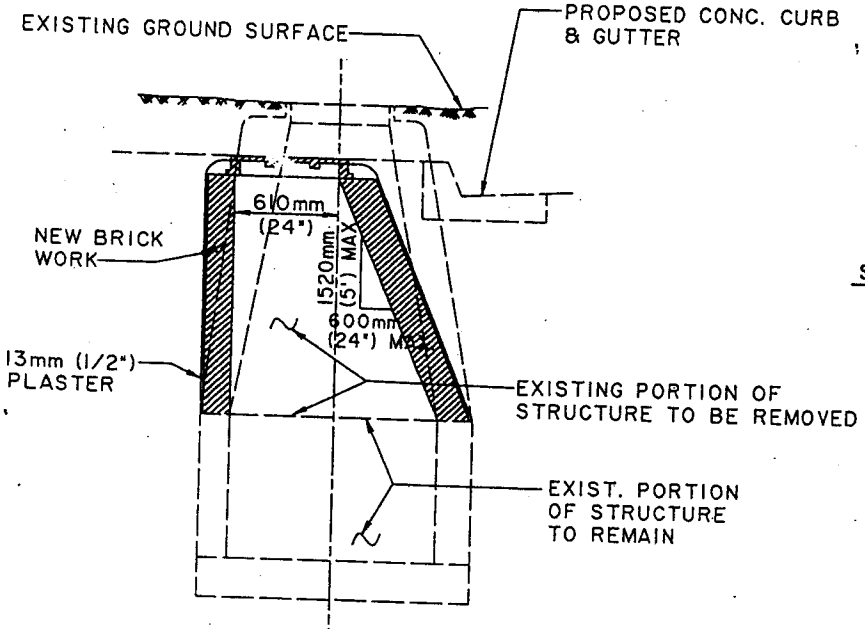
CASE I

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)

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

RECONSTRUCTION OF BRICK MANHOLE TOPS

APPROVED Thomas A. Tidemanson 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

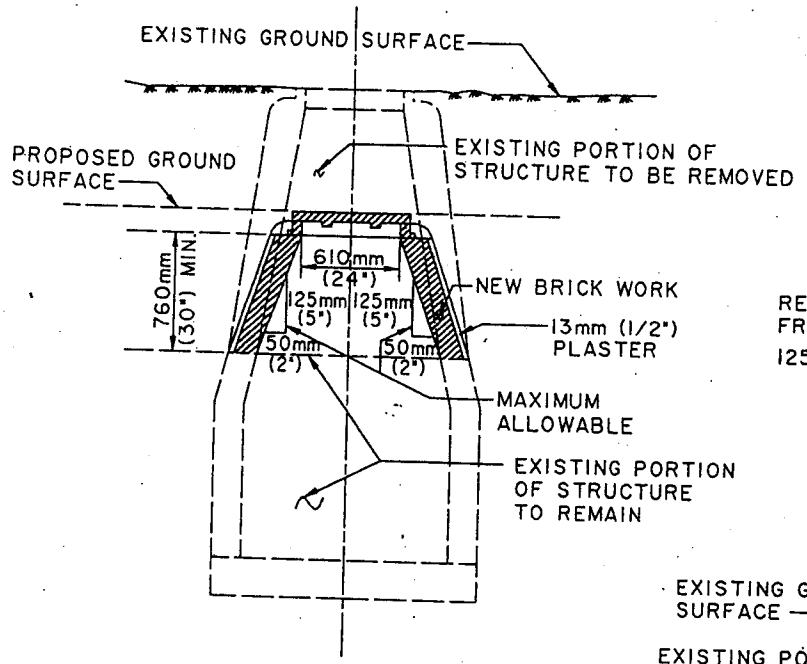
1999

REVISIONS

STANDARD PLAN METRIC

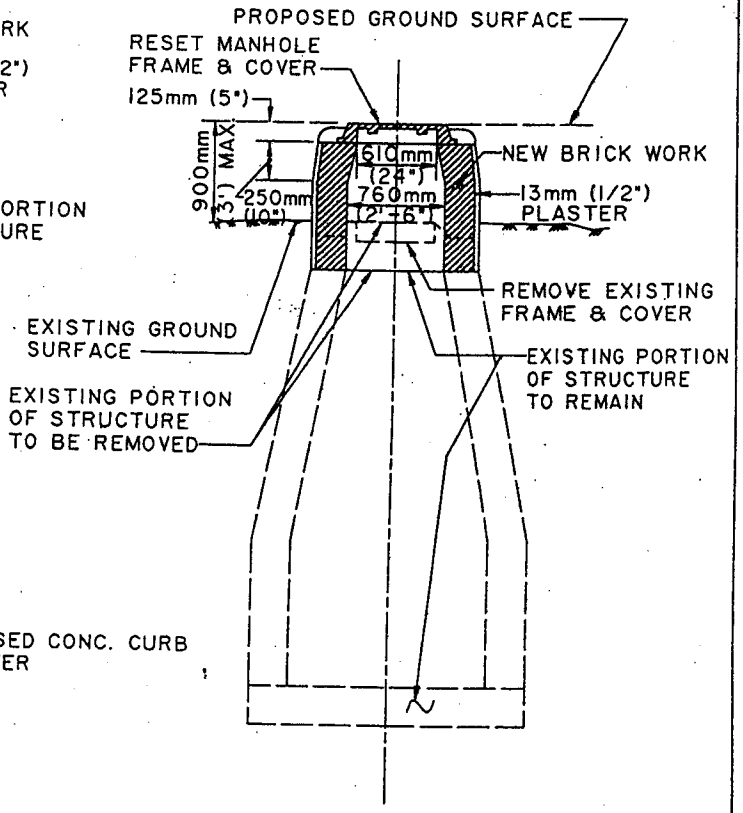
2009-1

SHEET 1 OF 2



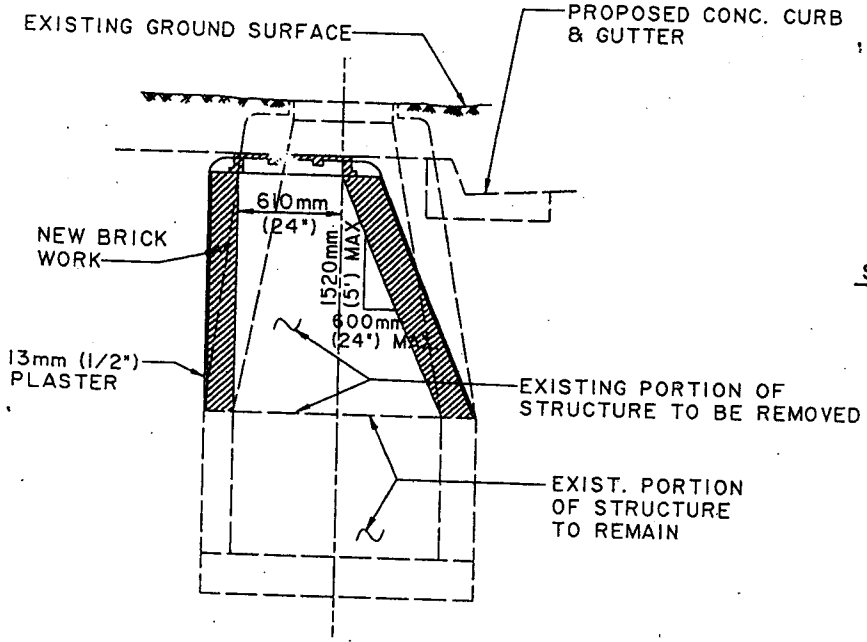
CASE I

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)

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

RECONSTRUCTION OF BRICK MANHOLE TOPS

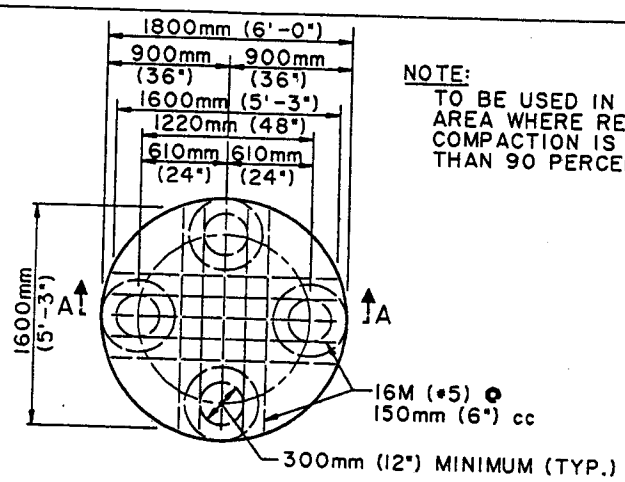
APPROVED Thomas A. Tidemanson 5/31/1992
DIRECTOR OF PUBLIC WORKS DATE

1999
REVISIONS

STANDARD PLAN METRIC

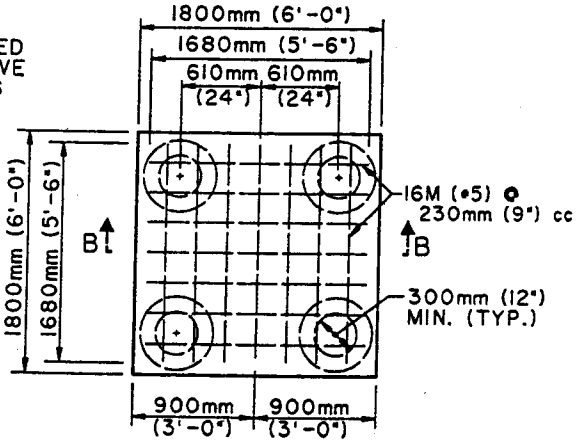
2009-1

SHEET 1 OF 2

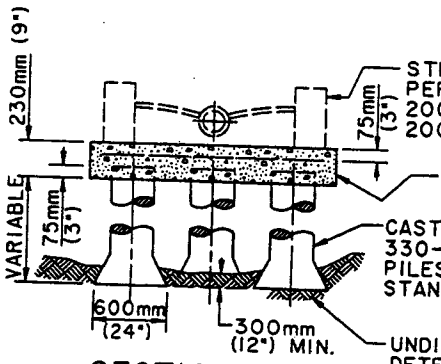


NOTE:
TO BE USED IN FILLED AREA WHERE RELATIVE COMPACTION IS LESS THAN 90 PERCENT.

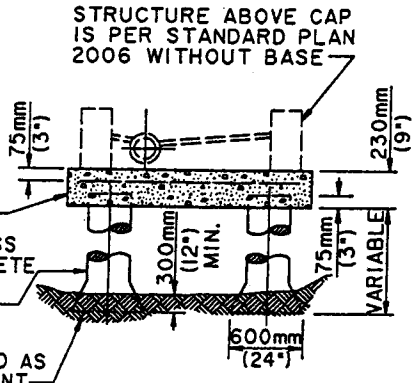
ROUND BASE



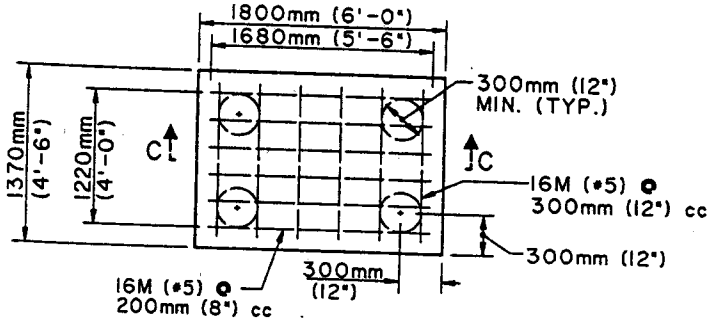
SQUARE BASE



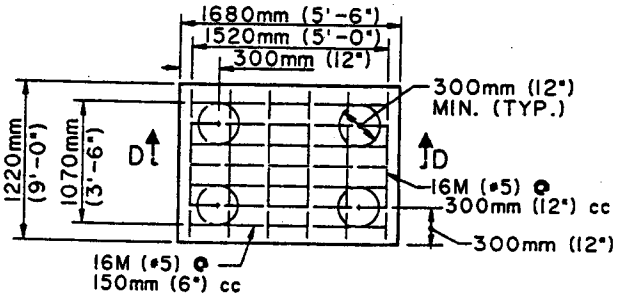
SECTION A-A



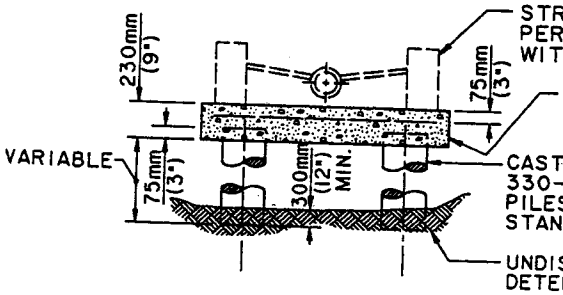
SECTION B-B



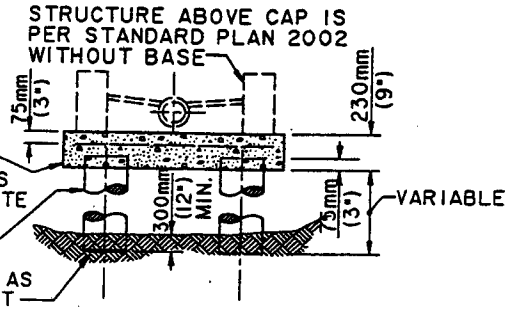
BRICK SHALLOW BASE



PRECAST CONCRETE SHALLOW BASE



SECTION C-C



SECTION D-D

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SPECIAL MANHOLE BASES

STANDARD PLAN METRIC

2011-2

SHEET 1 OF 2

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

1995, 1999
REVISIONS

NOTES

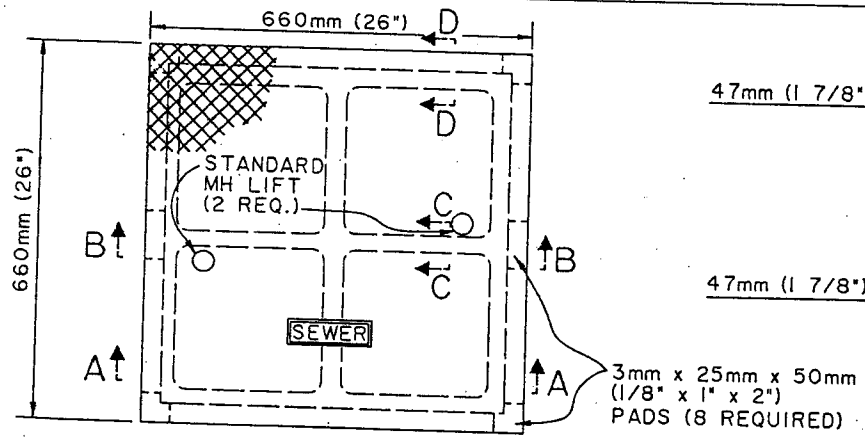
SEPARATE DESIGN WILL BE REQUIRED IN EACH OF THE FOLLOWING CASES:

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.

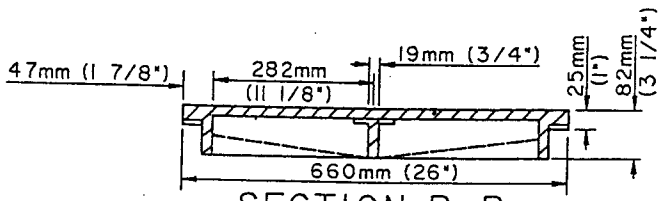
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SPECIAL MANHOLE BASES

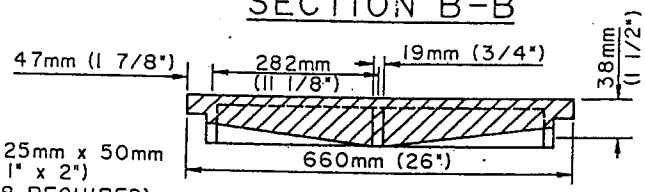
STANDARD PLAN
METRIC
2011-2
SHEET 2 OF 2



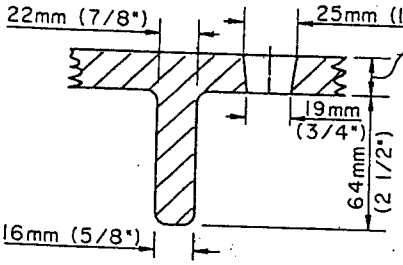
PLAN
MANHOLE COVER



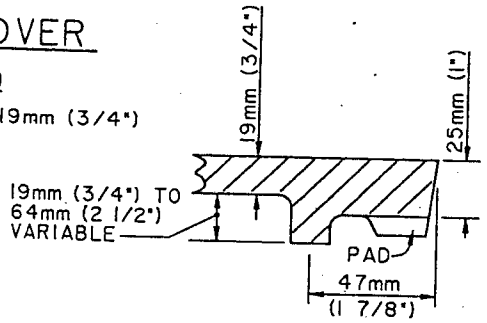
SECTION B-B



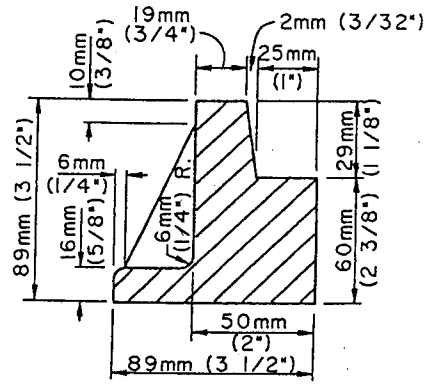
SECTION A-A



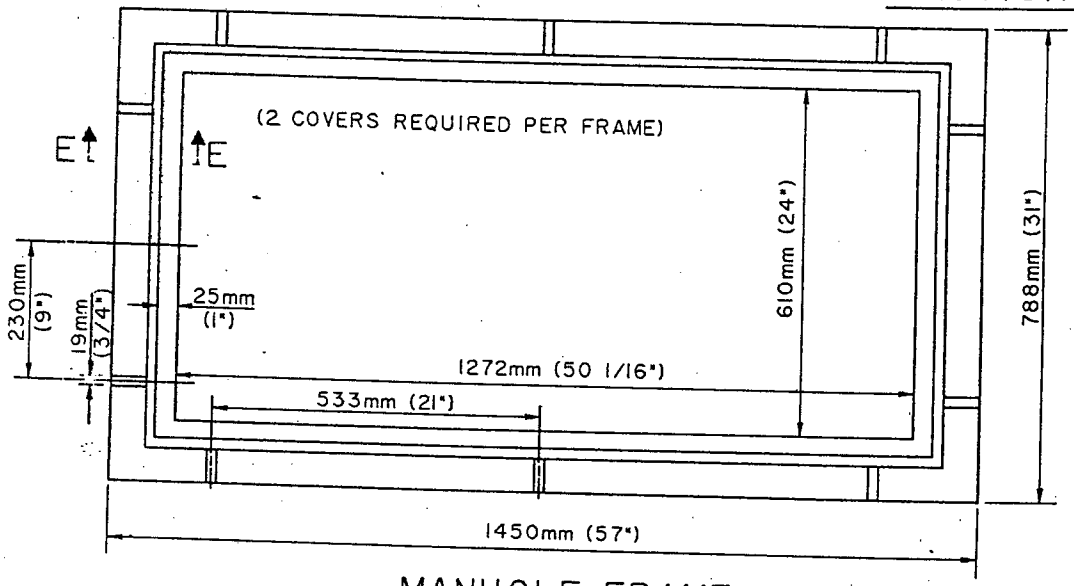
SECTION C-C



SECTION D-D



SECTION E-E



MANHOLE FRAME

NOTES:

1. FOR USE WITH MANHOLES PER STANDARD PLANS 2002 AND 2004.
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)
   TOTAL 298 Kg (660 LBS)
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.

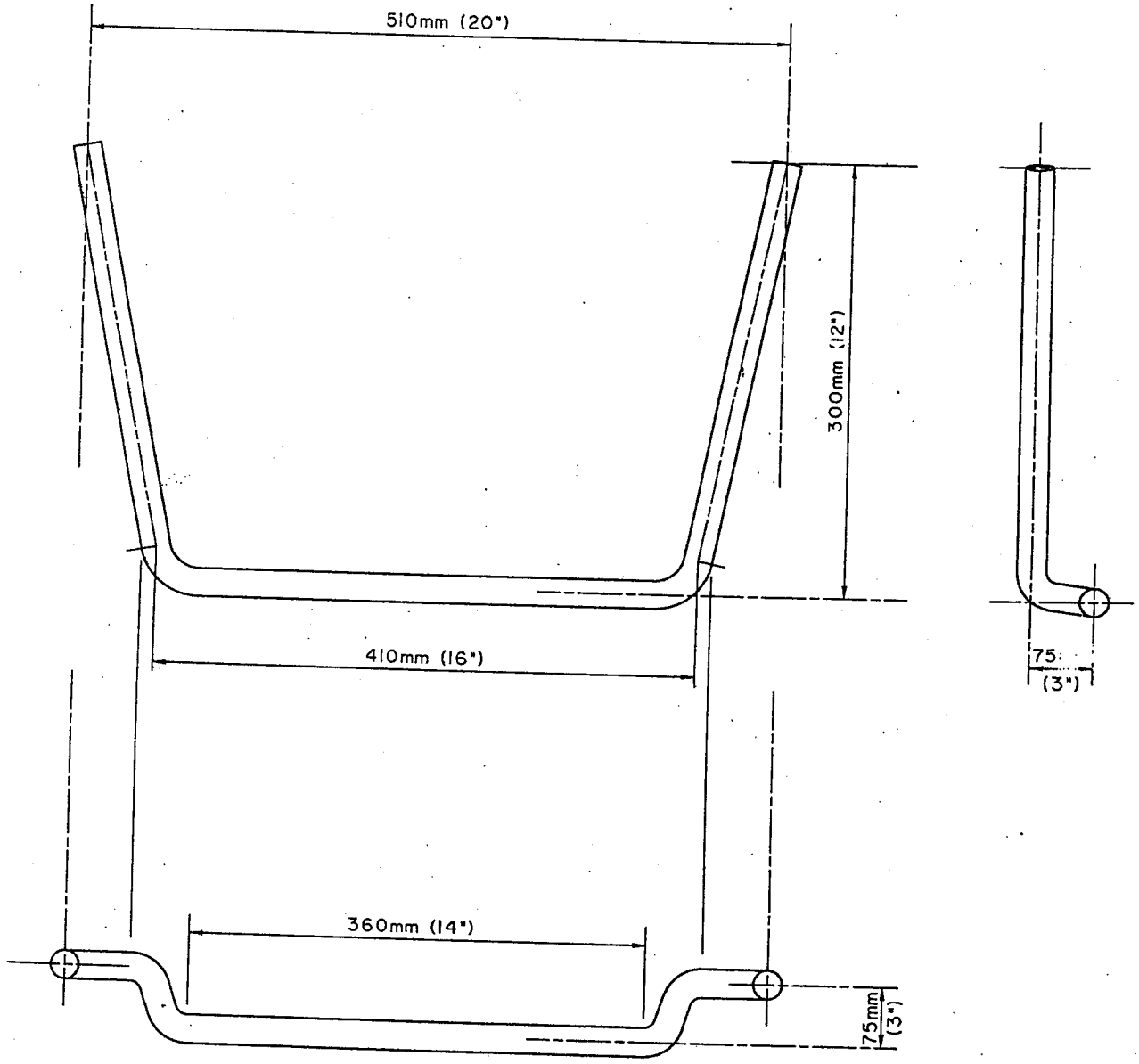
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

RECTANGULAR MANHOLE FRAME & COVER

STANDARD PLAN
METRIC
2014-1
SHEET 1 OF 1

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

1999
REVISIONS



LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

STANDARD MANHOLE STEP

STANDARD PLAN METRIC

2015-1

SHEET 1 OF 2

APPROVED Thomas A. Tidemanson 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

1999

REVISIONS

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.

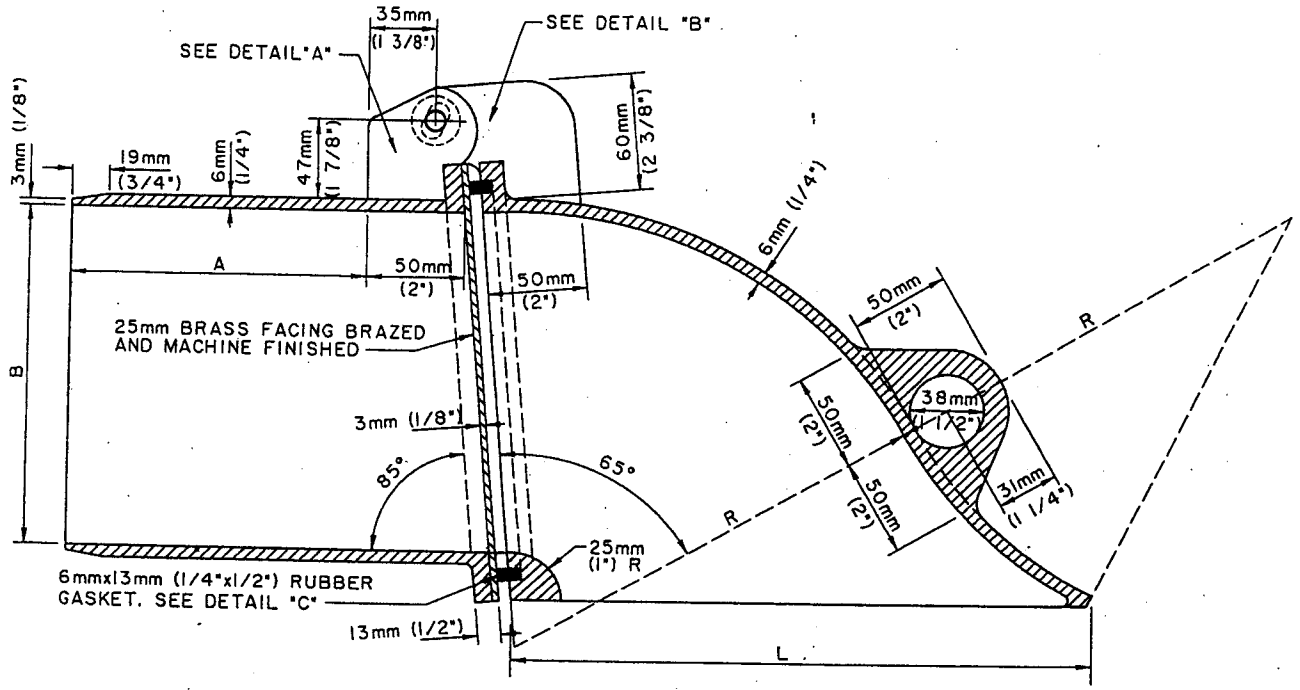
3. 19mm (3/4") Ø OR 19mm (3/4") SQUARE OR EQUIVALENT CROSS SECTIONAL AREA WROUGHT IRON CONFORMING TO ASTM A 207.

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

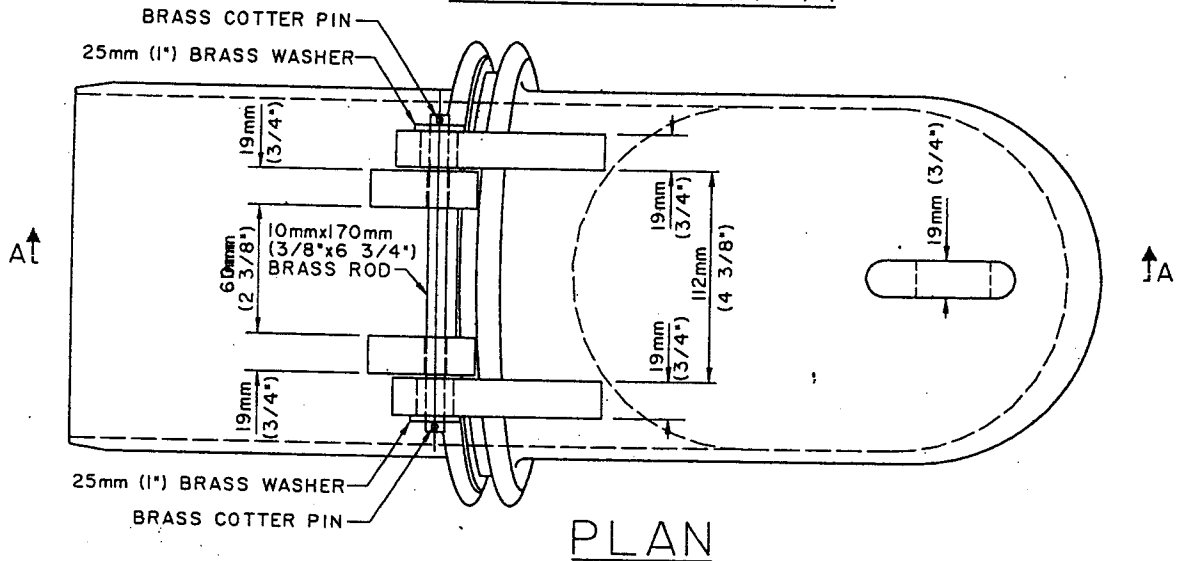
THE FOLLOWING STEP MAY BE SUBSTITUTED FOR THE STEPS SHOWN ABOVE:

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 SHAFTING 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.

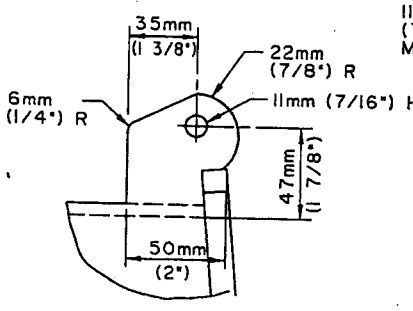
5. DIMENSIONS SHOWN ON THIS PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACT EQUAL VALUES. IF METRIC VALUES ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.



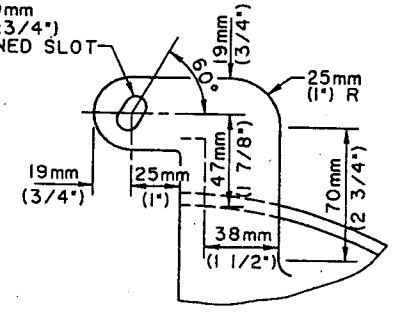
SECTION A-A



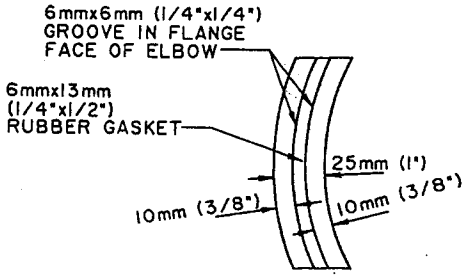
PLAN



DETAIL A



DETAIL B



DETAIL C

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

TRAP MANHOLE CASTING

STANDARD PLAN METRIC

2016-1

SHEET 1 OF 2

APPROVED Thomas A. Tidemanson 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

1999

REVISIONS

DIMENSIONS OF CASTING				
INLET DIAM.	A	B	R	L
250mm (10")	150mm (6")	230mm (9")	280mm (11")	375mm (14 3/4")
300mm (12")	180mm (7")	280mm (11")	330mm (13")	450mm (17 3/4")
380mm (15") & LARGER	SEE STANDARD PLAN 2017			

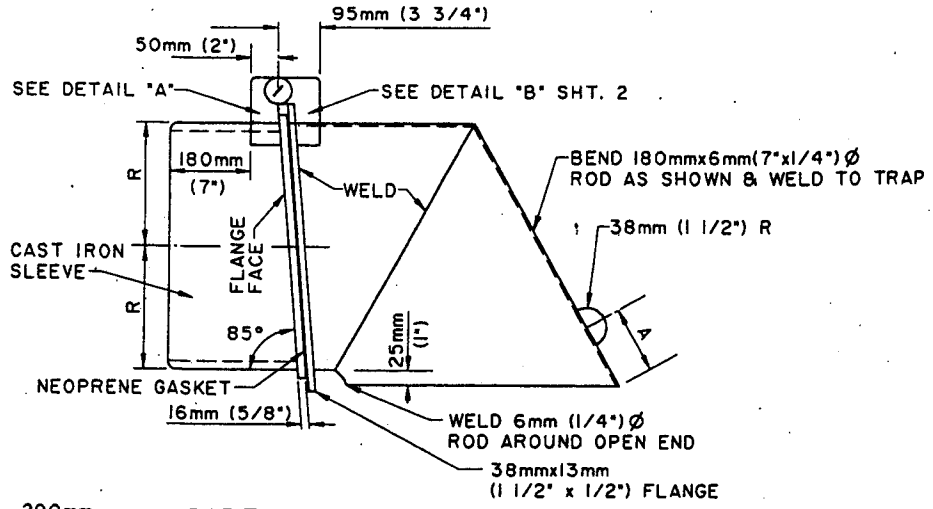
NOTES

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 208-2.2.
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.

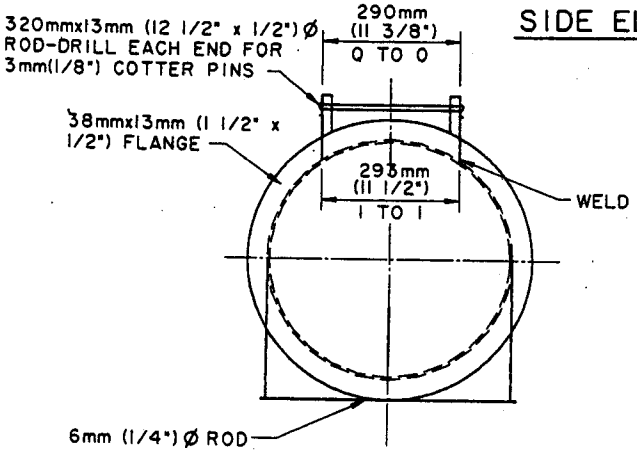
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

TRAP MANHOLE CASTING

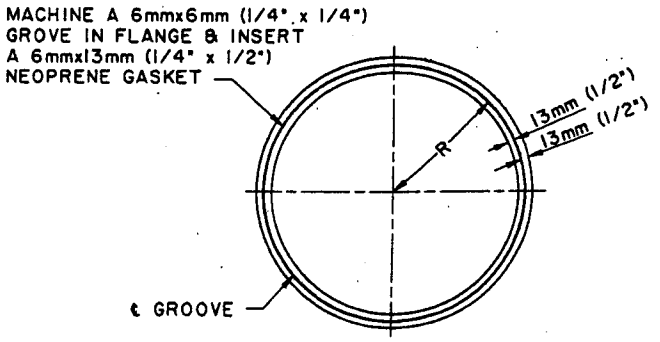
STANDARD PLAN
METRIC
2016-1
SHEET 2 OF 2



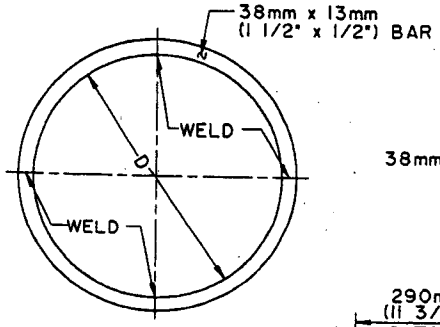
SIDE ELEVATION



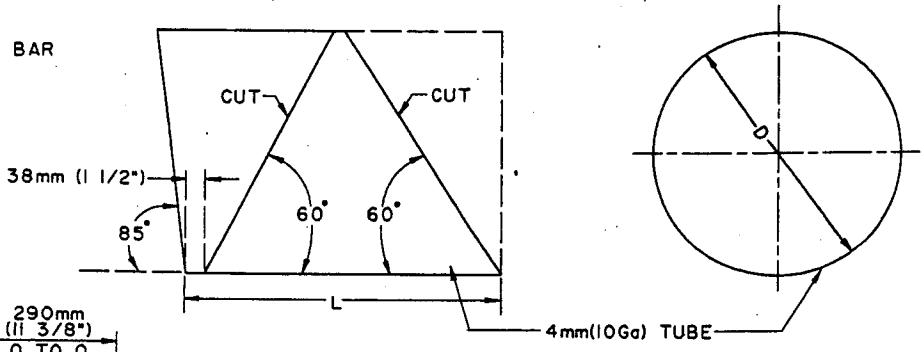
END ELEVATION



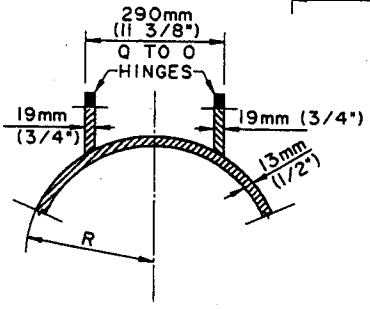
FLANGE FACE (STUB CASTING)



FLANGE



CONSTRUCTION DETAIL



DETAIL "A"

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

LARGE GAS TRAP

STANDARD PLAN METRIC

2017-1

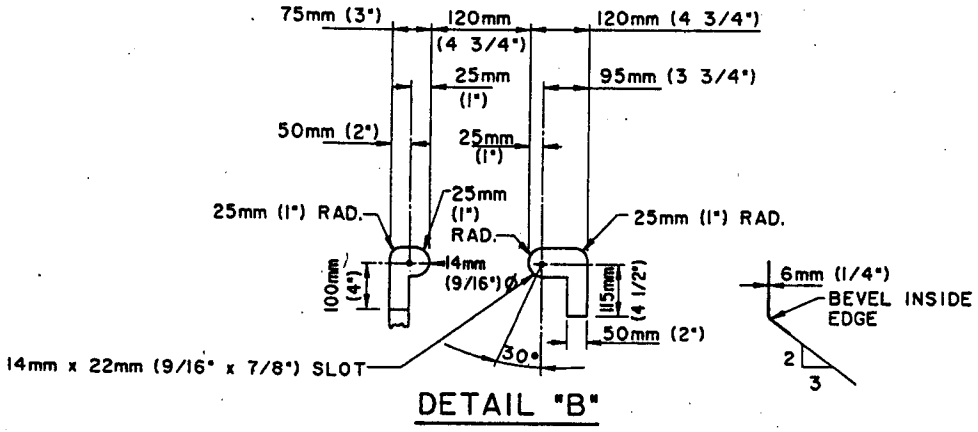
SHEET 1 OF 2

APPROVED Thomas A. Tidemanson 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

1999

REVISIONS



DETAIL "B"

DIMENSIONS OF TRAP				
INLET DIAM.	A	D	R	L
380mm (15")	100mm (4")	360mm (14")	184mm (7 1/4")	485mm (19 1/16")
460mm (18")	125mm (5")	430mm (17")	222mm (8 3/4")	575mm (22 9/16")
530mm (21")	150mm (6")	500mm (20")	260mm (10 1/4")	660mm (26")

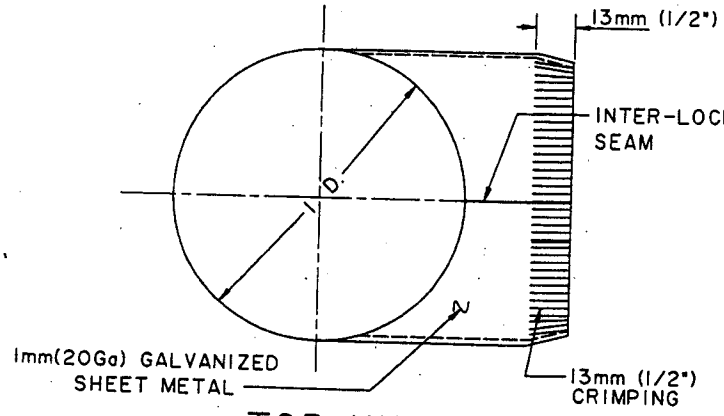
NOTES:

1. STAINLESS STEEL SHALL BE A.I.S.I TYPE 316 OR A.S.T.M. A240-49 TYPE 316.
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.

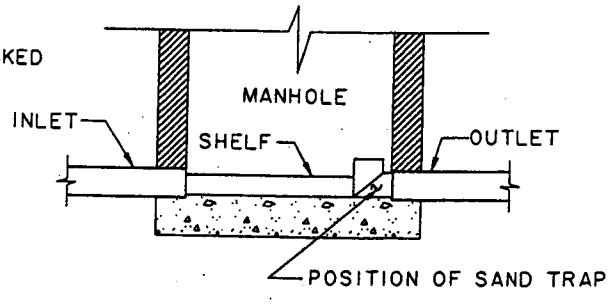
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

LARGE GAS TRAP

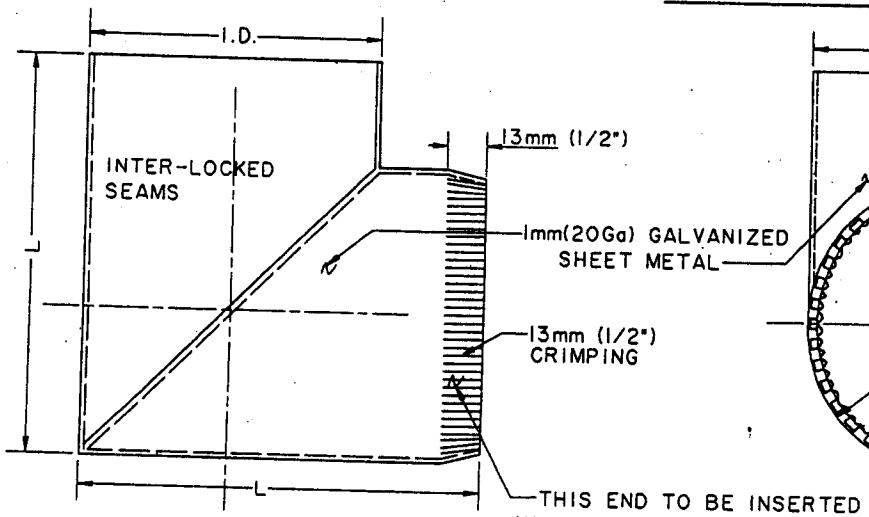
STANDARD PLAN
METRIC
2017-1
SHEET 2 OF 2



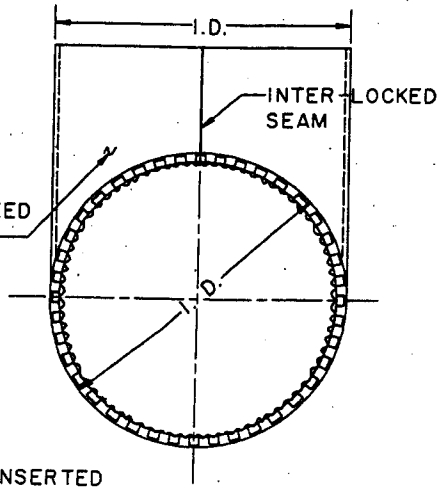
TOP VIEW



SECTIONAL VIEW
SHOWING PLACEMENT OF SAND TRAP



FRONT VIEW



SIDE VIEW

DIMENSIONS OF TRAP		
I.D.	L.	FLEXIBLE EQUIVALENT (SEE NOTES)
200mm (8")	270mm (10 1/2")	ST-2
250mm (10")	320mm (12 1/2")	ST-3
300mm (12")	410mm (16")	ST-4
380mm (15")	460mm (18")	ST-6
460mm (18")	490mm (19")	ST-8

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

TEMPORARY SAND TRAP

STANDARD PLAN METRIC

2018-1

SHEET 1 OF 2

APPROVED Thomas A. Tidemanson 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

1999

REVISIONS

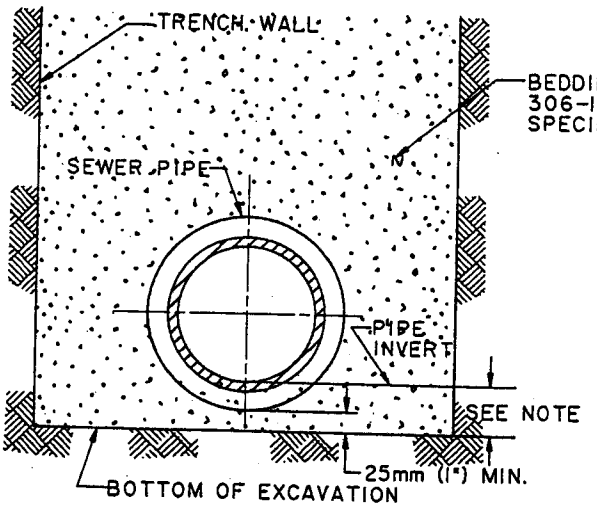
NOTES

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.

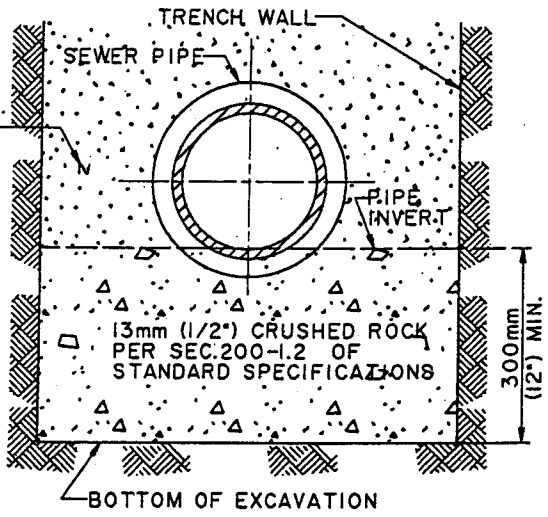
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

TEMPORARY SAND TRAP

STANDARD PLAN
METRIC
2018-1
SHEET 2 OF 2

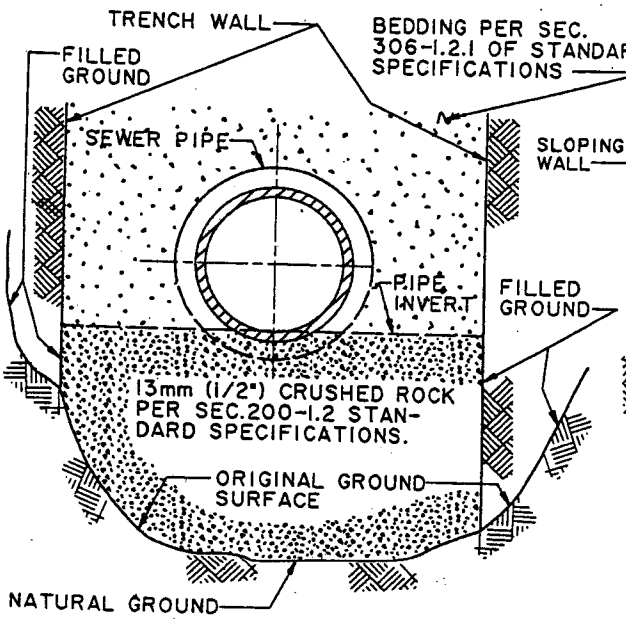


CASE I
NORMAL TRENCH

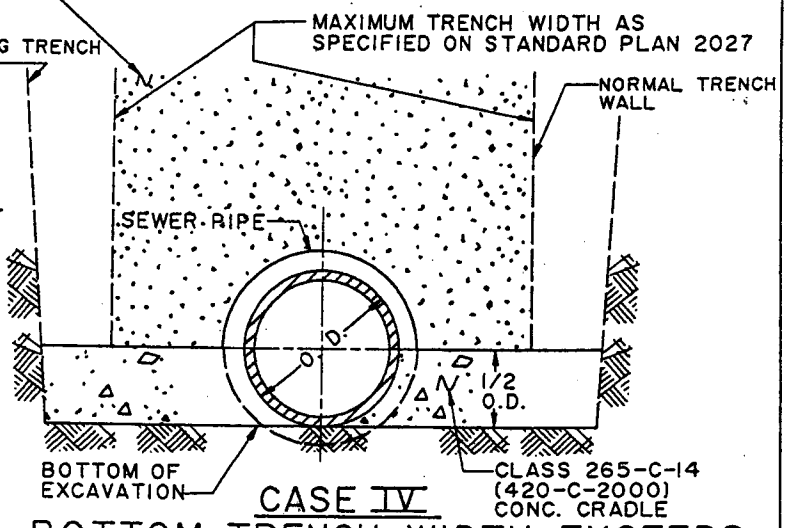


CASE II
WET, SPONGY GROUND

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



CASE III
FILLED GROUND
(LESS THAN 90% COMPACTION)



CASE IV
BOTTOM TRENCH WIDTH EXCEEDS THE WIDTH SPECIFIED ON STANDARD PLAN 2027-1

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.

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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

BEDDING FOR SEWER PIPE

STANDARD PLAN METRIC

2021-1

SHEET 1 OF 1

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

1999
REVISIONS

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.

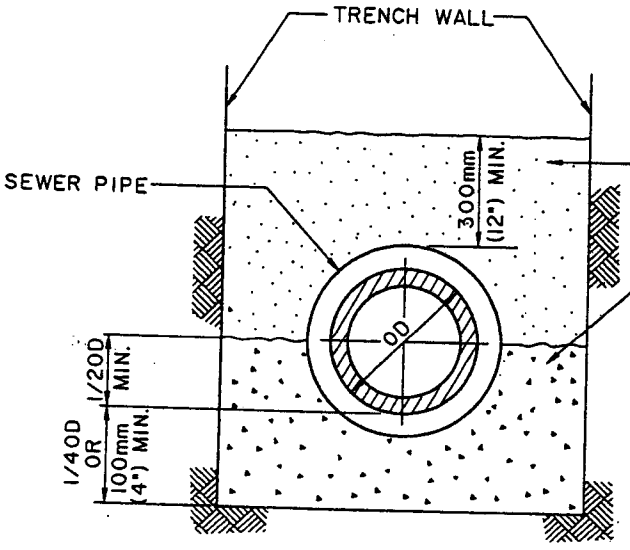


FIGURE 1

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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

BEDDING FOR ABS & PVC SEWER PIPE

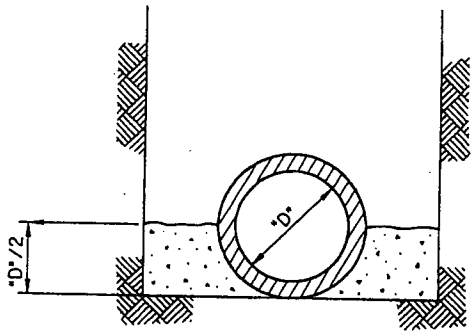
STANDARD PLAN METRIC

2022-1

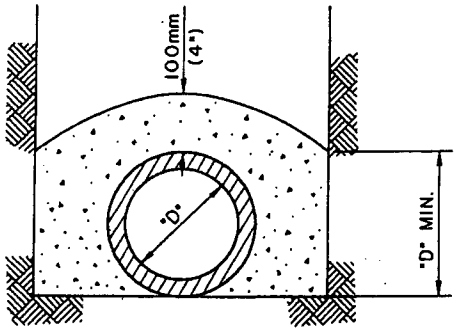
SHEET 1 OF 1

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

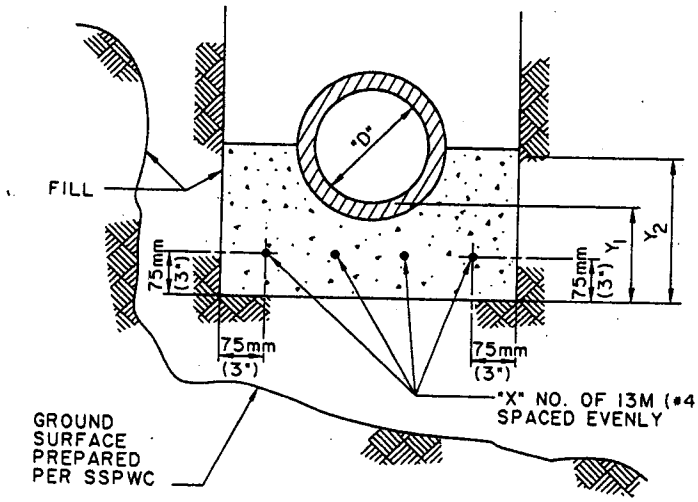
1999 REVISIONS



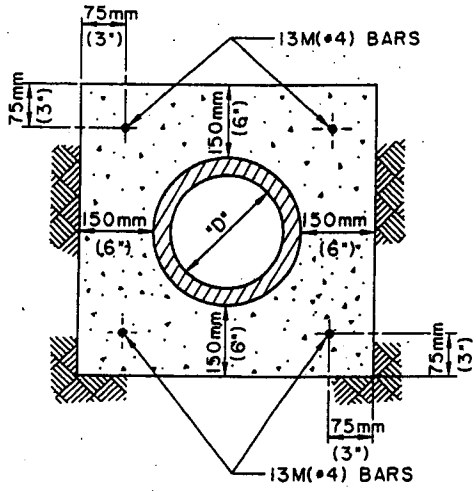
CASE I
CONCRETE CRADLE



CASE II
CONCRETE ENCASEMENT



CASE III
SPECIAL CRADLE



CASE IV
SPECIAL ENCASEMENT

SCHEDULE OF DIMENSIONS AND REINFORCING BARS FOR SPECIAL CRADLE - CASE III			
"D" (DIAMETER)	"X" NO. OF 13M(#4) BARS	THICKNESS	
		Y_1	Y_2
150mm (6")	2	100mm (4")	200mm (8")
200mm (8")	4	130mm (5")	250mm (10")
250mm (10")	4	150mm (6")	300mm (12")
300mm (12")	4	180mm (7")	380mm (15")
380mm (15")	5	230mm (9")	480mm (19")
460mm (18")	5	250mm (10")	560mm (22")
530mm (21")	6	300mm (12")	660mm (26")
600mm (24")	6	330mm (13")	710mm (28")

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

CRADLING AND ENCASEMENT

STANDARD PLAN
METRIC

2023-2

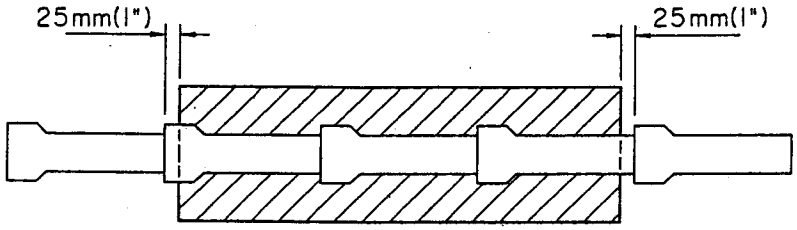
SHEET 1 OF 2

APPROVED *Thomas A. Gilmanson* 5/31/1992
DIRECTOR OF PUBLIC WORKS — DATE

1995, 1999
REVISIONS

NOTES

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



PLAN VIEW

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.

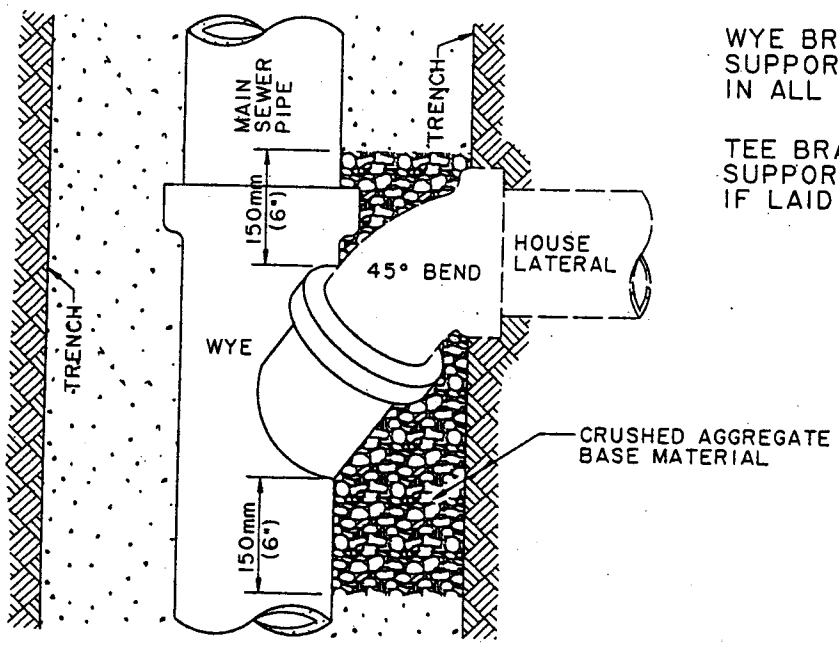
   d. CASE IV - SPECIAL ENCASEMENT
      1. WHEN CROSSING UNDER A STRUCTURE WITH A WIDTH GREATER THAN 1.5m(5') AND A CLEARANCE LESS THAN 450mm(1.5') AND GREATER THAN 150mm(0.5').
      2. WHEN WITHIN 3m(10') OF A PRESSURIZED WATER MAIN, OR WITHIN 7.6m(25') OF A GRAVITY FLOW WATER MAIN.

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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

CRADLING AND ENCASEMENT

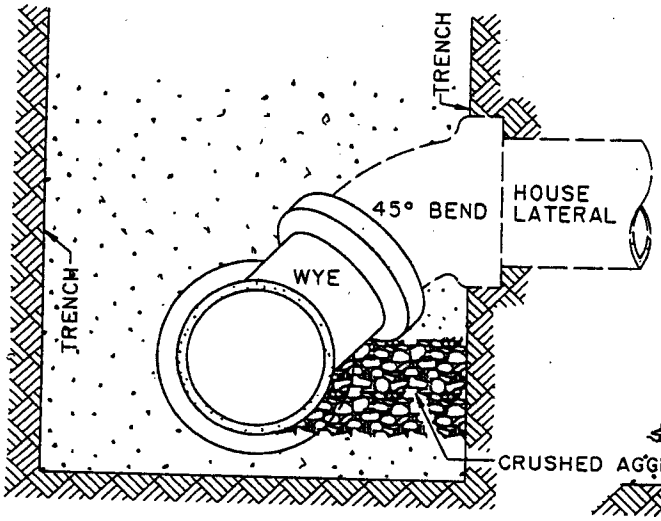
STANDARD PLAN
METRIC
2023-2
SHEET 2 OF 2



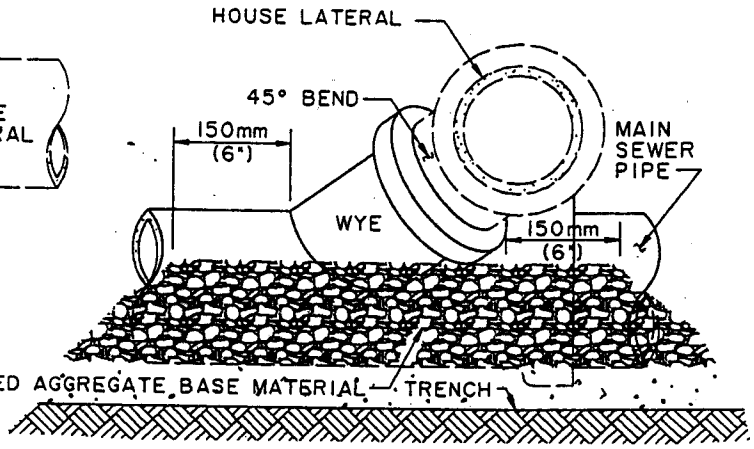
TOP

WYE BRANCHES TO BE SUPPORTED AS SHOWN IN ALL CASES

TEE BRANCHES TO BE SUPPORTED AS SHOWN IF LAID FLAT



FRONT



SIDE

NOTES:

1. AGGREGATE BASE MATERIAL TO BE 13mm(1/2") CRUSHED ROCK PER SEC. 200-1.2 OF SSPWC.
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 Thomas A. Tidemanson 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

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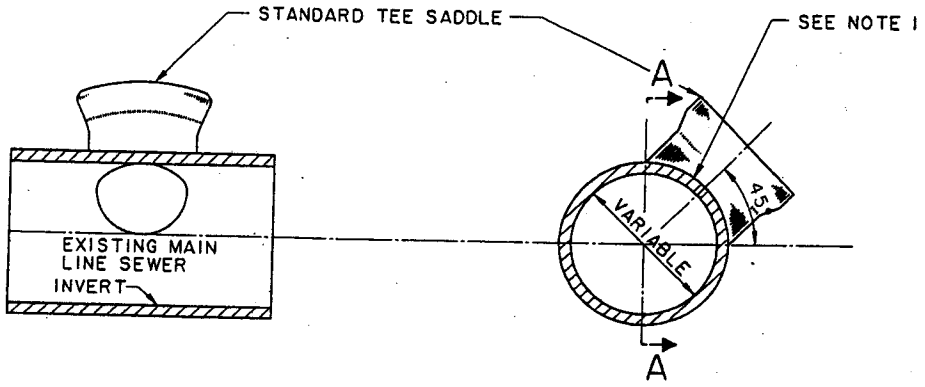
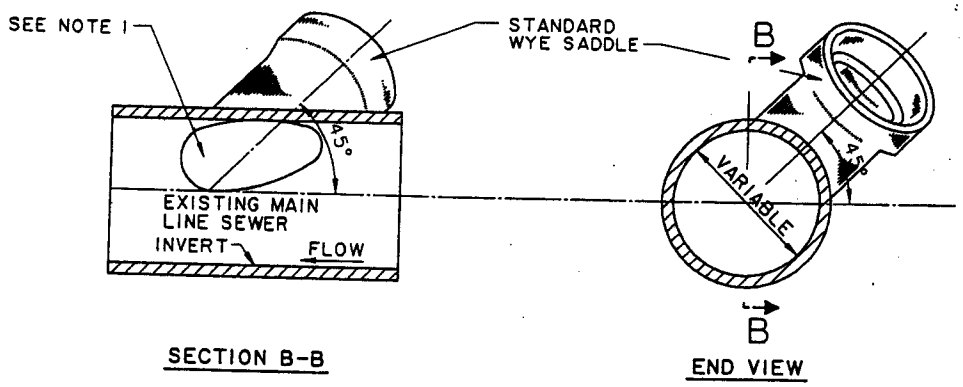
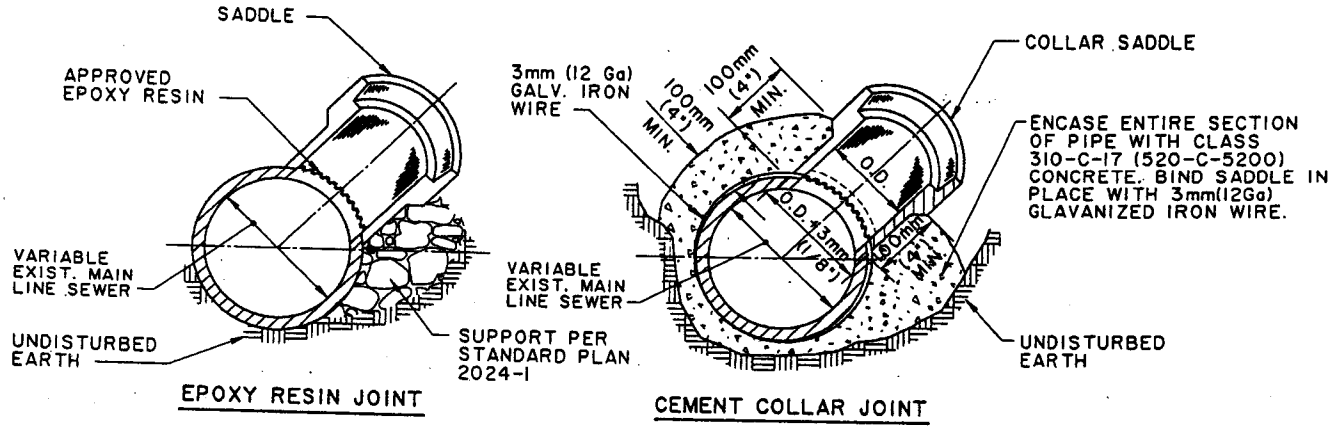
SHEET 1 OF 1



TEE SADDLE INSTALLATION



WYE SADDLE INSTALLATION



TEE OR WYE SADDLE JOINTS AND SUPPORT

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SADDLES FOR HOUSE LATERALS

STANDARD PLAN
METRIC

2025-2

SHEET 1 OF 2

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

1995, 1999
REVISIONS

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.

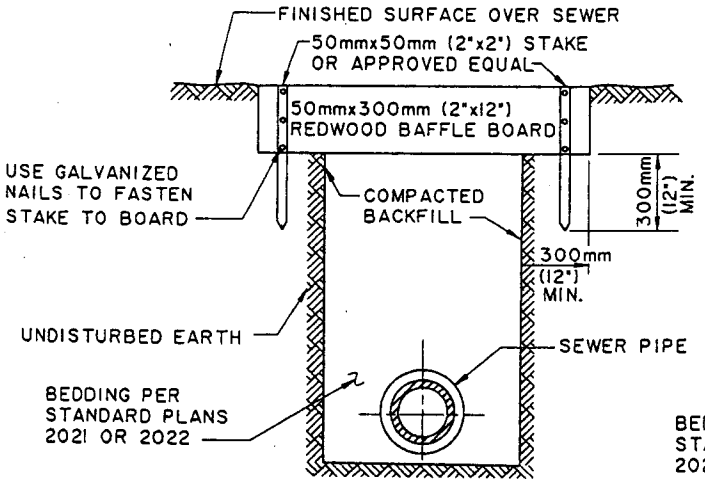
5. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SADDLES FOR HOUSE LATERALS

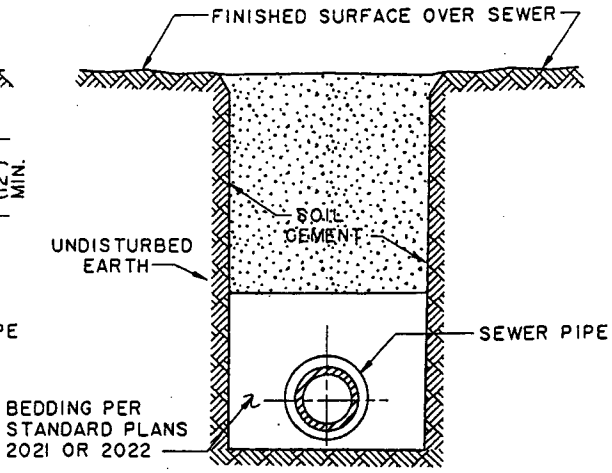
STANDARD PLAN
METRIC
2025-2
SHEET 2 OF 2

TO BE USED IN EASEMENTS WHERE THE SURFACE GRADE IS GREATER THAN 30% OR WHEN DESIGNATED ON THE PLAN



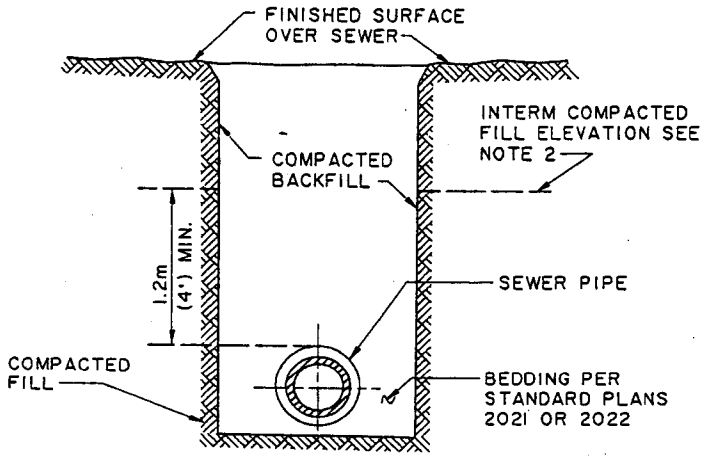
CASE I
BAFFLE BOARD

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 300mm(1') LAYER OF THE BACKFILL IS TO BE TOP SOIL TAMPED 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 VOIDS. 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.



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 LAID IN A TRENCH EXCAVATED IN THE COMPACTED FILL SLOPE AND DEEP ENOUGH TO PROVIDE AT LEAST 1.2m (4') OF COVER OVER THE PIPE.
3. CERTIFICATION IS REQUIRED BY A SOIL TESTING LABORATORY AND SOILS ENGINEER THAT THE COMPACTION FOR THE BACKFILL MEETS THE GRADING PLAN REQUIREMENTS.

NOTES:

1. IN ALL CASES ANCHOR BLOCKS WILL BE REQUIRED IN ACCORDANCE WITH APWA 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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

EROSION PROTECTION IN STEEP SLOPES

STANDARD PLAN METRIC

2026-1

SHEET 1 OF 1

APPROVED Thomas A. Tidemanson 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

1999

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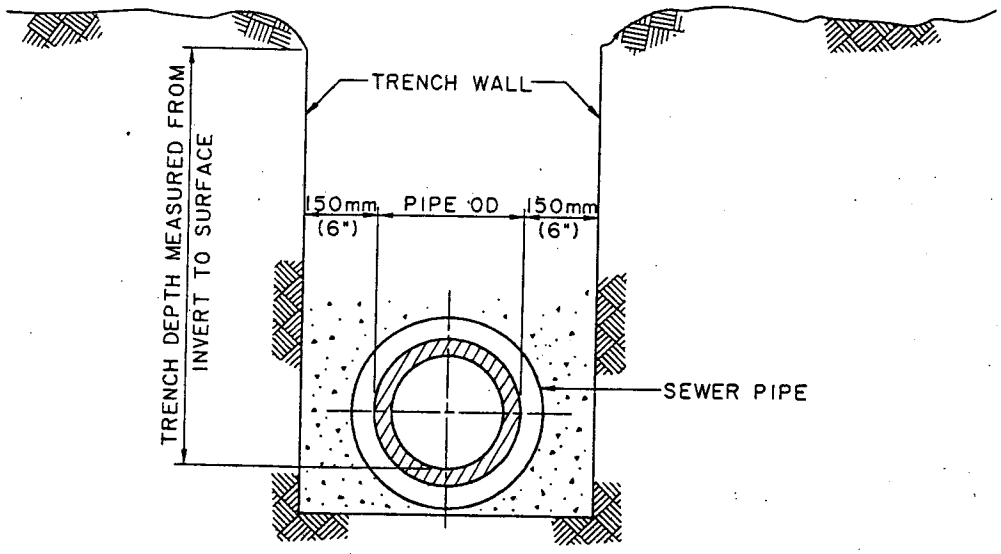

MINIMUM TRENCH WIDTH

MAXIMUM TRENCH WIDTH

MEASURED AT TOP OF PIPE

PIPE SIZE	DEPTH OF TRENCH					
	5.5m-6.0m (18'-20')	4.9m-5.5m (16'-18')	4.3m-4.9m (14'-16')	3.7m-4.3m (12'-14')	3.0m-3.7m (10'-12')	LESS THAN 3.0m (10')
100mm(4") & 150mm(6")	660mm(26")	660mm(26")	660mm(26")	660mm(26")	660mm(26")	NONE
200mm(8")	690mm(27")	690mm(27")	720mm(28")	720mm(28")	760mm(30")	NONE
250mm(10")	740mm(29")	760mm(30")	790mm(31")	810mm(32")	840mm(33")	NONE
300mm(12")	810mm(32")	840mm(33")	840mm(33")	890mm(35")	940mm(37")	NONE
380mm(15")	890mm(35")	910mm(36")	960mm(38")	990mm(39")	1070mm(42")	NONE
460mm(18")	990mm(39")	1020mm(40")	1070mm(42")	1120mm(44")	1220mm(48")	NONE
530mm(21")	1090mm(43")	1120mm(44")	1170mm(46")	1250mm(49")	1370mm(54")	NONE
600mm(24")	1140mm(45")	1190mm(47")	1270mm(50")	1350mm(53")	1470mm(58")	NONE
690mm(27")	1250mm(49")	1300mm(51")	1370mm(54")	1470mm(58")	1630mm(64")	NONE
760mm(30")	1320mm(52")	1400mm(55")	1470mm(58")	1600mm(63")	1780mm(70")	NONE
840mm(33")	1420mm(56")	1500mm(59")	1570mm(62")	1730mm(68")	1960mm(77")	NONE
900mm(36")	1500mm(59")	1570mm(62")	1680mm(66")	1850mm(73")	2110mm(83")	NONE

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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

ALLOWABLE TRENCH WIDTHS

STANDARD PLAN METRIC

2027-1

APPROVED Thomas A. Tidemanson 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

1999

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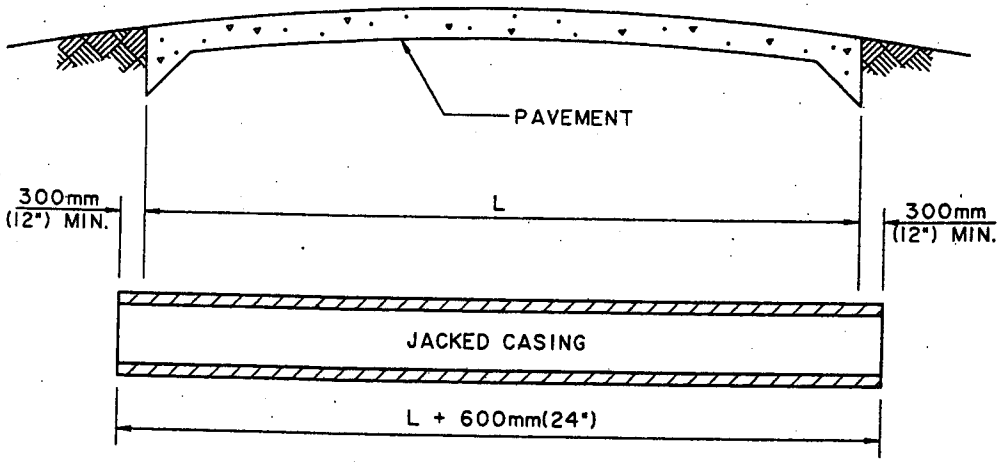
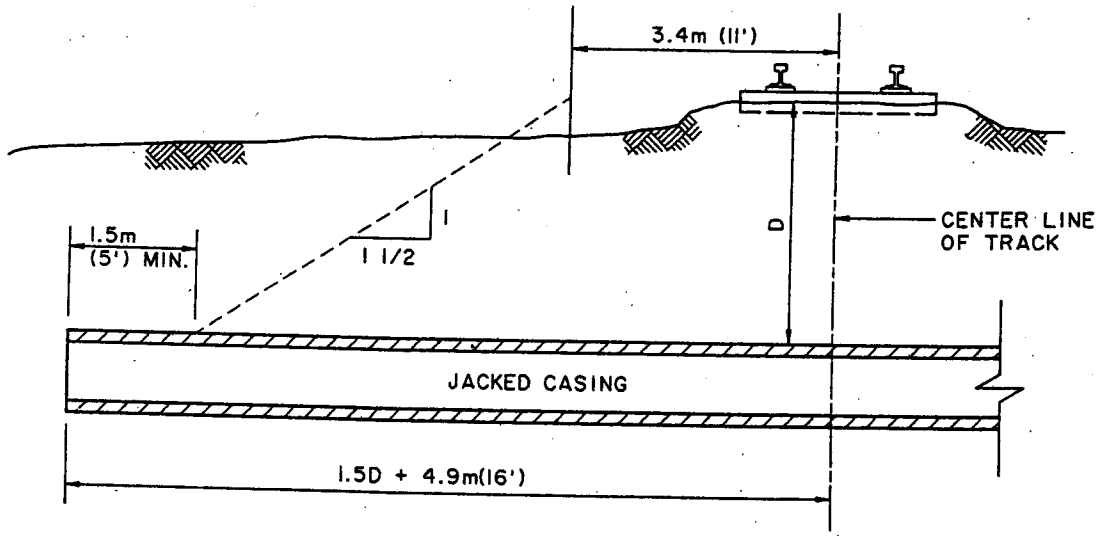
SHEET 1 OF 1



CROSSING UNDER ROADWAY



CROSSING UNDER RAILROAD

DIAMETER OF STEEL CASING	
PIPE SIZE	CASING DIAMETER
150mm(6")	760mm(30")
200mm(8")	760mm(30")-910mm(36")
250mm(10")	840mm(33")-910mm(36")
300mm(12")	910mm(36")-1070mm(42")
380mm(15")	1070mm(42")-1200mm(48")

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

JACKING STEEL CASING FOR SEWER PIPE

STANDARD PLAN
METRIC

2028-1

SHEET 1 OF 2

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

1999
REVISIONS

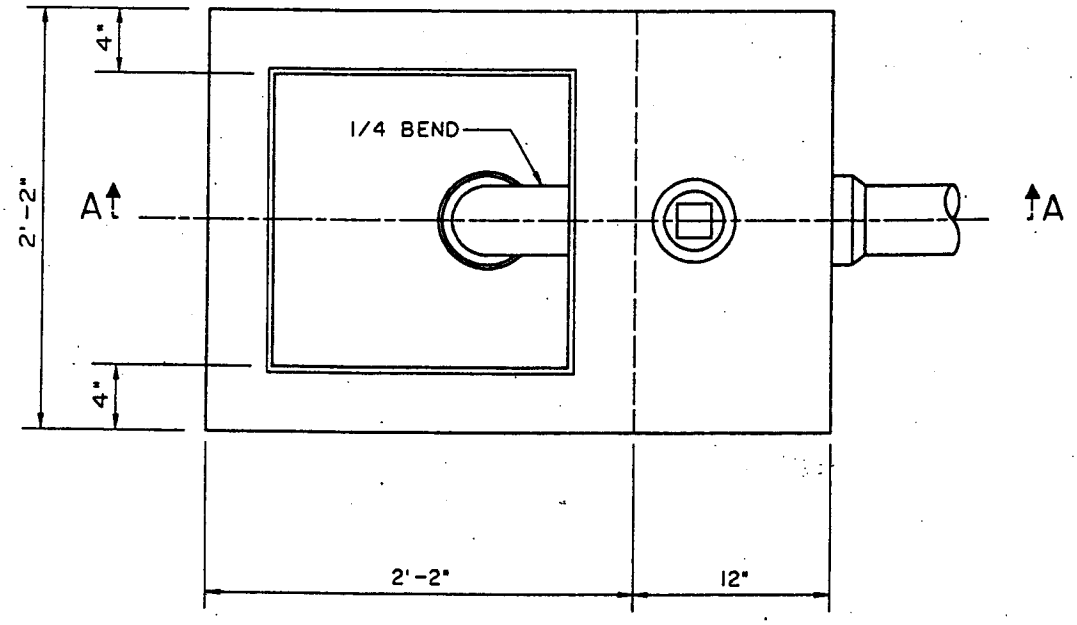
NOTES

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.

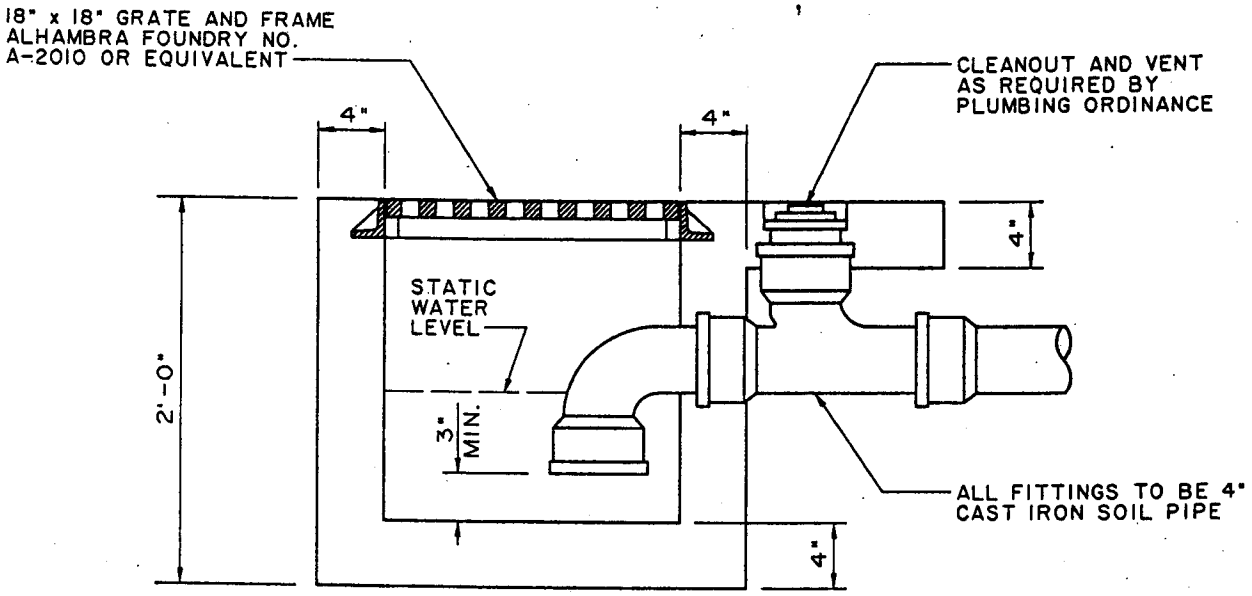
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

JACKING STEEL CASING FOR SEWER PIPE

STANDARD PLAN
METRIC
2028-1
SHEET 2 OF 2



PLAN
WITH GRATE REMOVED



SECTION A-A

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

STANDARD RECEPTOR

STANDARD PLAN
2040-0
SHEET 1 OF 2

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

REVISIONS

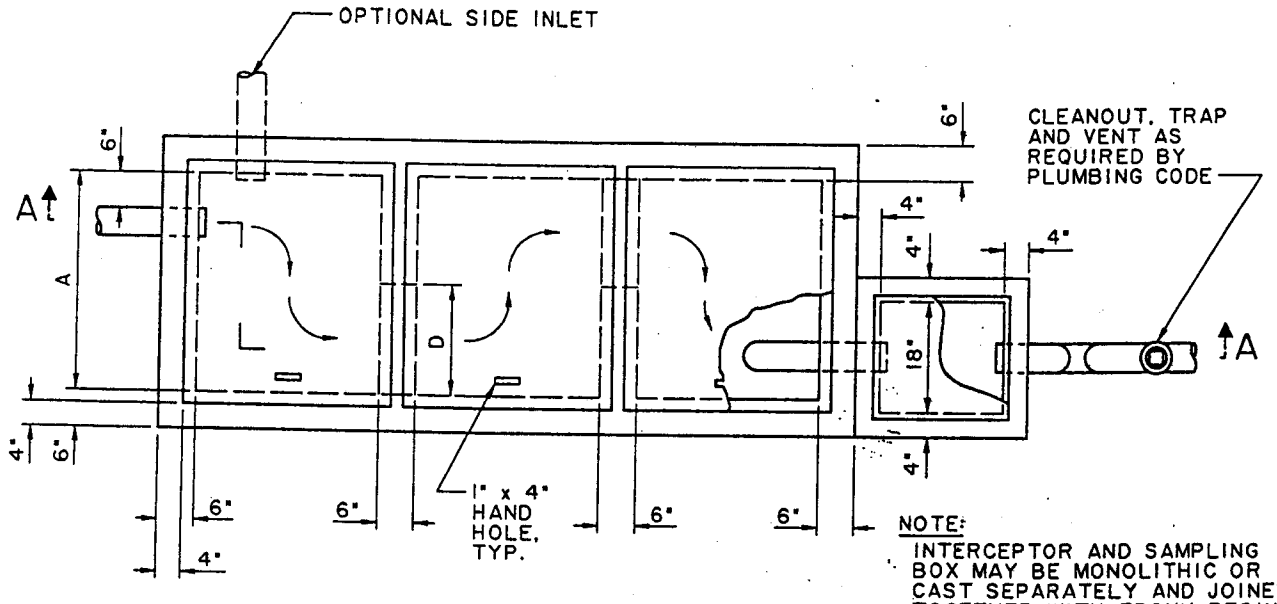
NOTES

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.

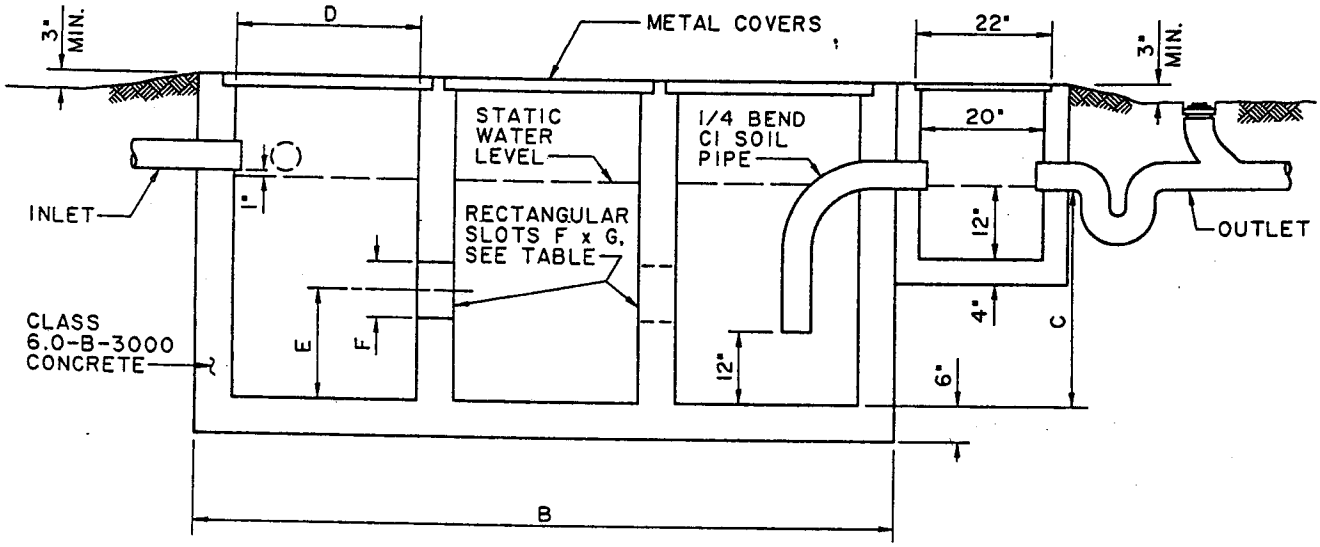
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

STANDARD RECEPTOR

STANDARD PLAN
2040-0
SHEET 2 OF 2



PLAN



SECTION A-A

CAPACITY GALLONS	DIMENSIONS							COVER SIZE	METAL COVERS	PIPE SIZE
	A	B	C	D	E	F	G			
510	3'-0"	9'-6"	3'-0"	2'-6"	18"	4 1/2"	18"	2'-10"x3'-4"	1/4" STEEL PLATE	4" MIN.
866	3'-6"	10'-3"	4'-0"	2'-9"	24"	6"	21"	3'-1"x3'-10"	3/8" ALUMINUM PLATE	4" MIN.
1260	4'-0"	12'-6"	4'-0"	3'-6"	24"	6"	24"	3'-10"x4'-4"	3/8" ALUMINUM PLATE	4" MIN.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SAND & GREASE INTERCEPTOR

STANDARD PLAN
2041-0
SHEET 1 OF 2

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

REVISIONS

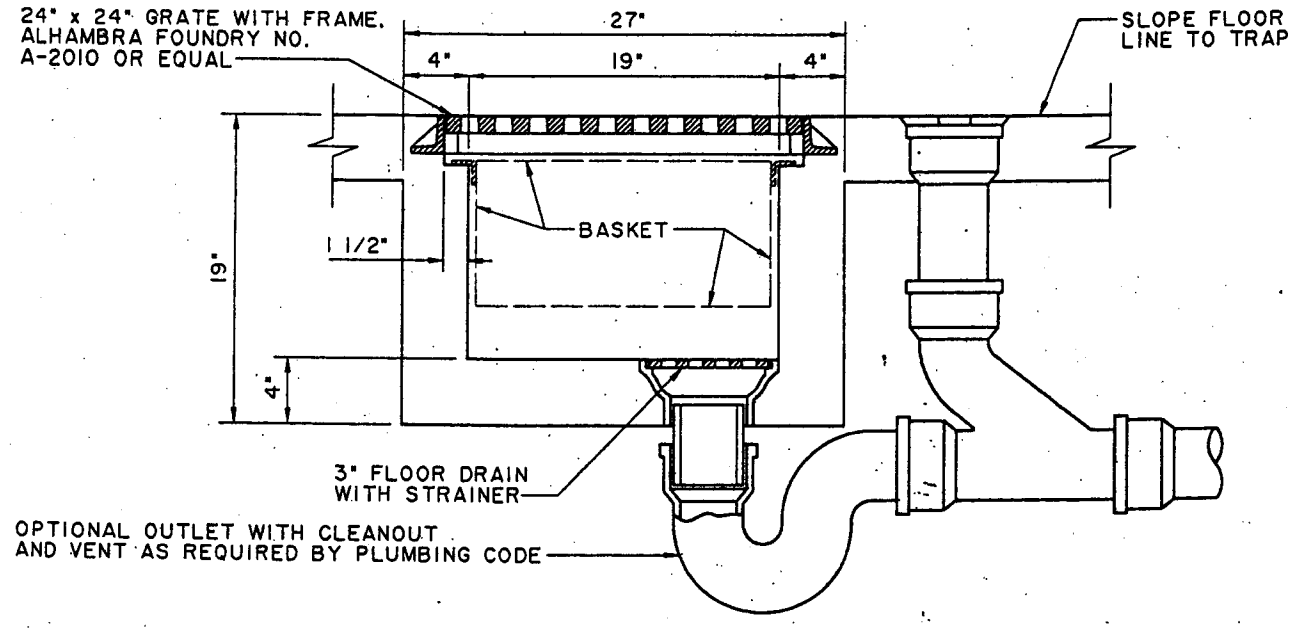
NOTES

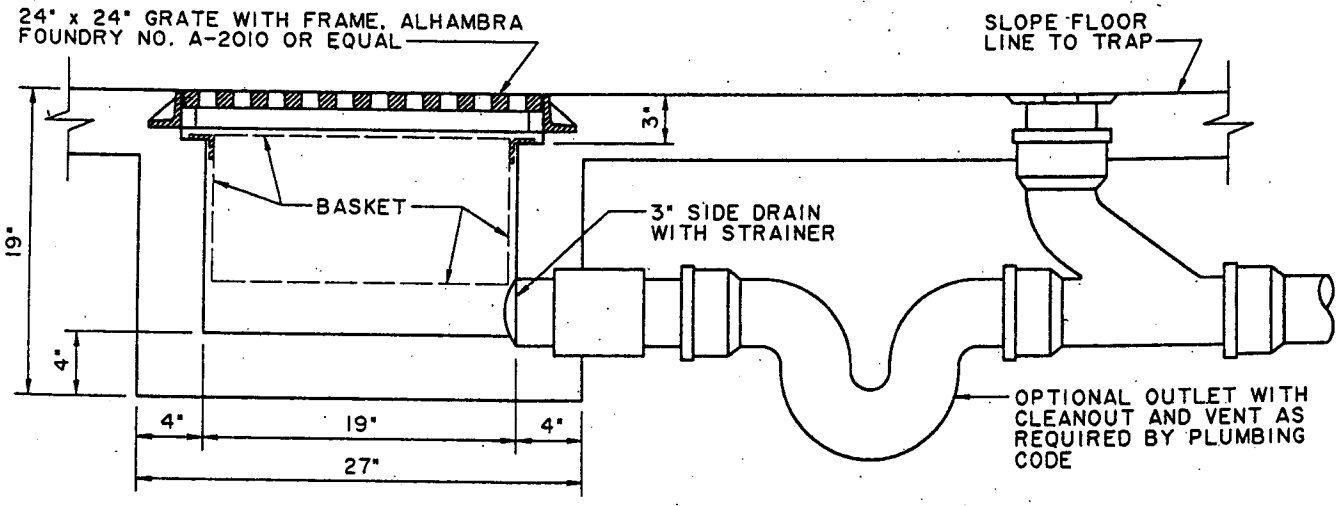
1. THE APPROVAL OF THE COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS MUST BE OBTAINED BEFORE INSTALLATION.
2. THE INTERCEPTOR TO BE CONSTRUCTED OF TYPE II PORTLAND CEMENT CONCRETE.
3. INTERCEPTOR EXCEEDING 6'-6" IN DEPTH MUST BE CONSTRUCTED OF REINFORCED CONCRETE.
4. IF INSTALLED INSIDE OF BUILDING, 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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

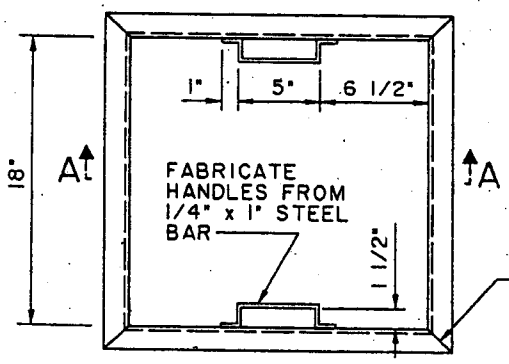
SAND & GREASE INTERCEPTOR

STANDARD PLAN
2041-0
SHEET 2 OF 2

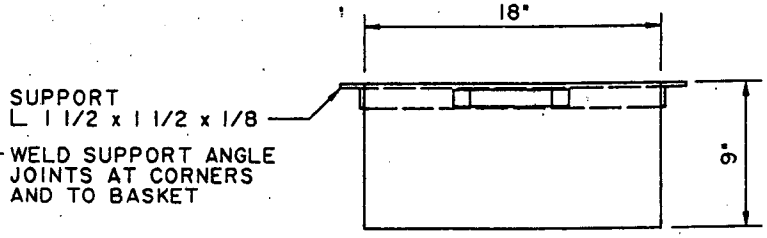




STRUCTURE DETAIL



PLAN



SECTION A-A

BASKET DETAIL

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

BASKET RECEPTOR

APPROVED Thomas A. Tidemanson 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

REVISIONS

STANDARD PLAN

2042-0

SHEET 1 OF 2

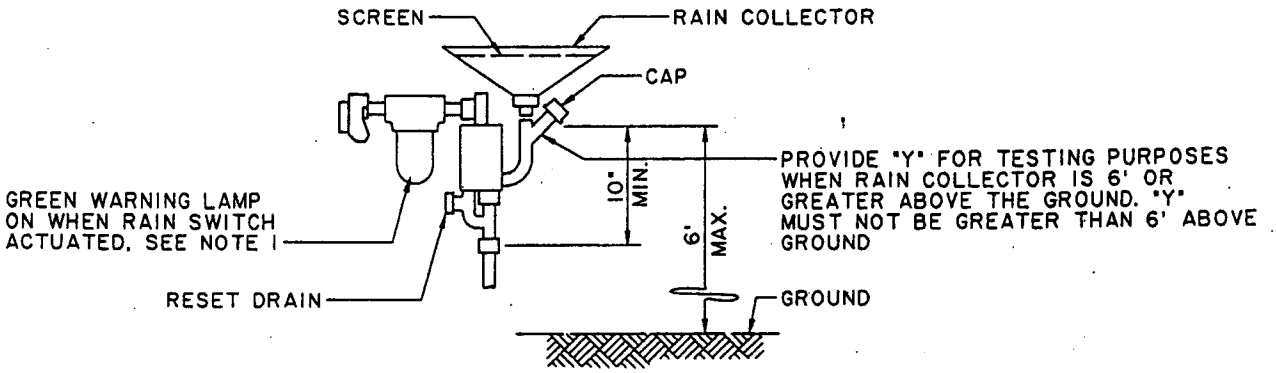
NOTES

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.

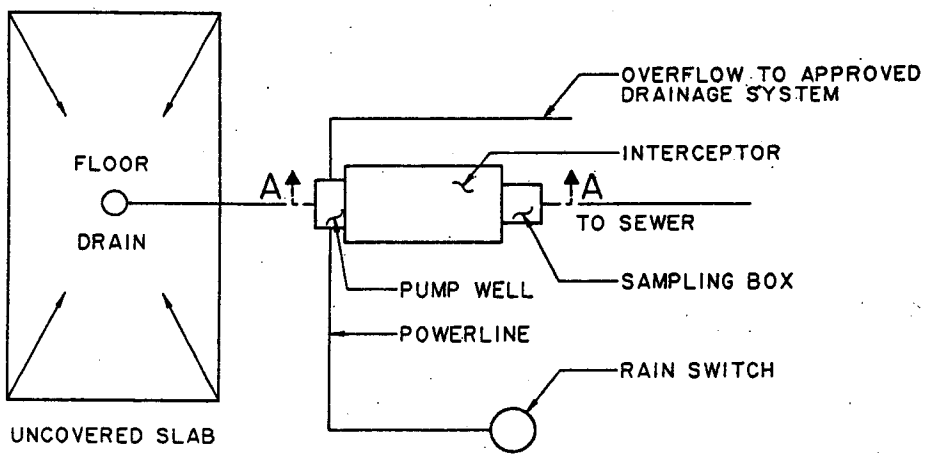
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

BASKET RECEPTOR

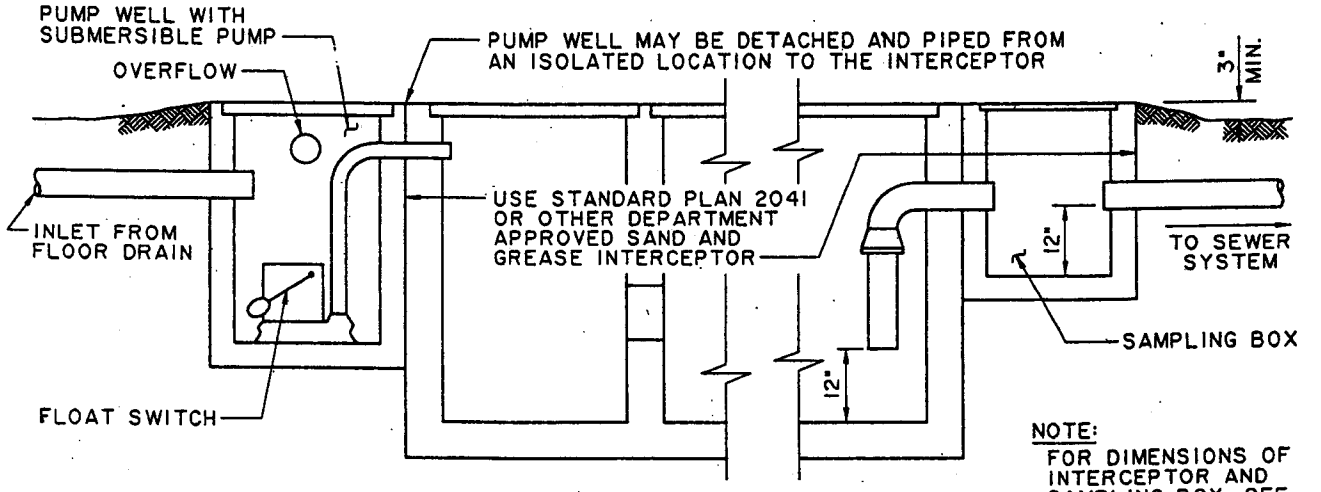
STANDARD PLAN
2042-0
SHEET 2 OF 2



APPROVED RAIN ACTIVATED SWITCH



SYSTEM LAYOUT



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

SECTION A-A

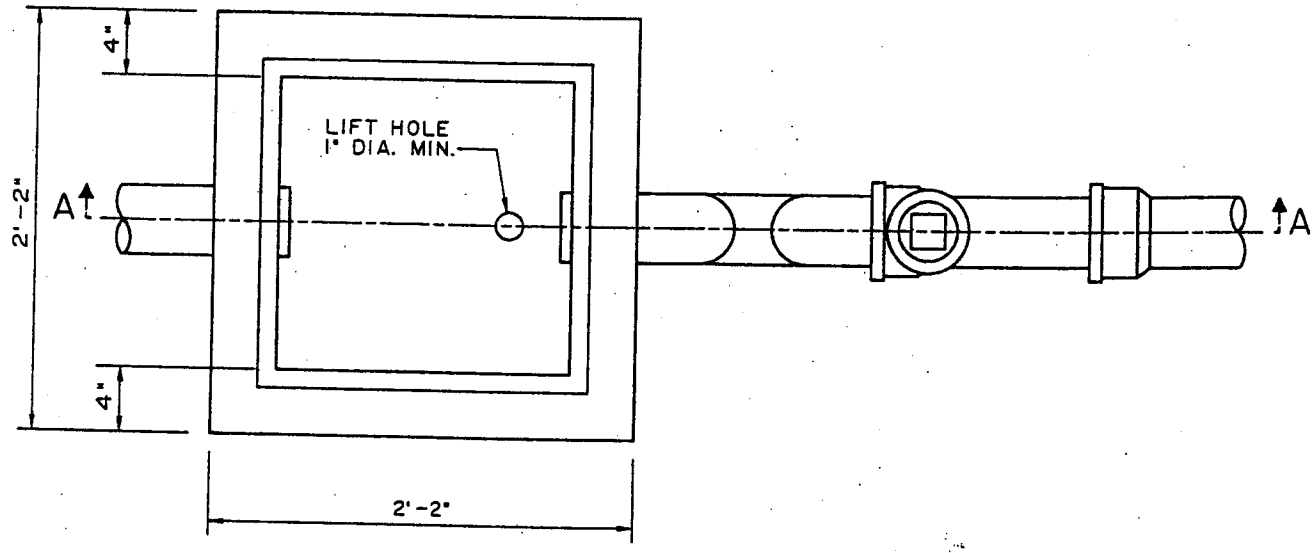
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

RAIN WATER DIVERSION SYSTEM

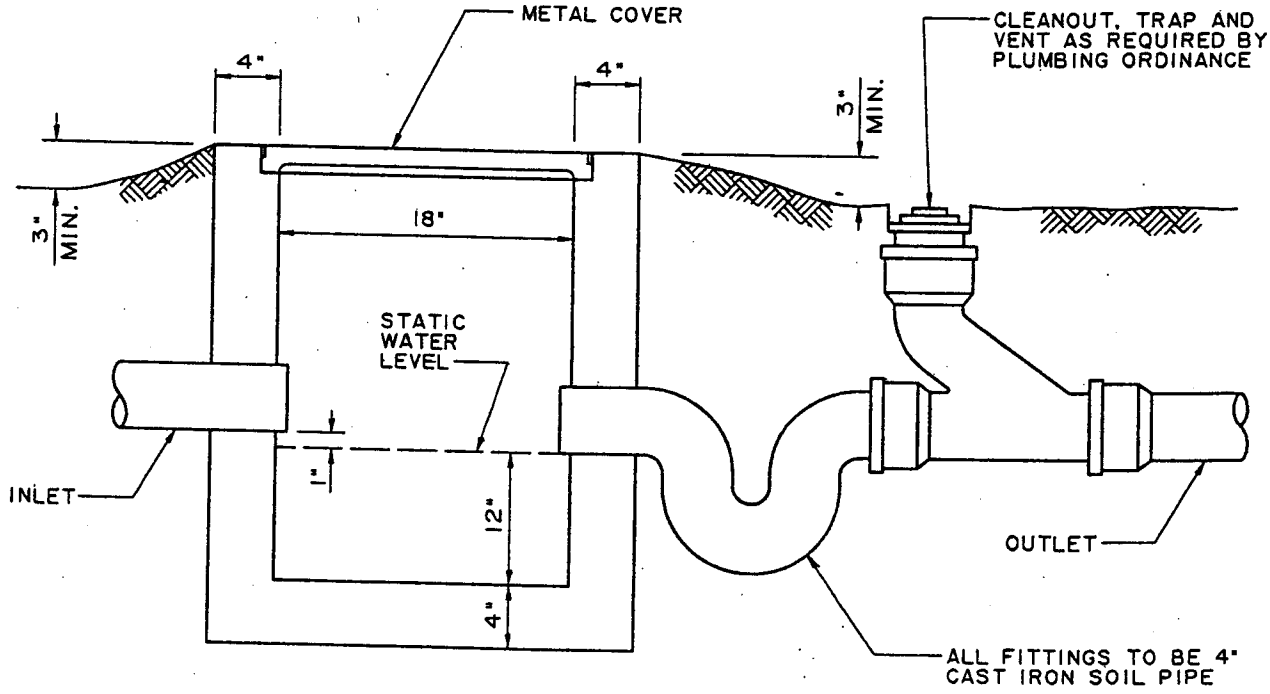
STANDARD PLAN
2043-0
SHEET 1 OF 2

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

REVISIONS



PLAN
WITH COVER REMOVED



SECTION A-A

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SAMPLING BOX

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

REVISIONS

STANDARD PLAN
2044-0
SHEET 1 OF 2

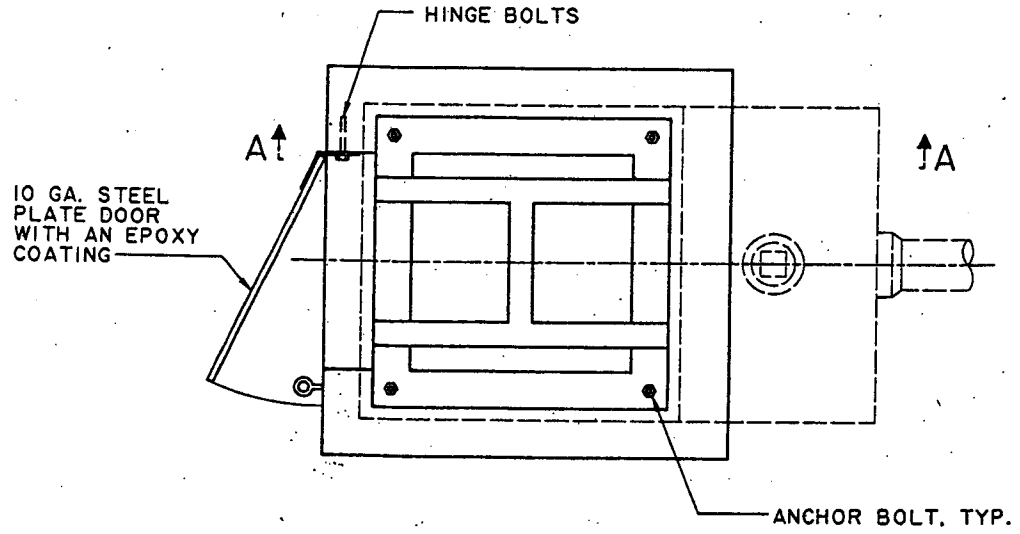
NOTES

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.

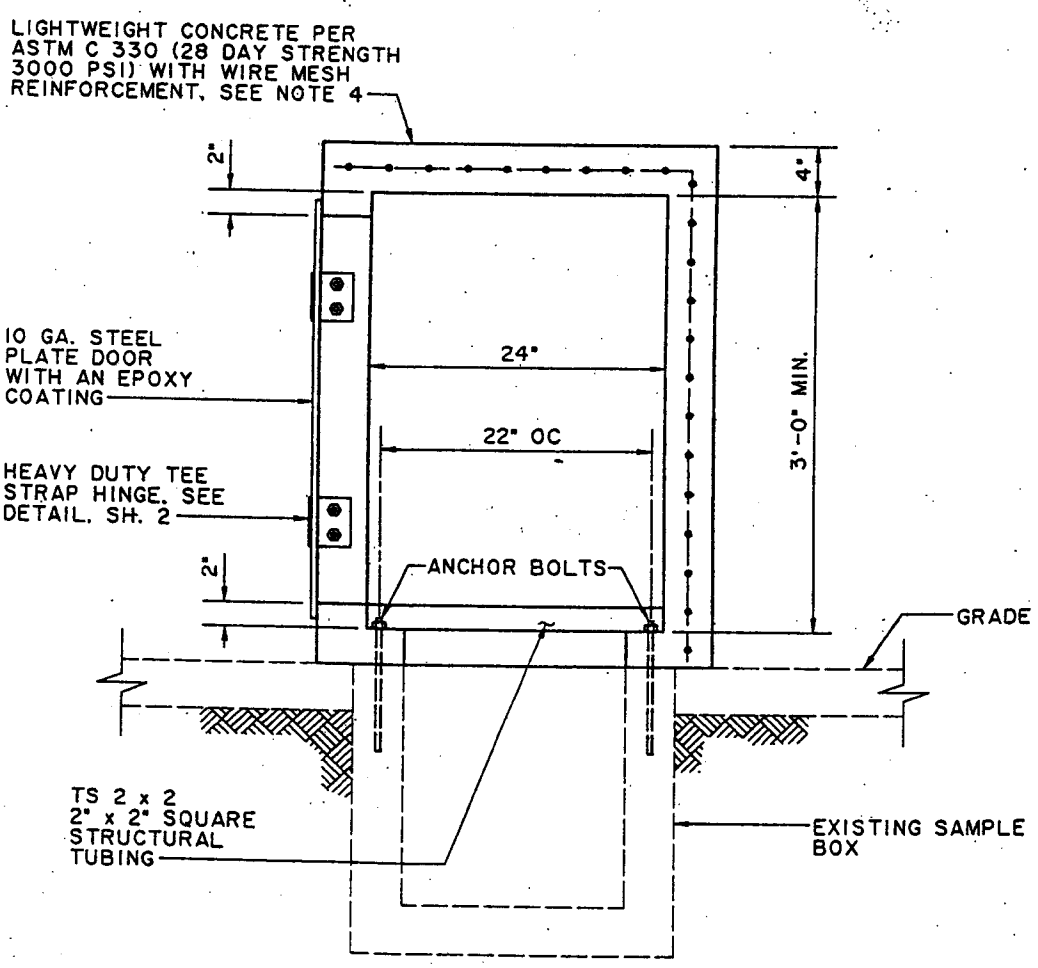
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SAMPLING BOX

STANDARD PLAN
2044-0
SHEET 2 OF 2



PLAN



SECTION A-A

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

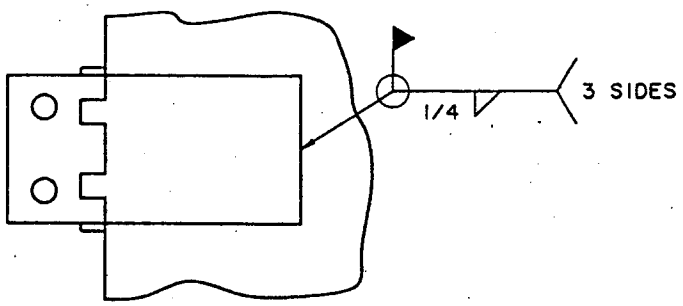
SECURED SAMPLING FACILITY

STANDARD PLAN 2045-0

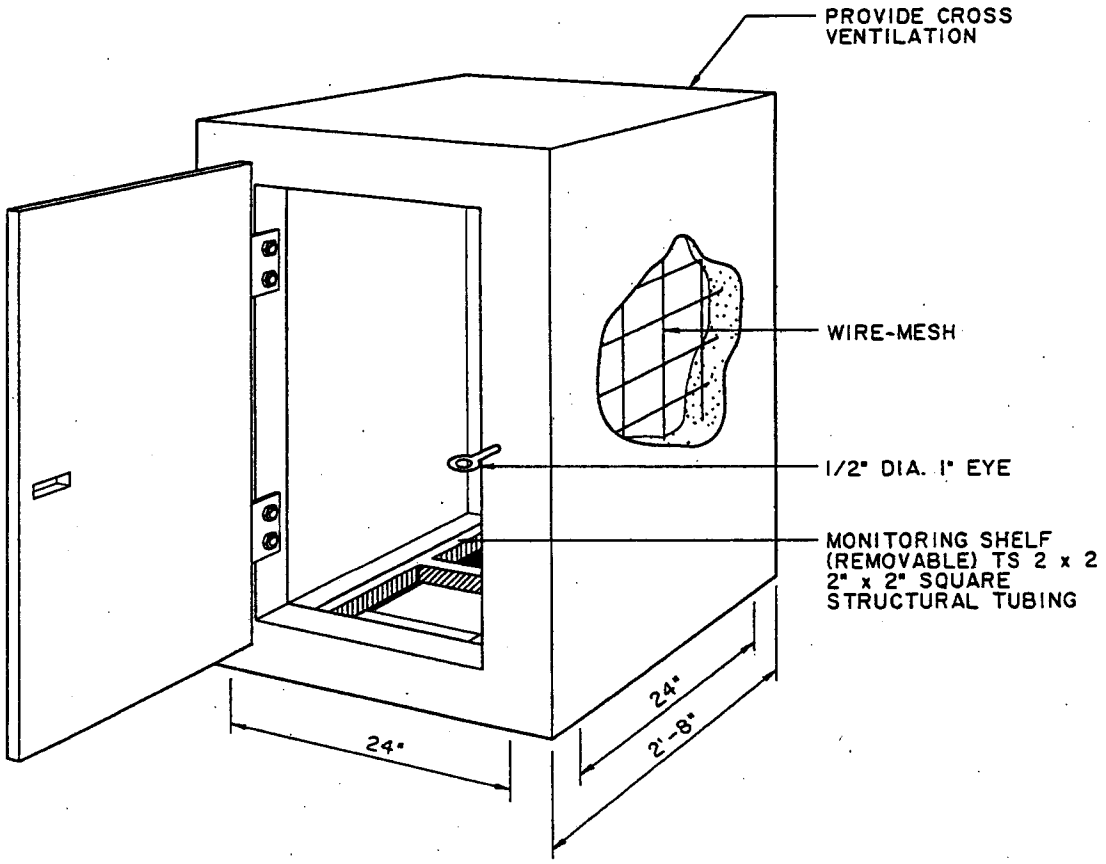
APPROVED Thomas A. Tidemanson 5/31/1992
DIRECTOR OF PUBLIC WORKS DATE

REVISIONS

SHEET 1 OF 3



HINGE DETAIL (SH. 1)



LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SECURED SAMPLING FACILITY

STANDARD PLAN
2045-0
SHEET 2 OF 3

NOTES

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

2. PROVIDE 120 VOLT RECEPTACLE, WITH CONTINUOUS CURRENT, INSIDE SECURED SAMPLING FACILITY. INSTALLATION SHALL COMPLY WITH LOCAL ELECTRICAL CODES. AN ELECTRICAL PERMIT IS REQUIRED.

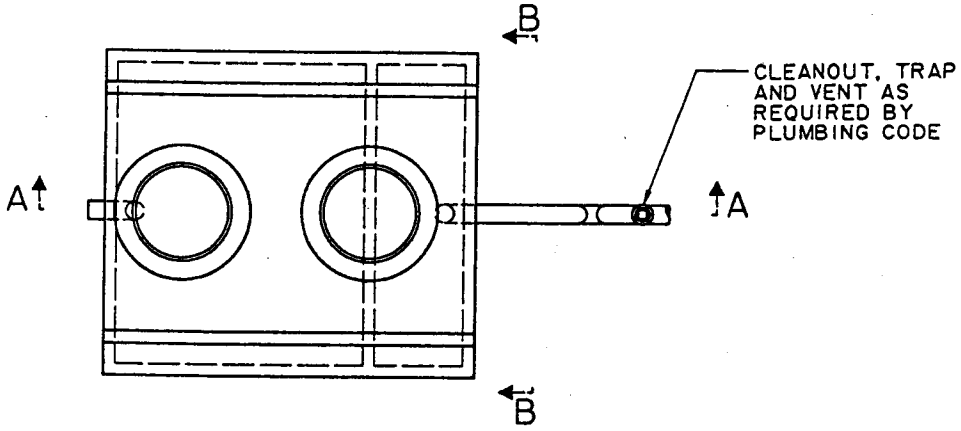
3. VENTILATION MUST BE PROVIDED FOR SECURED SAMPLING FACILITY, TO PREVENT THE OVER HEATING OF SAMPLING EQUIPMENT.

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

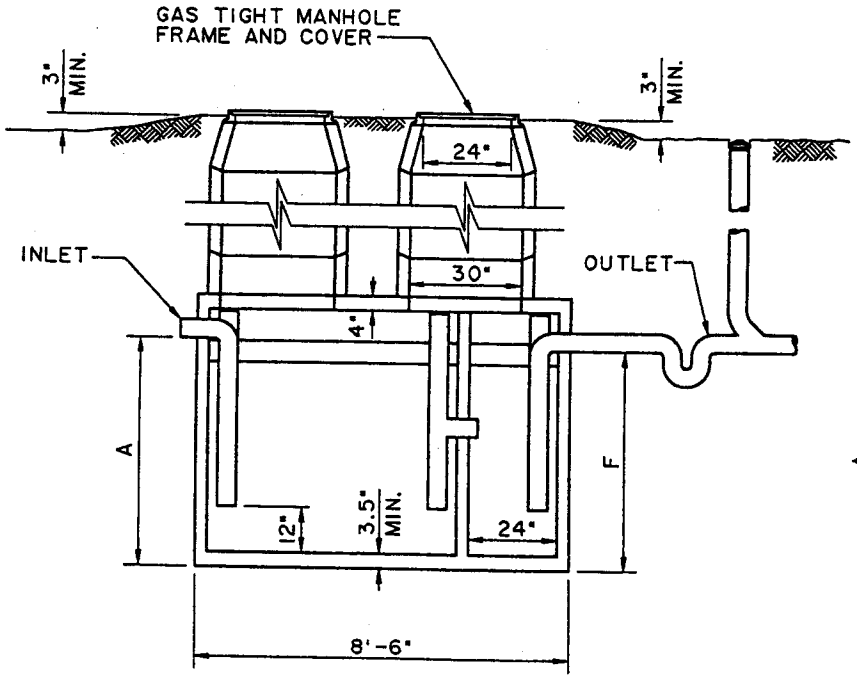
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SECURED SAMPLING FACILITY

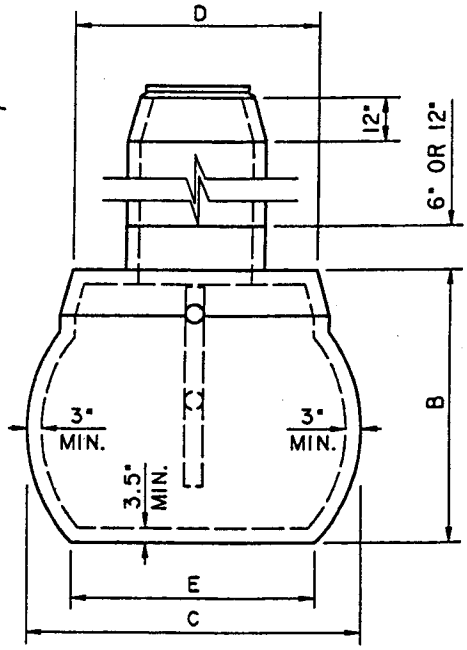
STANDARD PLAN
2045-0
SHEET 3 OF 3



PLAN



SECTION A-A



ELEVATION B-B

CAPACITY IN GALLONS	DIMENSIONS						EXCAVATION SPECIFICATIONS		
	A	B	C	D	E	F	DEPTH BELOW INLET	LENGTH	WIDTH
750	4'-1"	5'-3"	5'-10"	4'-4"	4'-0"	3'-11"	4'-11"	9'-6"	6'-10"
1000	4'-7"	5'-7"	6'-5"	4'-9"	4'-7"	4'-5"	4'-7"	9'-6"	7'-5"
1200	5'-3"	6'-3"	6'-5"	4'-9"	4'-5"	5'-1"	5'-3"	9'-6"	7'-5"
1500	5'-3"	6'-3"	7'-5"	5'-9"	5'-5"	5'-1"	5'-3"	9'-6"	8'-5"

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

GREASE INTERCEPTOR

STANDARD PLAN
2046-1
SHEET 1 OF 2

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

1995
REVISIONS

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.

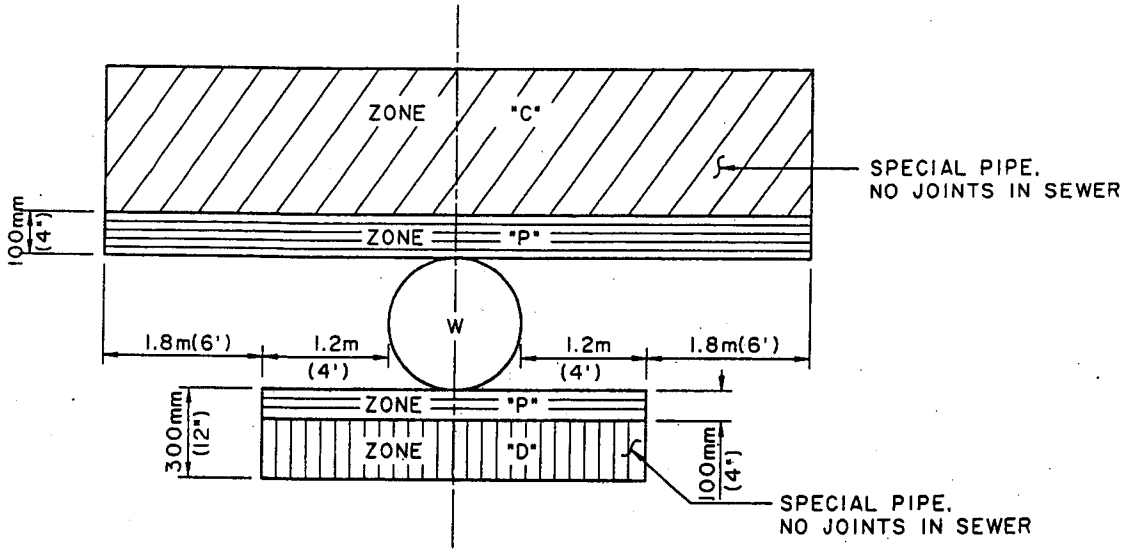
6. MANHOLE COVERS SHALL BE OF METAL.

7. STRUCTURE NOT FOR TRAFFIC LOADING.

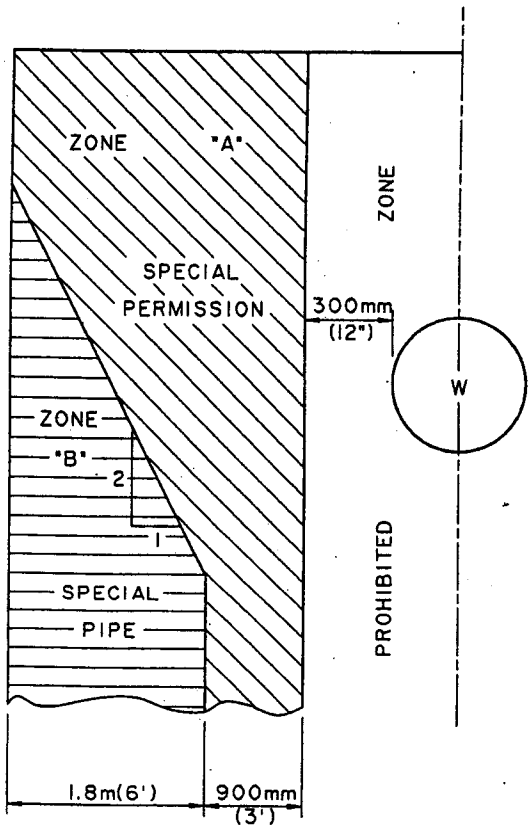
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

GREASE INTERCEPTOR

STANDARD PLAN
2046-1
SHEET 2 OF 2



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

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REQUIREMENTS FOR SANITARY SEWERS IN THE VICINITY OF PRESSURE WATER MAINS

STANDARD PLAN METRIC

2100-1

SHEET 1 OF 2

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

1999
REVISIONS

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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

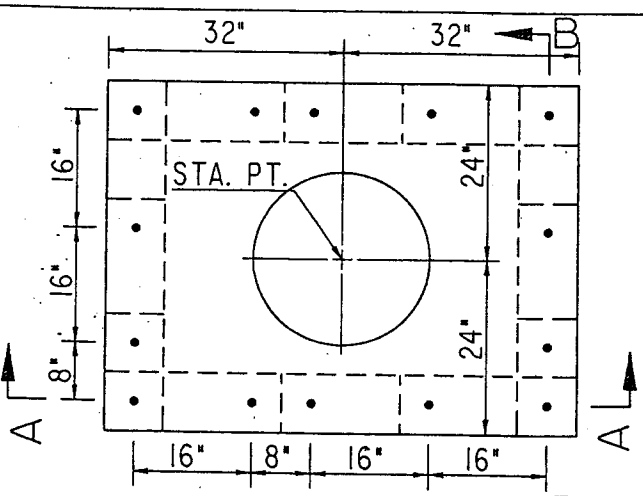
REQUIREMENTS FOR SANITARY SEWERS IN THE VICINITY OF PRESSURE WATER MAINS

STANDARD PLAN METRIC 2100-1

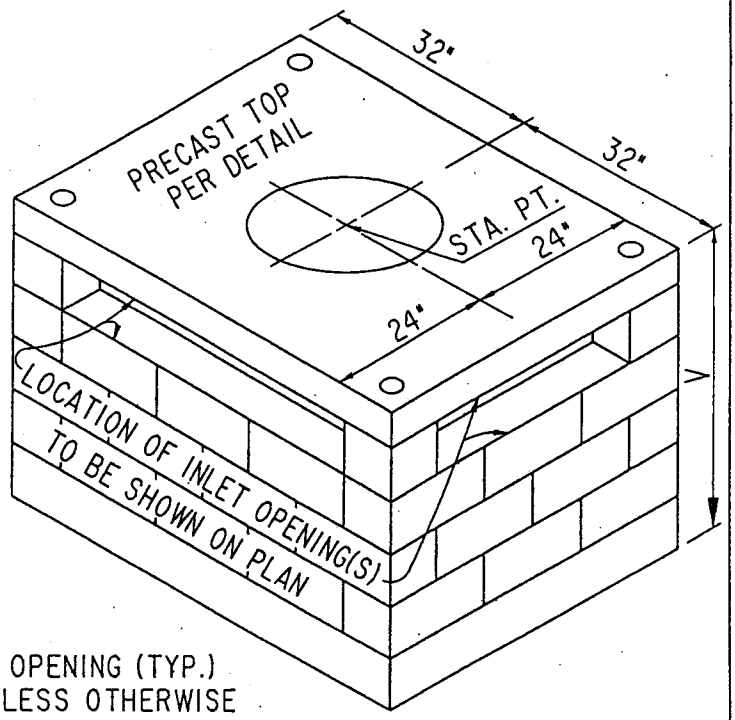
SHEET 2 OF 2

SECTION 3

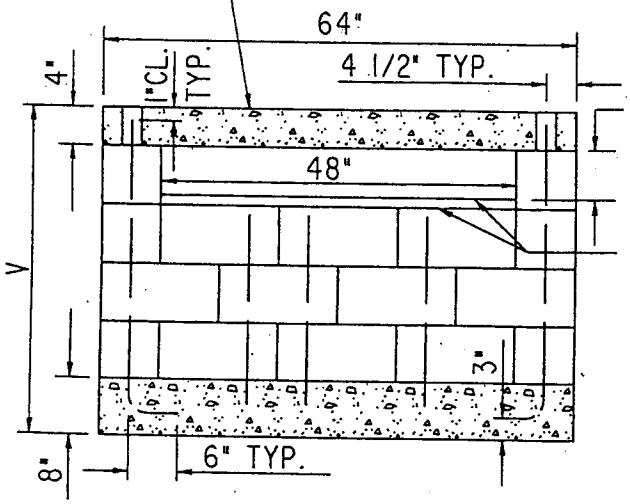
Flood Control and Storm Drain Facilities



TOP VIEW



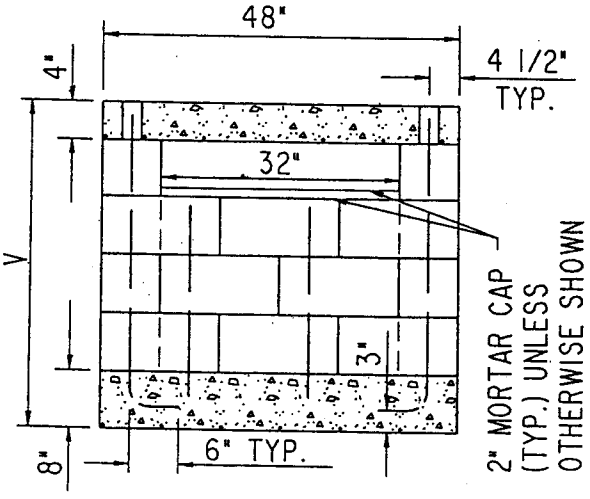
ISOMETRIC VIEW



6" OPENING (TYP.) UNLESS OTHERWISE SHOWN

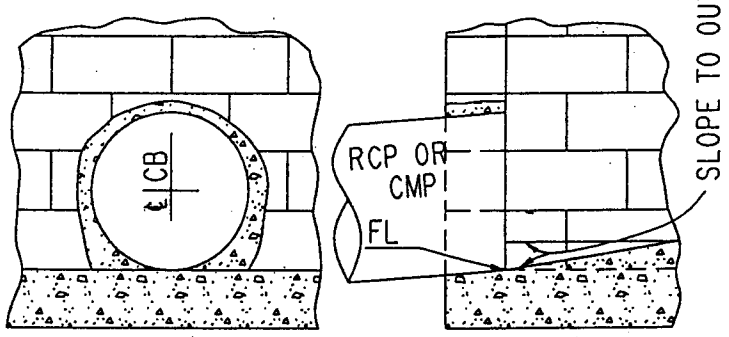
2" MORTAR CAP (TYP.) UNLESS OTHERWISE SHOWN

FRONT VIEW (A-A)



2" MORTAR CAP (TYP.) UNLESS OTHERWISE SHOWN

SIDE VIEW (B-B) TYP.



ELEVATION SECTION

PIPE CONNECTION DETAIL

(TYPICAL FOR FRONT, SIDE, OR BACK)

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.

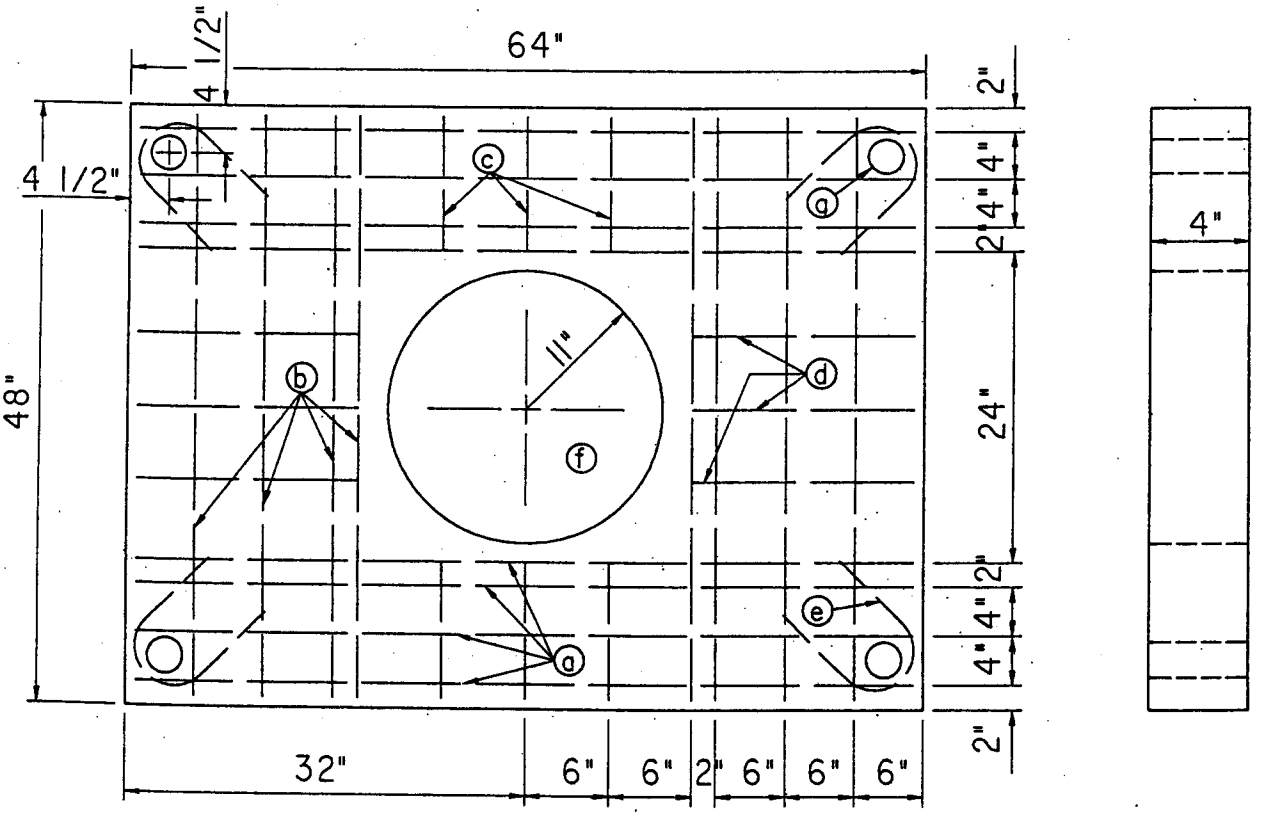
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

RURAL CATCH BASIN

STANDARD PLAN 3015-0

APPROVED Thomas A. Tidemanson 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE — REVISIONS



PLAN VIEW

END VIEW

PRECAST TOP DETAIL

STEEL LIST-

ⓐ NO.4 BARS, 62" LONG	8
ⓑ NO.4 BARS, 46" LONG	8
ⓒ NO.4 BARS, 11" LONG	6
ⓓ NO.4 BARS, 19" LONG	6
ⓔ NO.4 BARS, 24" LONG	4
ⓕ MANHOLE FRAME & COVER *	1
ⓖ 3" O.D. STEEL PIPE, 4"LONG	4

* ALHAMBRA FOUNDRY A-1530

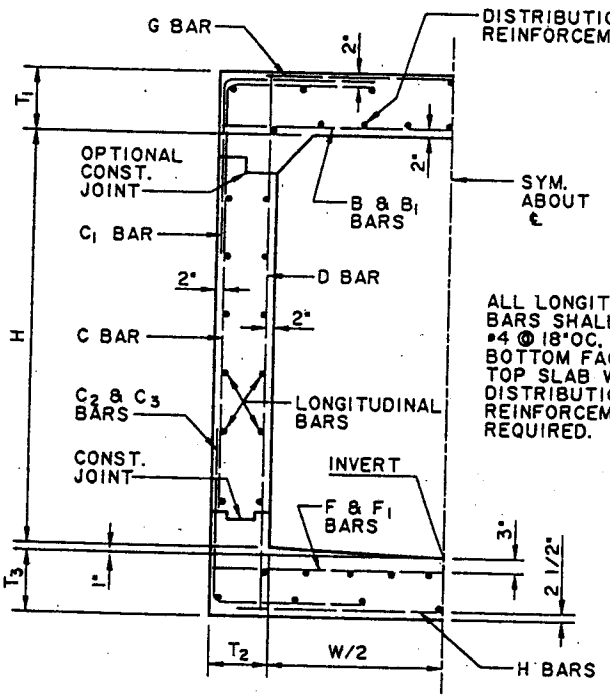
NOTES:

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

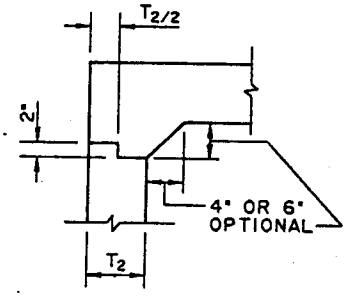
RURAL CATCH BASIN

STANDARD PLAN
3015-0
SHEET 2 OF 2

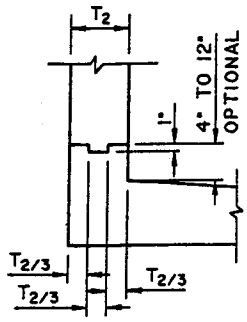


ALL LONGITUDINAL BARS SHALL BE #4 @ 18"OC. EXCEPT BOTTOM FACE OF TOP SLAB WHEN DISTRIBUTION REINFORCEMENT IS REQUIRED.

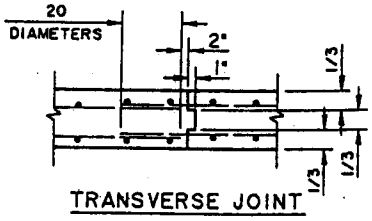
TYPICAL SINGLE RC BOX SECTION



TOP OF WALL

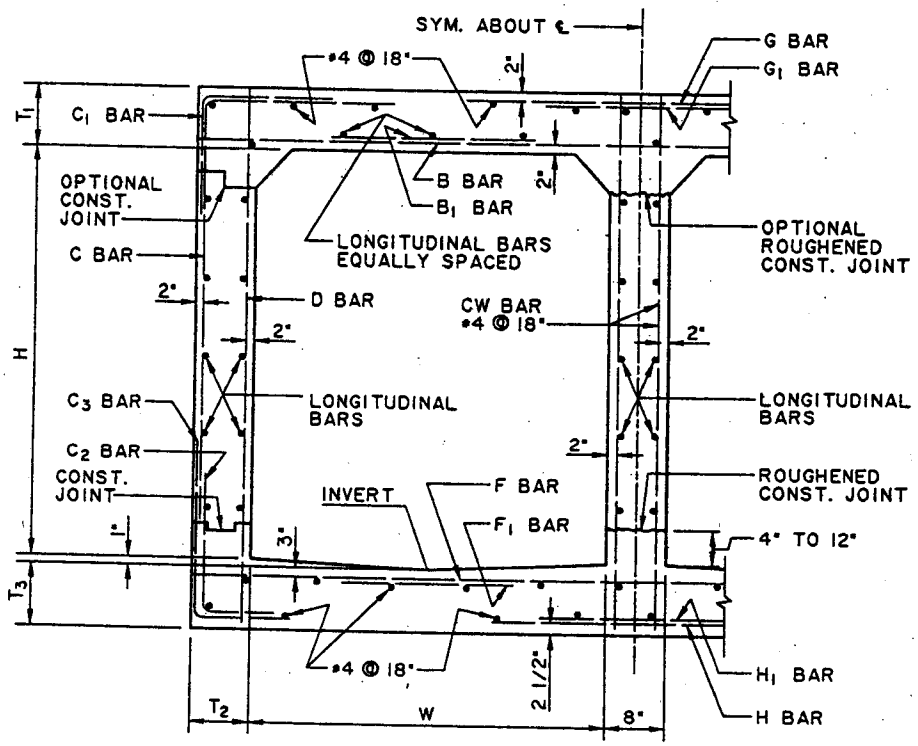


BASE OF WALL



TRANSVERSE JOINT

CONSTRUCTION JOINT DETAILS



TYPICAL DOUBLE RC BOX SECTION

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REINFORCED CONCRETE BOX CULVERT

STANDARD PLAN 3053-0

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

REVISIONS

SHEET 1 OF 21

SINGLE BOX SIZE		2'-0"W x 1'-0"H					2'-0"W x 2'-0"H				
		DEPTH OF COVER IN FEET									
		2'-11"	5'	10'	15'	20'	2'-11"	5'	10'	15'	20'
TOP SLAB THICKNESS. T_1		6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"
WALL THICKNESS. T_2		8"	8"	8"	8"	8"	8"	8"	8"	8"	8"
BOTTOM SLAB THICKNESS. T_3		7"	7"	7"	7"	7"	7"	7"	7"	7"	7"
		TRANSVERSE REINFORCEMENT									
B BARS	BAR NO. & SPACING	#4@9"	#4@20"	#4@16"	#4@18"	#4@14"	#4@17"	#4@20"	#4@16"	#4@17"	#4@13"
	LENGTH, H	3'-1 1/2"	3'-2"	3'-1 1/2"	3'-1 1/2"	3'-1 1/2"	3'-1 1/2"	3'-1 1/2"	3'-1 1/2"	3'-1 1/2"	3'-1 1/2"
B_1 BARS	BAR NO. & SPACING	---	---	---	---	---	#4@17"	---	---	---	---
	LENGTH, H	---	---	---	---	---	3'-1 1/2"	---	---	---	---
C BARS	BAR NO. & SPACING	#4@10"	#4@14"	#4@14"	#4@14"	#4@12"	#4@10"	#4@14"	#4@14"	#4@14"	#4@12"
	HOR. LENGTH, H	2'-3"	1'-1"	2'-2 1/2"	1'-1"	2'-2 1/2"	2'-2 1/2"	1'-1"	2'-2 1/2"	1'-1"	2'-2 1/2"
	VERT. LENGTH, V	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	2'-0"	1'-11 1/2"	1'-11 1/2"	1'-11 1/2"	1'-11 1/2"
C_1 BARS	BAR NO. & SPACING	---	---	---	---	---	---	---	---	---	---
	HOR. LENGTH, H	---	---	---	---	---	---	---	---	---	---
	VERT. LENGTH, V	---	---	---	---	---	---	---	---	---	---
C_2 BARS	BAR NO. & SPACING	#4@10"	#4@14"	#5@14"	#4@14"	#4@12"	#4@10"	#4@14"	#4@14"	#4@14"	#5@12"
	HOR. LENGTH, H	1'-3"	1'-1"	2'-6"	2'-2 1/2"	2'-2 1/2"	2'-2 1/2"	1'-1"	2'-2 1/2"	2'-2 1/2"	2'-6"
	VERT. LENGTH, V	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
C_3 BARS	BAR NO. & SPACING	---	---	---	---	---	---	---	---	---	---
	HOR. LENGTH, H	---	---	---	---	---	---	---	---	---	---
	VERT. LENGTH, V	---	---	---	---	---	---	---	---	---	---
D BARS	BAR NO. & SPACING	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	1'-10 1/2"	1'-10 1/2"	1'-10 1/2"	1'-10 1/2"	1'-10 1/2"	2'-10 1/2"	2'-10 1/2"	2'-10 1/2"	2'-10 1/2"	2'-10 1/2"
F BARS	BAR NO. & SPACING	#4@20"	#4@20"	#4@14"	#4@17"	#4@13"	#4@19"	#4@20"	#4@14"	#4@16"	#5@19"
	LENGTH, H	3'-2"	3'-1 1/2"	3'-1 1/2"	3'-1 1/2"	---	3'-1 1/2"	3'-1 1/2"	3'-1 1/2"	3'-1 1/2"	3'-1 1/2"
F_1 BARS	BAR NO. & SPACING	---	---	---	---	---	---	---	---	---	---
	LENGTH, H	---	---	---	---	---	---	---	---	---	---
G BARS	BAR NO. & SPACING	#4@10"	---	#4@14"	---	#4@12"	#4@10"	---	#4@14"	---	#4@12"
	LENGTH, H	1'-0"	---	1'-0"	---	---	1'-0"	---	1'-0"	---	1'-0"
H BARS	BAR NO. & SPACING	---	---	#5@14"	#4@14"	#4@12"	#4@10"	---	#4@14"	#4@14"	#5@12"
	LENGTH, H	---	---	1'-0"	1'-0"	1'-0"	1'-0"	---	1'-0"	1'-0"	1'-0"
		LONGITUDINAL REINFORCEMENT									
NO. 4 LONG BARS	NUMBER IN TOP SLAB	6	7	6	7	6	5	7	6	7	6
	NUMBER IN BOTTOM SLAB	7	7	6	6	6	6	7	6	6	6
	NUMBER IN WALLS	4	4	4	4	4	4	4	4	4	4
	TOTAL NUMBER	17	18	16	17	16	15	18	16	17	16
CONCRETE: CU. YDS. PER LIN. FT.		0.20	0.20	0.20	0.20	0.20	0.25	0.25	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		3'-0"W x 1'-0"H					3'-0"W x 2'-0"H				
		DEPTH OF COVER IN FEET									
		2'-11"	5'	10'	15'	20'	2'-11"	5'	10'	15'	20'
TOP SLAB THICKNESS. T_1		6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"
WALL THICKNESS. T_2		8"	8"	8"	8"	8"	8"	8"	8"	8"	8"
BOTTOM SLAB THICKNESS. T_3		7"	7"	7"	7"	7"	7"	7"	7"	7"	7"
		TRANSVERSE REINFORCEMENT									
B BARS	BAR NO. & SPACING	#6@15"	#4@19"	#4@19"	#4@11"	#5@13"	#7@20"	#4@18"	#5@15"	#5@16"	#5@12"
	LENGTH, H	4'-1 1/2"	4'-1 1/2"	4'-1 1/2"	4'-1 1/2"	4'-1 1/2"	4'-1 1/2"	4'-1 1/2"	4'-1 1/2"	4'-1 1/2"	4'-1 1/2"
B_1 BARS	BAR NO. & SPACING	---	---	#4@19"	---	---	---	---	---	---	---
	LENGTH, H	---	---	2'-11 1/2"	---	---	---	---	---	---	---
C BARS	BAR NO. & SPACING	#4@10"	#4@14"	#4@11"	#4@11"	#4@8"	#4@10"	#4@14"	#4@10"	#4@11"	#4@8"
	HOR. LENGTH, H	2'-5 1/2"	1'-2 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	1'-2 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"
	VERT. LENGTH, V	0'-11 1/2"	0'-11 1/2"	0'-11 1/2"	0'-11 1/2"	0'-11 1/2"	1'-11 1/2"	1'-11 1/2"	1'-11 1/2"	1'-11 1/2"	1'-11 1/2"
C_1 BARS	BAR NO. & SPACING	---	---	---	---	---	---	---	---	---	---
	HOR. LENGTH, H	---	---	---	---	---	---	---	---	---	---
	VERT. LENGTH, V	---	---	---	---	---	---	---	---	---	---
C_2 BARS	BAR NO. & SPACING	#4@10"	#4@14"	#4@11"	#4@11"	#4@8"	#4@10"	#4@14"	#4@10"	#5@11"	#4@8"
	HOR. LENGTH, H	1'-4"	1'-2 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	1'-8 1/2"	1'-2 1/2"	2'-5 1/2"	2'-9"	2'-5 1/2"
	VERT. LENGTH, V	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
C_3 BARS	BAR NO. & SPACING	---	---	---	---	---	---	---	---	---	---
	HOR. LENGTH, H	---	---	---	---	---	---	---	---	---	---
	VERT. LENGTH, V	---	---	---	---	---	---	---	---	---	---
D BARS	BAR NO. & SPACING	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	1'-10 1/2"	1'-10 1/2"	1'-10 1/2"	1'-10 1/2"	1'-10 1/2"	2'-10 1/2"	2'-10 1/2"	2'-10 1/2"	2'-10 1/2"	2'-10 1/2"
F BARS	BAR NO. & SPACING	#4@16"	#4@18"	#5@16"	#5@16"	#4@20"	#4@15"	#4@	#4@17"	#4@9"	#5@11"
	LENGTH, H	4'-1 1/2"	4'-1 1/2"	4'-1 1/2"	4'-1 1/2"	4'-1 1/2"	4'-1 1/2"	2'-10 1/2"	4'-1 1/2"	4'-1 1/2"	4'-1 1/2"
F_1 BARS	BAR NO. & SPACING	---	---	---	---	#5@20"	---	---	#4@17"	---	---
	LENGTH, H	---	---	---	---	4'-1 1/2"	---	---	4'-1 1/2"	---	---
G BARS	BAR NO. & SPACING	#4@10"	---	#4@11"	#4@11"	#4@8"	#4@10"	---	#4@10"	#4@11"	#4@8"
	LENGTH, H	1'-6"	---	1'-6"	1'-6"	1'-6"	1'-6"	---	1'-6"	1'-6"	1'-6"
H BARS	BAR NO. & SPACING	---	---	#4@11"	#4@11"	#4@8"	---	---	#4@10"	#5@11"	#4@8"
	LENGTH, H	---	---	1'-6"	1'-6"	1'-6"	---	---	1'-6"	1'-6"	1'-6"
		LONGITUDINAL REINFORCEMENT									
NO. 4 LONG BARS	NUMBER IN TOP SLAB	7	8	8	8	8	7	7	8	8	8
	NUMBER IN BOTTOM SLAB	8	8	8	8	8	10	10	8	8	8
	NUMBER IN WALLS	4	4	4	4	4	4	4	4	4	4
	TOTAL NUMBER	19	20	20	20	20	21	21	20	20	20
CONCRETE: CU. YDS. PER LIN. FT.		0.24	0.24	0.24	0.24	0.24	0.29	0.29	0.29	0.29	0.29
STEEL: LBS. PER LIN. FT.		33.3	24.6	34.8	34.8	41.9	38.0	37.4	39.8	42.8	45.6

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REINFORCED CONCRETE BOX CULVERT

STANDARD PLAN
3053-0
SHEET 3 OF 21

SINGLE BOX SIZE		3'-0"W x 3'-0"H					4'-0"W x 1'-0"H				
		DEPTH OF COVER IN FEET									
		2'-11"	5'	10'	15'	20'	2'-11"	5'	10'	15'	20'
TOP SLAB THICKNESS, T_1		6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	7 1/4"
WALL THICKNESS, T_2		8"	8"	8"	8"	8"	8"	8"	8"	8"	8"
BOTTOM SLAB THICKNESS, T_3		7"	7"	7"	7"	7"	7"	7"	7"	7"	8 1/4"
		TRANSVERSE REINFORCEMENT									
B BARS	BAR NO. & SPACING	#4@16"	#4@17"	#4@9"	#4@10"	#6@17"	#7@17"	#4@13"	#5@19"	#5@17"	#6@17"
	LENGTH, H	4'-1 1/2"	4'-1 1/2"	4'-1 1/2"	4'-1 1/2"	4'-1 1/2"	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"
B_1 BARS	BAR NO. & SPACING	#5@16"	---	---	---	---	---	---	#4@19"	#4@17"	#4@17"
	LENGTH, H	4'-1 1/2"	---	---	---	---	---	---	3'-3"	3'-2"	2'-11 1/2"
C BARS	BAR NO. & SPACING	#4@10"	#4@14"	#4@10"	#4@11"	#4@8"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	2'-5 1/2"	1'-4 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-8 1/2"	1'-7 1/2"	2'-8 1/2"	2'-8 1/2"	2'-8 1/2"
	VERT. LENGTH, V	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	0'-11 1/2"	0'-11 1/2"	0'-11 1/2"	0'-11 1/2"	1'-0 1/2"
C_1 BARS	BAR NO. & SPACING	---	---	---	---	---	#4@14"	---	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	---	---	---	---	---	1'-1"	---	1'-0"	1'-0"	1'-1"
	VERT. LENGTH, V	---	---	---	---	---	0'-11 1/2"	---	0'-11 1/2"	0'-11 1/2"	1'-0 1/2"
C_2 BARS	BAR NO. & SPACING	#4@10"	#4@14"	#4@10"	#5@11"	#4@8"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	1'-3 1/2"	1'-3 1/2"	2'-5 1/2"	2'-9"	2'-5 1/2"	1'-6"	1'-6 1/2"	2'-8 1/2"	2'-8 1/2"	2'-8 1/2"
	VERT. LENGTH, V	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-1 1/2"
C_3 BARS	BAR NO. & SPACING	---	---	---	---	---	---	---	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	---	---	---	---	---	---	---	0'-11 1/2"	1'-0"	1'-0 1/2"
	VERT. LENGTH, V	---	---	---	---	---	---	---	2'-0"	2'-0"	2'-1 1/2"
D BARS	BAR NO. & SPACING	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	3'-10 1/2"	3'-10 1/2"	3'-10 1/2"	3'-10 1/2"	3'-10 1/2"	1'-10 1/2"	1'-10 1/2"	1'-10 1/2"	1'-10 1/2"	2'-0 1/2"
F BARS	BAR NO. & SPACING	#4@14"	#4@15"	#5@13"	#6@20"	#6@15"	#5@19"	#5@19"	#5@17"	#6@20"	#6@17"
	LENGTH, H	4'-1 1/2"	4'-1 1/2"	4'-1 1/2"	4'-1 1/2"	4'-1 1/2"	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"
F_1 BARS	BAR NO. & SPACING	---	---	---	---	---	---	---	#4@17"	#4@20"	#4@17"
	LENGTH, H	---	---	---	---	---	---	---	3'-5 1/2"	3'-1 1/2"	3'-6"
G BARS	BAR NO. & SPACING	#4@10"	---	#4@10"	#4@11"	#4@8"	#4@14"	---	#4@14"	#4@14"	#4@14"
	LENGTH, H	1'-6"	---	1'-6"	1'-6"	1'-6"	2'-0"	---	2'-0"	2'-0"	2'-0"
H BARS	BAR NO. & SPACING	---	---	#4@10"	#5@11"	#4@8"	---	---	#4@14"	#4@14"	#4@14"
	LENGTH, H	---	---	1'-6"	1'-6"	1'-6"	---	---	2'-0"	2'-0"	2'-0"
		LONGITUDINAL REINFORCEMENT									
NO. 4 LONG BARS	NUMBER IN TOP SLAB	7	8	8	8	8	9	10	9	9	9
	NUMBER IN BOTTOM SLAB	8	8	8	8	8	8	10	9	9	9
	NUMBER IN WALLS	8	8	8	8	8	4	4	4	4	4
	TOTAL NUMBER	23	24	24	24	24	21	24	22	22	22
CONCRETE: CU. YDS. PER LIN. FT.		0.34	0.34	0.34	0.34	0.34	0.29	0.29	0.29	0.29	0.32
STEEL: LBS. PER LIN. FT.		41.5	32.3	45.3	47.9	51.5	38.0	31.2	43.9	44.9	48.3

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REINFORCED CONCRETE BOX CULVERT

STANDARD PLAN
3053-0
SHEET 4 OF 21

SINGLE BOX SIZE		4'-0"W x 2'-0"H					4'-0"W x 3'-0"H				
		DEPTH OF COVER IN FEET									
		2'-11"	5'	10'	15'	20'	2'-11"	5'	10'	15'	20'
TOP SLAB THICKNESS, T_1		6 1/2"	6 1/2"	6 1/2"	6 1/2"	7 1/4"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	7 1/4"
WALL THICKNESS, T_2		8"	8"	8"	8"	8"	8"	8"	8"	8"	8"
BOTTOM SLAB THICKNESS, T_3		7"	7"	7"	7"	8"	7"	7"	7"	7"	8 1/4"
		TRANSVERSE REINFORCEMENT									
B BARS	BAR NO. & SPACING	#5@20"	#5@19"	#5@16"	#6@20"	#7@20"	#4@10"	#4@20"	#6@20"	#6@20"	#7@20"
	LENGTH, H	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"
B_1 BARS	BAR NO. & SPACING	#6@20"	---	#4@16"	#4@20"	#4@20"	#4@10"	#4@20"	#4@20"	#4@20"	#4@20"
	LENGTH, H	5'-1"	---	3'-3"	3'-0"	2'-9 1/2"	5'-1"	3'-6 1/2"	3'-1 1/2"	3'-1 1/2"	3'-0"
C BARS	BAR NO. & SPACING	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@9"	#4@14"	#4@9"	#4@14"	#4@14"
	HOR. LENGTH, H	2'-8 1/2"	1'-4"	2'-8 1/2"	2'-8 1/2"	2'-8 1/2"	2'-8 1/2"	1'-4 1/2"	2'-8 1/2"	2'-8 1/2"	2'-8 1/2"
	VERT. LENGTH, V	1'-11 1/2"	1'-11 1/2"	1'-11 1/2"	1'-11 1/2"	2'-5"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	3'-0 1/2"
C_1 BARS	BAR NO. & SPACING	#4@14"	---	#4@14"	#4@14"	#4@14"	---	---	---	#4@14"	#4@14"
	HOR. LENGTH, H	1'-1"	---	0'-11 1/2"	0'-11 1/2"	1'-0"	---	---	---	0'-11"	1'-0"
	VERT. LENGTH, V	1'-11 1/2"	---	1'-11 1/2"	1'-11 1/2"	2'-0 1/2"	---	---	---	2'-11 1/2"	3'-0 1/2"
C_2 BARS	BAR NO. & SPACING	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@9"	#4@14"	#5@9"	#4@14"	#4@14"
	HOR. LENGTH, H	1'-4"	1'-4"	2'-8 1/2"	2'-8 1/2"	2'-8 1/2"	1'-5"	1'-5"	3'-0"	2'-8 1/2"	2'-8 1/2"
	VERT. LENGTH, V	2'-0"	2'-0"	2'-0"	2'-0"	2'-1"	2'-0"	2'-0"	2'-0"	2'-0"	2'-1 1/2"
C_3 BARS	BAR NO. & SPACING	---	---	#4@14"	#4@14"	#4@14"	---	---	---	#4@14"	#4@14"
	HOR. LENGTH, H	---	---	0'-11"	0'-11"	2'-8 1/2"	---	---	---	0'-11"	2'-8 1/2"
	VERT. LENGTH, V	---	---	2'-0"	2'-0"	2'-1"	---	---	---	2'-0"	2'-1 1/2"
D BARS	BAR NO. & SPACING	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	---	2'-10 1/2"	2'-10 1/2"	2'-10 1/2"	3'-5"	3'-10 1/2"	3'-10 1/2"	3'-10 1/2"	3'-10 1/2"	4'-0 1/2"
F BARS	BAR NO. & SPACING	#5@18"	#4@20"	#6@20"	#6@19"	#7@19"	#5@17"	#4@19"	#6@18"	#6@17"	#7@15"
	LENGTH, H	---	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"
F_1 BARS	BAR NO. & SPACING	---	#4@20"	#4@20"	#4@19"	#4@19"	---	#4@19"	#4@18"	#4@17"	---
	LENGTH, H	---	3'-10"	3'-5"	3'-4 1/2"	3'-3"	---	3'-11 1/2"	3'-5"	3'-3 1/2"	---
G BARS	BAR NO. & SPACING	#4@14"	---	#4@14"	#4@14"	#4@14"	#4@9"	---	#4@9"	#4@14"	#4@14"
	LENGTH, H	2'-0"	---	2'-0"	2'-0"	2'-0"	2'-0"	---	2'-0"	2'-0"	2'-0"
H BARS	BAR NO. & SPACING	---	---	#4@14"	#4@14"	#4@14"	---	---	#5@9"	#4@14"	#4@14"
	LENGTH, H	---	---	2'-0"	2'-0"	2'-0"	---	---	2'-0"	2'-0"	2'-0"
		LONGITUDINAL REINFORCEMENT									
NO. 4 LONG BARS	NUMBER IN TOP SLAB	10	8	9	9	9	10	8	9	9	9
	NUMBER IN BOTTOM SLAB	8	8	9	9	9	8	8	9	9	9
	NUMBER IN WALLS	4	4	4	4	4	8	8	8	8	8
	TOTAL NUMBER	22	20	22	22	22	26	24	26	26	26
CONCRETE: CU. YDS. PER LIN. FT.		0.34	0.34	0.34	0.34	0.37	0.39	0.39	0.39	0.39	0.42
STEEL: LBS. PER LIN. FT.		42.2	30.4	48.4	48.9	54.8	50.6	35.6	61.8	55.5	61.1

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REINFORCED CONCRETE BOX CULVERT

STANDARD PLAN
3053-0
SHEET 5 OF 21

SINGLE BOX SIZE		4'-0"W x 4'-0"H					5'-0"W x 1'-0"H				
		DEPTH OF COVER IN FEET									
		2'-11"	5'	10'	15'	20'	2'-11"	5'	10'	15'	20'
TOP SLAB THICKNESS. T_1		6 1/2"	6 1/2"	6 1/2"	6 1/2"	7 1/4"	6 3/4"	6 1/2"	7"	7 1/2"	8 1/2"
WALL THICKNESS. T_2		8"	8"	8"	8"	8"	8"	8"	8"	8"	8"
BOTTOM SLAB THICKNESS. T_3		7"	7"	7"	7 1/4"	8 1/4"	7"	7"	7 3/4"	8"	9 1/4"
		TRANSVERSE REINFORCEMENT									
B BARS	BAR NO. & SPACING	#5@15"	#4@20"	#6@20"	#6@20"	#7@20"	#5@18"	#4@19"	#6@19"	#6@18"	#7@18"
	LENGTH, H	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"
B_1 BARS	BAR NO. & SPACING	#5@15"	#4@20"	#4@20"	#4@20"	#4@20"	#6@18"	#4@19"	#4@19"	#4@18"	#4@18"
	LENGTH, H	5'-1"	3'-8"	3'-2 1/2"	3'-2"	3'-0"	6'-1"	3'-11 1/2"	3'-6 1/2"	3'-7 1/2"	3'-6"
C BARS	BAR NO. & SPACING	#4@9"	#4@14"	#4@9"	#4@14"	#4@14"	#4@14"	#4@11"	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	2'-8 1/2"	1'-9 1/2"	2'-8 1/2"	2'-8 1/2"	2'-8 1/2"	2'-11 1/2"	1'-10 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"
	VERT. LENGTH, V	3'-11 1/2"	3'-11 1/2"	3'-11 1/2"	3'-11 1/2"	4'-0 1/2"	1'-0"	0'-11 1/2"	1'-0"	1'-0 1/2"	1'-1 1/2"
C_1 BARS	BAR NO. & SPACING	---	---	---	#4@14"	#4@14"	#4@14"	---	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	---	---	---	0'-11"	1'-0"	1'-3 1/2"	---	1'-2 1/2"	1'-3"	1'-3"
	VERT. LENGTH, V	---	---	---	3'-11 1/2"	4'-0 1/2"	1'-0"	---	1'-0"	1'-0 1/2"	1'-1 1/2"
C_2 BARS	BAR NO. & SPACING	#4@9"	#4@14"	#5@9"	#4@14"	#4@14"	#5@14"	#4@11"	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	1'-7"	1'-7"	3'-0"	2'-8 1/2"	2'-8 1/2"	1'-10"	1'-10"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"
	VERT. LENGTH, V	2'-0"	2'-0"	2'-0"	2'-0 1/2"	2'-1 1/2"	2'-0"	2'-0"	2'-1"	2'-1"	2'-2 1/2"
C_3 BARS	BAR NO. & SPACING	---	---	---	#4@14"	#4@14"	---	---	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	---	---	---	0'-11"	2'-8 1/2"	---	---	1'-2 1/2"	1'-2 1/2"	1'-2 1/2"
	VERT. LENGTH, V	---	---	---	2'-0 1/2"	2'-1 1/2"	---	---	2'-1"	2'-1"	2'-2 1/2"
D BARS	BAR NO. & SPACING	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	4'-10 1/2"	---	4'-10 1/2"	4'-10 1/2"	5'-0 1/2"	1'-11"	1'-10 1/2"	1'-11 1/2"	2'-0 1/2"	2'-3"
F BARS	BAR NO. & SPACING	#5@16"	#4@18"	#7@17"	#6@16"	#6@11"	#4@19"	#4@18"	#6@18"	#6@17"	#7@17"
	LENGTH, H	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"	5'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"
F_1 BARS	BAR NO. & SPACING	---	#4@18"	---	#4@16"	---	#4@19"	#4@18"	#4@18"	#4@17"	#4@17"
	LENGTH, H	---	4'-0"	---	3'-3"	---	4'-4"	4'-3"	3'-10 1/2"	3'-11"	3'-10"
G BARS	BAR NO. & SPACING	#4@9"	---	#4@9"	#4@14"	#4@14"	#4@14"	---	#4@14"	#4@14"	#4@14"
	LENGTH, H	2'-0"	---	2'-0"	2'-0"	2'-0"	2'-6"	---	2'-6"	2'-6"	2'-6"
H BARS	BAR NO. & SPACING	---	---	#5@9"	#4@14"	#4@14"	---	---	#4@14"	#4@14"	#4@14"
	LENGTH, H	---	---	2'-0"	2'-0"	2'-0"	---	---	2'-6"	2'-6"	2'-6"
		LONGITUDINAL REINFORCEMENT									
NO. 4 LONG BARS	NUMBER IN TOP SLAB	10	10	9	9	9	11	11	10	10	10
	NUMBER IN BOTTOM SLAB	10	10	9	9	9	11	11	10	10	10
	NUMBER IN WALLS	8	8	8	8	8	4	4	4	4	4
	TOTAL NUMBER	28	28	26	26	26	26	26	24	24	24
CONCRETE: CU. YDS. PER LIN. FT.		0.44	0.44	0.44	0.44	0.47	0.34	0.33	0.35	0.37	0.41
STEEL: LBS. PER LIN. FT.		55.5	41.2	65.3	59.2	64.3	49.1	37.5	52.2	53.3	58.4

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REINFORCED CONCRETE BOX CULVERT

STANDARD PLAN
3053-0
SHEET 6 OF 21

SINGLE BOX SIZE		5'-0"W x 2'-0"H					5'-0"W x 3'-0"H				
		DEPTH OF COVER IN FEET									
		2'-11"	5'	10'	15'	20'	2'-11"	5'	10'	15'	20'
TOP SLAB THICKNESS, T_1		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, T_2		8"	8"	8"	8"	8"	8"	8"	8"	8"	8"
BOTTOM SLAB THICKNESS, T_3		7"	7"	7 3/4"	8"	9 1/4"	7"	7"	7 3/4"	8 1/4"	9 1/4"
		TRANSVERSE REINFORCEMENT									
B BARS	BAR NO. & SPACING	#4@18"	#4@17"	#6@17"	#6@16"	#8@20"	#5@13"	#4@16"	#7@20"	#7@20"	#8@20"
	LENGTH, H	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"
B_1 BARS	BAR NO. & SPACING	#7@18"	#4@17"	#4@17"	#4@16"	#4@20"	#5@13"	#4@16"	#4@20"	#4@20"	#4@20"
	LENGTH, H	6'-1"	4'-0 1/2"	3'-7"	3'-7 1/2"	3'-3 1/2"	6'-1"	4'-1 1/2"	3'-4 1/2"	3'-7"	3'-6 1/2"
C BARS	BAR NO. & SPACING	#4@14"	#4@12"	#4@14"	#4@14"	#4@14"	#4@14"	#4@13"	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	2'-11 1/2"	1'-10"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	1'-9"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"
	VERT. LENGTH, V	2'-0"	1'-11 1/2"	2'-0"	2'-0 1/2"	2'-1 1/2"	3'-0"	2'-11 1/2"	3'-0"	3'-0 1/2"	3'-1 1/2"
C_1 BARS	BAR NO. & SPACING	#4@14"	---	#4@14"	#4@14"	#4@14"	#4@14"	---	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	1'-3"	---	1'-1 1/2"	1'-2"	1'-2 1/2"	1'-2 1/2"	---	1'-1"	1'-1 1/2"	1'-2"
	VERT. LENGTH, V	2'-0"	---	2'-0"	2'-0 1/2"	2'-1 1/2"	1'-9"	---	1'-6"	1'-3 1/2"	1'-3"
C_2 BARS	BAR NO. & SPACING	#4@14"	#4@12"	#4@14"	#4@14"	#4@14"	#4@14"	#4@13"	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	1'-8"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	1'-7 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"
	VERT. LENGTH, V	2'-0"	2'-0"	2'-1"	2'-1"	2'-2 1/2"	2'-0"	2'-0"	2'-1"	2'-1 1/2"	2'-2 1/2"
C_3 BARS	BAR NO. & SPACING	---	---	#4@14"	#4@14"	#4@14"	---	---	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	---	---	1'-1 1/2"	1'-1 1/2"	1'-1"	---	---	1'-0 1/2"	1'-1"	2'-11 1/2"
	VERT. LENGTH, V	---	---	2'-1"	2'-1"	2'-2 1/2"	---	---	2'-1"	2'-1 1/2"	2'-2 1/2"
D BARS	BAR NO. & SPACING	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	2'-11"	2'-10 1/2"	3'-0"	3'-0 1/2"	3'-3"	3'-10 1/2"	3'-10 1/2"	4'-0"	4'-0 1/2"	4'-3"
F BARS	BAR NO. & SPACING	#4@18"	#4@16"	#7@20"	#7@19"	#8@20"	#4@17"	#4@15"	#7@19"	#7@18"	#8@18"
	LENGTH, H	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"
F_1 BARS	BAR NO. & SPACING	#4@18"	#4@16"	#4@20"	#4@19"	#4@20"	#4@17"	#4@15"	#4@19"	#4@18"	#4@18"
	LENGTH, H	4'-6 1/2"	4'-4 1/2"	3'-8 1/2"	3'-9"	4'-0"	4'-8"	4'-6"	3'-10 1/2"	3'-11"	3'-9 1/2"
G BARS	BAR NO. & SPACING	#4@14"	---	#4@14"	#4@14"	#4@14"	#4@14"	---	#4@14"	#4@14"	#4@14"
	LENGTH, H	2'-6"	---	2'-6"	2'-6"	2'-6"	2'-6"	---	2'-6"	2'-6"	2'-6"
H BARS	BAR NO. & SPACING	---	#4@12"	#4@14"	#4@14"	#4@14"	---	#4@13"	#4@14"	#4@14"	#4@14"
	LENGTH, H	---	2'-6"	2'-6"	2'-6"	2'-6"	---	2'-6"	2'-6"	2'-6"	2'-6"
		LONGITUDINAL REINFORCEMENT									
NO. 4 LONG BARS	NUMBER IN TOP SLAB	11	11	10	10	10	11	11	10	10	10
	NUMBER IN BOTTOM SLAB	11	10	10	10	10	11	10	10	10	10
	NUMBER IN WALLS	4	4	4	4	4	8	8	8	8	8
	TOTAL NUMBER	26	25	24	24	24	30	29	28	28	28
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	58.5	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		5'-0"W x 4'-0"H					5'-0"W x 5'-0"H				
		DEPTH OF COVER IN FEET									
		2'-11"	5'	10'	15'	20'	2'-11"	5'	10'	15'	20'
TOP SLAB THICKNESS, T_1		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, T_2		8"	8"	8"	8"	8"	8"	8"	8"	8"	8"
BOTTOM SLAB THICKNESS, T_3		7"	7"	7 3/4"	8 1/4"	9 1/2"	7"	7"	8"	8 1/4"	9 1/2"
		TRANSVERSE REINFORCEMENT									
B BARS	BAR NO. & SPACING	#4@8"	#4@16"	#6@15"	#7@19"	#8@20"	#7@12"	#4@20"	#7@19"	#6@15"	#8@20"
	LENGTH, H	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"
B_1 BARS	BAR NO. & SPACING	#4@8"	#4@16"	#4@15"	#4@19"	#4@20"	---	#5@20"	#4@19"	#4@15"	#4@20"
	LENGTH, H	6'-1"	4'-3"	3'-7 1/2"	3'-6"	3'-7 1/2"	---	4'-7 1/2"	3'-5 1/2"	3'-8 1/2"	3'-6"
C BARS	BAR NO. & SPACING	#4@14"	#4@13"	#4@14"	#4@14"	#4@14"	#4@14"	#4@13"	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	2'-11 1/2"	1'-9 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	2'-4"	2'-5"	3'-6"	2'-8"
	VERT. LENGTH, V	4'-0"	3'-11 1/2"	4'-0"	4'-0 1/2"	4'-1 1/2"	5'-0"	4'-11 1/2"	5'-0"	5'-0 1/2"	5'-1 1/2"
C_1 BARS	BAR NO. & SPACING	#4@14"	---	#4@14"	#4@14"	#4@14"	#4@14"	---	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	1'-2"	---	1'-1"	1'-1 1/2"	1'-2"	1'-2"	---	1'-1"	1'-1 1/2"	1'-2 1/2"
	VERT. LENGTH, V	1'-6 1/2"	---	1'-1 1/2"	1'-1"	1'-1 1/2"	1'-3 1/2"	---	1'-0 1/2"	1'-1"	1'-2"
C_2 BARS	BAR NO. & SPACING	#4@14"	#5@13"	#4@14"	#4@14"	#4@14"	#4@14"	#5@13"	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	1'-8 1/2"	3'-3"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	1'-10 1/2"	1'-10 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"
	VERT. LENGTH, V	2'-0"	2'-0"	2'-1"	2'-1 1/2"	2'-2 1/2"	2'-0"	2'-0"	2'-1"	2'-1 1/2"	2'-2 1/2"
C_3 BARS	BAR NO. & SPACING	---	---	#4@14"	#4@14"	#4@14"	---	---	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	---	---	1'-0 1/2"	1'-0 1/2"	2'-11 1/2"	---	---	1'-0 1/2"	1'-1"	1'-1 1/2"
	VERT. LENGTH, V	---	---	2'-1"	2'-1 1/2"	2'-2 1/2"	---	---	2'-1"	2'-1 1/2"	2'-2 1/2"
D BARS	BAR NO. & SPACING	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	4'-10 1/2"	4'-10 1/2"	5'-0"	5'-0 1/2"	5'-3"	5'-10 1/2"	5'-10 1/2"	6'-0"	6'-0 1/2"	6'-3"
F BARS	BAR NO. & SPACING	#4@16"	#5@18"	#7@18"	#7@17"	#8@18"	#5@20"	#4@14"	#7@17"	#7@17"	#8@18"
	LENGTH, H	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"	6'-1 1/2"
F_1 BARS	BAR NO. & SPACING	#4@16"	#4@18"	#4@18"	#4@17"	#4@18"	#4@20"	#4@14"	#4@17"	#4@17"	#4@18"
	LENGTH, H	4'-9"	4'-2"	3'-10 1/2"	3'-10"	3'-11"	4'-5"	4'-8"	3'-10"	3'-10"	3'-9 1/2"
G BARS	BAR NO. & SPACING	#4@14"	---	#4@14"	#4@14"	#4@14"	#4@14"	---	---	---	---
	LENGTH, H	2'-6"	---	2'-6"	2'-6"	2'-6"	2'-6"	---	---	---	---
H BARS	BAR NO. & SPACING	---	#5@13"	#4@14"	#4@14"	#4@14"	---	---	#4@14"	#4@14"	#4@14"
	LENGTH, H	---	2'-6"	2'-6"	2'-6"	2'-6"	---	---	2'-6"	2'-6"	2'-6"
		LONGITUDINAL REINFORCEMENT									
NO. 4 LONG BARS	NUMBER IN TOP SLAB	12	11	10	10	10	12	11	11	11	11
	NUMBER IN BOTTOM SLAB	11	10	10	10	10	11	11	10	10	10
	NUMBER IN WALLS	8	8	8	8	8	12	12	12	12	12
	TOTAL NUMBER	31	29	28	28	28	35	34	33	33	33
CONCRETE: CU. YDS. PER LIN. FT.		0.48	0.48	0.50	0.52	0.57	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

SINGLE BOX SIZE		6'-0"W x 1'-0"H					6'-0"W x 2'-0"H				
		DEPTH OF COVER IN FEET									
		2'-11"	5'	10'	15'	20'	2'-11"	5'	10'	15'	20'
TOP SLAB THICKNESS, T_1		7"	6 1/2"	7 1/2"	8 1/4"	10"	7"	6 1/2"	7 3/4"	8 1/4"	9 3/4"
WALL THICKNESS, T_2		8"	8"	8"	8"	8"	8"	8"	8"	8"	8"
BOTTOM SLAB THICKNESS, T_3		7"	7"	8 1/2"	9"	10 1/2"	7"	7"	8 1/2"	9"	10 1/2"
		TRANSVERSE REINFORCEMENT									
B BARS	BAR NO. & SPACING	#5@19"	#4@18"	#6@16"	#7@20"	#8@19"	#5@18"	#4@13"	#7@18"	#7@17"	#8@17"
	LENGTH, H	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"
B_1 BARS	BAR NO. & SPACING	#7@19"	#5@18"	#4@16"	#5@20"	#4@19"	#7@18"	#4@13"	#4@18"	#4@17"	#4@17"
	LENGTH, H	7'-1"	4'-8"	4'-1"	4'-2"	4'-2"	7'-1"	4'-5 1/2"	3'-11"	4'-1"	4'-2"
C BARS	BAR NO. & SPACING	#4@14"	#4@14"	#4@12"	#4@12"	#4@12"	#4@12"	#4@14"	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"
	VERT. LENGTH, V	1'-0"	0'-11 1/2"	1'-1"	1'-1 1/2"	1'-3"	2'-0"	1'-11 1/2"	2'-1"	2'-1 1/2"	2'-3"
C_1 BARS	BAR NO. & SPACING	#5@14"	#4@14"	#4@12"	#4@12"	#4@12"	#4@12"	#4@14"	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	1'-6"	1'-3 1/2"	1'-4 1/2"	1'-4 1/2"	1'-4 1/2"	1'-4 1/2"	1'-2 1/2"	1'-4"	1'-4"	1'-4 1/2"
	VERT. LENGTH, V	1'-0"	0'-11 1/2"	1'-1"	1'-1 1/2"	1'-3"	2'-0"	1'-11 1/2"	2'-1"	2'-1 1/2"	2'-3"
C_2 BARS	BAR NO. & SPACING	#5@14"	#4@14"	#4@12"	#4@12"	#4@12"	#5@12"	#4@14"	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	2'-0 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	1'-11 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"
	VERT. LENGTH, V	2'-0"	2'-0"	2'-1 1/2"	2'-2"	2'-3 1/2"	2'-0"	2'-0"	2'-1 1/2"	2'-2"	2'-3 1/2"
C_3 BARS	BAR NO. & SPACING	---	#4@14"	#4@12"	#4@12"	#4@12"	---	#4@14"	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	---	1'-3"	1'-3 1/2"	1'-3 1/2"	1'-4"	---	1'-2"	1'-3"	1'-3"	1'-3"
	VERT. LENGTH, V	---	2'-0"	2'-1 1/2"	2'-2"	2'-3 1/2"	---	2'-0"	2'-1 1/2"	2'-2"	2'-3 1/2"
D BARS	BAR NO. & SPACING	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	1'-11"	1'-10 1/2"	2'-1"	2'-2 1/2"	2'-5 1/2"	2'-11"	2'-10 1/2"	3'-1 1/2"	3'-2 1/2"	3'-5 1/2"
F BARS	BAR NO. & SPACING	#4@16"	#4@18"	#6@15"	#7@18"	#8@18"	#4@15"	#5@20"	#7@17"	#7@16"	#8@16"
	LENGTH, H	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"
F_1 BARS	BAR NO. & SPACING	#4@16"	#5@18"	#4@15"	#4@18"	#4@18"	#4@15"	#5@20"	#4@17"	#4@16"	#4@16"
	LENGTH, H	4'-9"	5'-5"	4'-5"	4'-4"	4'-6"	4'-11 1/2"	4'-10"	4'-4"	4'-6"	4'-7"
G BARS	BAR NO. & SPACING	#4@14"	#4@14"	#4@12"	#4@12"	#4@12"	#4@12"	#4@14"	#4@14"	#4@14"	#4@14"
	LENGTH, H	3'-0"	3'-0"	3'-0"	3'-0"	3'-0"	3'-0"	3'-0"	3'-0"	3'-0"	3'-0"
H BARS	BAR NO. & SPACING	---	#4@14"	#4@12"	#4@12"	#4@12"	---	#4@14"	#4@14"	#4@14"	#4@14"
	LENGTH, H	---	3'-0"	3'-0"	3'-0"	3'-0"	---	3'-0"	3'-0"	3'-0"	3'-0"
		LONGITUDINAL REINFORCEMENT									
NO. 4 LONG BARS	NUMBER IN TOP SLAB	13	12	12	12	12	14	12	12	12	12
	NUMBER IN BOTTOM SLAB	12	12	12	12	12	12	12	12	12	12
	NUMBER IN WALLS	4	4	4	4	4	4	4	4	4	4
	TOTAL NUMBER	29	28	28	28	28	30	28	28	28	28
CONCRETE: CU. YDS. PER LIN. FT.		0.38	0.37	0.44	0.46	0.53	0.43	0.42	0.49	0.51	0.58
STEEL: LBS. PER LIN. FT.		59.0	53.8	66.1	68.3	74.8	65.3	58.3	68.4	70.3	77.6

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REINFORCED CONCRETE BOX CULVERT

STANDARD PLAN
3053-0
SHEET 9 OF 21

SINGLE BOX SIZE		6'-0"W x 3'-0"H					6'-0"W x 4'-0"H				
		DEPTH OF COVER IN FEET									
		2'-11"	5'	10'	15'	20'	2'-11"	5'	10'	15'	20'
TOP SLAB THICKNESS, T_1		7"	6 1/2"	7 3/4"	8 1/4"	9 3/4"	7"	6 1/2"	7 3/4"	8 1/4"	9 3/4"
WALL THICKNESS, T_2		8"	8"	8"	8"	8"	7"	8"	8"	8"	8"
BOTTOM SLAB THICKNESS, T_3		7"	7"	8 1/2"	9 1/4"	10 1/2"	7"	7"	8 3/4"	9 1/4"	10 3/4"
		TRANSVERSE REINFORCEMENT									
B BARS	BAR NO. & SPACING	#4@15"	#5@16"	#7@17"	#7@16"	#8@16"	#6@8"	#5@19"	#8@20"	#8@19"	#9@19"
	LENGTH, H	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"
B_1 BARS	BAR NO. & SPACING	#7@15"	#4@16"	#4@17"	#4@16"	#4@16"	---	#5@19"	#4@20"	#4@19"	#4@19"
	LENGTH, H	7'-1"	4'-2 1/2"	4'-0 1/2"	4'-1 1/2"	4'-2"	---	4'-8 1/2"	3'-9 1/2"	3'-10"	3'-10 1/2"
C BARS	BAR NO. & SPACING	#4@13"	#4@13"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"
	VERT. LENGTH, V	3'-0"	2'-11 1/2"	3'-1"	3'-1 1/2"	3'-3"	4'-0"	3'-11 1/2"	4'-1"	4'-1 1/2"	4'-3"
C_1 BARS	BAR NO. & SPACING	#4@13"	#4@13"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	1'-4"	1'-1 1/2"	1'-3"	1'-3 1/2"	1'-3 1/2"	1'-4"	1'-1 1/2"	1'-3"	1'-3"	1'-3 1/2"
	VERT. LENGTH, V	3'-0"	1'-8 1/2"	3'-1"	3'-1 1/2"	1'-10"	2'-11"	1'-5"	2'-2 1/2"	1'-9"	1'-5 1/2"
C_2 BARS	BAR NO. & SPACING	#5@13"	#4@13"	#4@14"	#4@14"	#4@14"	#5@14"	#4@14"	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	1'-10 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	1'-10 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"
	VERT. LENGTH, V	2'-0"	2'-0"	2'-1 1/2"	2'-2 1/2"	2'-3 1/2"	2'-0"	2'-0"	2'-2"	2'-2 1/2"	2'-4"
C_3 BARS	BAR NO. & SPACING	---	#4@13"	#4@14"	#4@14"	#4@14"	---	#4@14"	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	---	1'-1"	1'-2 1/2"	1'-2 1/2"	3'-2 1/2"	---	1'-1"	1'-2 1/2"	1'-2"	3'-2 1/2"
	VERT. LENGTH, V	---	2'-0"	2'-1 1/2"	2'-2 1/2"	2'-3 1/2"	---	2'-0"	1'-8 1/2"	2'-2 1/2"	2'-4"
D BARS	BAR NO. & SPACING	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	3'-11"	3'-10 1/2"	4'-1 1/2"	4'-2 1/2"	4'-5 1/2"	4'-11"	4'-10 1/2"	5'-1 1/2"	5'-2 1/2"	5'-5 1/2"
F BARS	BAR NO. & SPACING	#4@18"	#5@15"	#8@19"	#8@18"	#8@15"	#4@17"	#4@11"	#7@15"	#7@14"	#9@18"
	LENGTH, H	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"
F_1 BARS	BAR NO. & SPACING	#5@18"	#4@15"	#4@19"	#4@18"	#4@15"	#5@17"	#4@11"	#4@15"	#4@14"	#4@18"
	LENGTH, H	5'-5 1/2"	4'-6 1/2"	4'-0 1/2"	4'-2 1/2"	4'-7"	5'-6 1/2"	5'-0 1/2"	4'-6"	4'-6 1/2"	4'-5"
G BARS	BAR NO. & SPACING	#4@13"	#4@13"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"
	LENGTH, H	3'-0"	3'-0"	3'-0"	3'-0"	3'-0"	3'-0"	3'-0"	3'-0"	3'-0"	3'-0"
H BARS	BAR NO. & SPACING	---	#4@13"	#4@14"	#4@14"	#4@14"	---	#4@14"	#4@14"	#4@14"	#4@14"
	LENGTH, H	---	3'-0"	3'-0"	3'-0"	3'-0"	---	3'-0"	3'-0"	3'-0"	3'-0"
		LONGITUDINAL REINFORCEMENT									
NO. 4 LONG BARS	NUMBER IN TOP SLAB	14	12	12	12	12	14	12	12	12	12
	NUMBER IN BOTTOM SLAB	12	12	12	12	12	12	12	12	12	12
	NUMBER IN WALLS	8	8	8	8	8	8	8	8	8	8
	TOTAL NUMBER	34	32	32	32	32	34	32	32	32	32
CONCRETE: CU. YDS. PER LIN. FT.		0.48	0.47	0.53	0.56	0.63	0.53	0.52	0.59	0.61	0.68
STEEL: LBS. PER LIN. FT.		70.8	65.7	76.2	78.2	86.1	72.2	66.3	77.9	79.8	88.6

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REINFORCED CONCRETE BOX CULVERT

STANDARD PLAN
3053-0
SHEET 10 OF 21

SINGLE BOX SIZE		6'-0"W x 5'-0"H					6'-0"W x 6'-0"H				
		DEPTH OF COVER IN FEET									
		2'-11"	5'	10'	15'	20'	2'-11"	5'	10'	15'	20'
TOP SLAB THICKNESS, T_1		7"	6 1/2"	7 3/4"	8 1/4"	9 3/4"	7"	6 1/2"	7 3/4"	8 1/4"	9 3/4"
WALL THICKNESS, T_2		8"	8"	8"	8"	8"	8"	8"	8"	8"	8"
BOTTOM SLAB THICKNESS, T_3		7"	7"	8 3/4"	9 1/4"	10 3/4"	7"	7"	8 3/4"	9 1/4"	10 3/4"
		TRANSVERSE REINFORCEMENT									
B BARS	BAR NO. & SPACING	#4@14"	#5@18"	#7@16"	#8@19"	#8@16"	#9@17"	#5@18"	#8@19"	#8@19"	#9@20"
	LENGTH, H	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"
B_1 BARS	BAR NO. & SPACING	#7@14"	#5@18"	#4@16"	#4@19"	#4@16"	---	#5@18"	#4@19"	#4@19"	#4@20"
	LENGTH, H	7'-1"	4'-8 1/2"	4'-1 1/2"	3'-10 1/2"	4'-3"	---	4'-9 1/2"	3'-8"	3'-9 1/2"	3'-11 1/2"
C BARS	BAR NO. & SPACING	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-3"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"
	VERT. LENGTH, V	5'-0"	4'-11 1/2"	5'-1"	5'-1 1/2"	5'-3"	6'-0"	5'-11 1/2"	6'-1"	6'-1 1/2"	6'-3"
C_1 BARS	BAR NO. & SPACING	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	1'-4"	1'-1 1/2"	1'-3"	1'-3 1/2"	1'-4"	1'-3 1/2"	1'-1 1/2"	1'-3"	1'-4"	1'-4 1/2"
	VERT. LENGTH, V	2'-7 1/2"	1'-1 1/2"	1'-8"	1'-6"	1'-4 1/2"	2'-4"	1'-0 1/2"	1'-6"	1'-5 1/2"	1'-5"
C_2 BARS	BAR NO. & SPACING	#5@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	2'-0"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	2'-3"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"
	VERT. LENGTH, V	2'-0"	2'-0"	2'-2"	2'-2 1/2"	2'-4"	2'-0"	2'-0"	2'-2"	2'-2 1/2"	2'-4"
C_3 BARS	BAR NO. & SPACING	---	#4@14"	#4@14"	#4@14"	#4@14"	---	#4@14"	#4@14"	#4@14"	#4@14"
	HOR. LENGTH, H	---	1'-1"	1'-2"	1'-2 1/2"	3'-2 1/2"	---	1'-1 1/2"	1'-2 1/2"	1'-3"	1'-4"
	VERT. LENGTH, V	---	2'-0"	2'-2"	2'-2 1/2"	2'-4"	---	2'-0"	2'-2"	2'-2 1/2"	2'-4"
D BARS	BAR NO. & SPACING	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	5'-11"	5'-10 1/2"	6'-1 1/2"	6'-2 1/2"	6'-5 1/2"	6'-11"	6'-10 1/2"	7'-1 1/2"	7'-2 1/2"	7'-5 1/2"
F BARS	BAR NO. & SPACING	#5@20"	#6@20"	#8@18"	#8@17"	#9@18"	#5@16"	#5@13"	#7@14"	#7@14"	#8@15"
	LENGTH, H	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"	7'-1 1/2"
F_1 BARS	BAR NO. & SPACING	#5@20"	#5@20"	#4@18"	#4@17"	#4@18"	#4@16"	#4@13"	#4@14"	#4@14"	#4@15"
	LENGTH, H	5'-3 1/2"	4'-8 1/2"	4'-3 1/2"	4'-3"	4'-4 1/2"	4'-11"	4'-8"	4'-5 1/2"	4'-6 1/2"	4'-6 1/2"
G BARS	BAR NO. & SPACING	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	#4@14"	---	#4@14"	#4@14"	#4@14"
	LENGTH, H	3'-0"	3'-0"	3'-0"	3'-0"	3'-0"	3'-0"	---	3'-0"	3'-0"	3'-0"
H BARS	BAR NO. & SPACING	---	#4@14"	#4@14"	#4@14"	#4@14"	---	#4@14"	#4@14"	#4@14"	#4@14"
	LENGTH, H	---	3'-0"	3'-0"	3'-0"	3'-0"	---	3'-0"	3'-0"	3'-0"	3'-0"
		LONGITUDINAL REINFORCEMENT									
NO. 4 LONG BARS	NUMBER IN TOP SLAB	14	12	12	12	12	15	14	12	12	12
	NUMBER IN BOTTOM SLAB	12	12	12	12	12	12	12	12	12	12
	NUMBER IN WALLS	12	12	12	12	12	16	16	16	16	16
	TOTAL NUMBER	38	36	36	36	36	43	42	40	40	40
CONCRETE: CU. YDS. PER LIN. FT.		0.58	0.57	0.64	0.66	0.73	0.63	0.62	0.69	0.71	0.78
STEEL: LBS. PER LIN. FT.		77.5	71.6	83.1	84.6	92.8	83.7	76.4	88.7	89.0	94.7

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REINFORCED CONCRETE BOX CULVERT

STANDARD PLAN
3053-0
SHEET 11 OF 21

DOUBLE BOX SIZE		3'-0"W x 1'-0"H					3'-0"W x 2'-0"H				
		DEPTH OF COVER IN FEET									
		2'-11"	5'	10'	15'	20'	2'-11"	5'	10'	15'	20'
TOP SLAB THICKNESS, T_1		6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"
WALL THICKNESS, T_2		8"	8"	8"	8"	8"	7"	8"	8"	8"	8"
BOTTOM SLAB THICKNESS, T_3		7"	7"	7"	7"	7"	8"	7"	7"	7"	7"
		TRANSVERSE REINFORCEMENT									
B BARS	BAR NO. & SPACING	#4@18"	#4@20"	#4@15"	#4@20"	#4@20"	#4@17"	#4@20"	#4@20"	#4@19"	#4@20"
	LENGTH, H	7'-9"	7'-9"	7'-9"	7'-9"	7'-9"	7'-9"	7'-9"	7'-9"	7'-9"	7'-9"
B_1 BARS	BAR NO. & SPACING	#5@19"	---	---	#4@20"	#4@20"	#5@17"	---	#4@20"	#4@19"	#4@20"
	LENGTH, H	7'-9"	---	---	2'-11"	7'-9"	7'-9"	---	2'-11"	2'-11 1/2"	7'-9"
C BARS	BAR NO. & SPACING	#4@10"	#4@14"	#4@14"	#4@13"	#4@10"	#4@11"	#4@14"	#4@14"	#4@13"	#4@10"
	HOR. LENGTH, H	2'-5 1/2"	1'-2 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	1'-2 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"
	VERT. LENGTH, V	0'-11 1/2"	0'-11 1/2"	0'-11 1/2"	0'-11 1/2"	0'-11 1/2"	1'-11 1/2"	1'-11 1/2"	1'-11 1/2"	1'-11 1/2"	1'-11 1/2"
C_1 BARS	BAR NO. & SPACING	---	---	---	---	---	---	---	---	---	---
	HOR. LENGTH, H	---	---	---	---	---	---	---	---	---	---
	VERT. LENGTH, V	---	---	---	---	---	---	---	---	---	---
C_2 BARS	BAR NO. & SPACING	#4@10"	#4@14"	#4@14"	#4@13"	#4@10"	#4@11"	#4@14"	#4@14"	#4@13"	#4@10"
	HOR. LENGTH, H	2'-5 1/2"	1'-2 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	1'-2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"
	VERT. LENGTH, V	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
C_3 BARS	BAR NO. & SPACING	---	---	---	---	---	---	---	---	---	---
	HOR. LENGTH, H	---	---	---	---	---	---	---	---	---	---
	VERT. LENGTH, V	---	---	---	---	---	---	---	---	---	---
D BARS	BAR NO. & SPACING	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	1'-10 1/2"	1'-10 1/2"	1'-10 1/2"	1'-10 1/2"	1'-10 1/2"	2'-10 1/2"	2'-10 1/2"	2-10 1/2	2'-10 1/2"	2'-10 1/2"
F BARS	BAR NO. & SPACING	#4@19"	#4@20"	#4@14"	#4@20"	#4@20"	#4@18"	#4@20"	#4@20"	#4@20"	#4@19"
	LENGTH, H	7'-9"	7'-9"	7'-9"	7'-9"	7'-9"	7'-9"	7'-9"	7'-9"	7'-9"	7'-9"
F_1 BARS	BAR NO. & SPACING	---	---	---	#4@20"	#4@20"	---	---	#4@20"	#4@20"	#4@19"
	LENGTH, H	---	---	---	7'-9"	7'-9"	---	---	7'-9"	7'-9"	7'-9"
G BARS	BAR NO. & SPACING	#4@12"	#4@14"	#4@12"	#4@11"	#4@14"	#4@12"	#4@14"	#4@12"	#4@11"	#4@14"
	LENGTH, H	5'-2"	2'-7 1/2"	5'-2"	5'-2"	5'-2"	5'-2"	2'-7 1/2"	5'-2"	5'-2"	5'-2"
G_1 BARS	BAR NO. & SPACING	---	---	---	---	#4@14"	---	---	---	---	#4@14"
	LENGTH, H	---	---	---	---	1'-8"	---	---	---	---	1'-8 1/2"
H BARS	BAR NO. & SPACING	#4@14"	#4@14"	#4@12"	#4@14"	#4@14"	#4@14"	#4@14"	#4@11"	#4@14"	#4@14"
	LENGTH, H	5'-2"	2'-7 1/2"	5'-2"	5'-2"	5'-2"	5'-2"	2'-7 1/2"	5'-2"	5'-2"	5'-2"
H_1 BARS	BAR NO. & SPACING	---	---	---	#4@14"	#4@14"	---	---	---	#4@14"	#4@14"
	LENGTH, H	---	---	---	1'-6"	1'-8 1/2"	---	---	---	1'-7"	1'-9"
CW BARS	BAR NO. & SPACING	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	1'-10 1/2"	1'-10 1/2"	1'-10 1/2"	1'-10 1/2"	1'-10 1/2"	2'-10 1/2"	2'-10 1/2"	2'-10 1/2"	2'-10 1/2"	2'-10 1/2"
		LONGITUDINAL REINFORCEMENT									
NO. 4 LONG BARS	NUMBER IN TOP SLAB	12	14	14	14	14	12	14	14	14	14
	NUMBER IN BOTTOM SLAB	15	14	14	14	14	15	14	14	14	14
	NUMBER IN WALLS	6	6	6	6	6	6	6	6	6	6
	TOTAL NUMBER	33	34	34	34	34	33	34	34	34	34
CONCRETE: CU. YDS. PER LIN. FT.		0.44	0.44	0.44	0.44	0.44	0.51	0.51	0.51	0.51	0.51
STEEL: LBS. PER LIN. FT.		52.8	41.3	50.5	55.0	58.9	55.8	44.2	56.9	58.4	62.7

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REINFORCED CONCRETE BOX CULVERT

STANDARD PLAN
3053-0
SHEET 12 OF 21

DOUBLE BOX SIZE		3'-0"W x 3'-0"H					4'-0"W x 1'-0"H				
		DEPTH OF COVER IN FEET									
		2'-11"	5'	10'	15'	20'	2'-11"	5'	10'	15'	20'
TOP SLAB THICKNESS, T_1		6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	7 1/2"
WALL THICKNESS, T_2		8"	8"	8"	8"	8"	8"	8"	8"	8"	8"
BOTTOM SLAB THICKNESS, T_3		7"	7"	7"	7"	7 1/4"	7"	7"	7"	7"	8 1/4"
		TRANSVERSE REINFORCEMENT									
B BARS	BAR NO. & SPACING	#4@20"	#4@20"	#4@15"	#4@19"	#4@20"	#4@18"	#4@16"	#4@20"	#4@18"	#4@20"
	LENGTH, H	7'-9"	7'-9"	7'-9"	7'-9"	7'-9"	9'-9"	9'-9"	9'-9"	9'-9"	9'-9"
B_1 BARS	BAR NO. & SPACING	#6@20"	---	#4@20"	#4@19"	#4@20"	#6@18"	---	#4@20"	#4@18"	#5@20"
	LENGTH, H	7'-9"	---	2'-11 1/2"	2'-11 1/2"	7'-9"	9'-9"	---	3'-8 1/2"	9'-9"	9'-9"
C BARS	BAR NO. & SPACING	#4@11"	#4@14"	#4@14"	#4@13"	#4@10"	#4@10"	#4@14"	#4@11"	#4@10"	#4@9"
	HOR. LENGTH, H	2'-5 1/2"	1'-5"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-8 1/2"	1'-6 1/2"	2'-8 1/2"	2'-8 1/2"	2'-8 1/2"
	VERT. LENGTH, V	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	0'-11 1/2"	0'-11 1/2"	0'-11 1/2"	0'-11 1/2"	1'-1"
C_1 BARS	BAR NO. & SPACING	---	---	---	---	---	---	---	---	---	---
	HOR. LENGTH, H	---	---	---	---	---	---	---	---	---	---
	VERT. LENGTH, V	---	---	---	---	---	---	---	---	---	---
C_2	BAR NO. & SPACING	#4@11"	#4@14"	#4@14"	#4@13"	#4@10"	#4@10"	#4@14"	#4@11"	#4@10"	#4@9"
	HOR. LENGTH, H	2'-5 1/2"	1'-3 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-8 1/2"	1'-3 1/2"	2'-8 1/2"	2'-8 1/2"	2'-8 1/2"
	VERT. LENGTH, V	2'-0"	2'-0"	2'-0"	2'-0"	2'-5"	2'-0"	2'-0"	2'-0"	2'-0"	2'-1 1/2"
C_3 BARS	BAR NO. & SPACING	---	---	---	---	---	---	---	---	---	---
	HOR. LENGTH, H	---	---	---	---	---	---	---	---	---	---
	VERT. LENGTH, V	---	---	---	---	---	---	---	---	---	---
D BARS	BAR NO. & SPACING	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	3'-10 1/2"	3'-10 1/2"	3'-10 1/2"	3'-10 1/2"	3'-10 1/2"	1'-10 1/2"	1'-10 1/2"	1'-10 1/2"	1'-10 1/2"	2'-1"
F BARS	BAR NO. & SPACING	#4@18"	#4@20"	#4@20"	#4@20"	#4@19"	#4@20"	#4@15"	#4@18"	#4@17"	#4@19"
	LENGTH, H	7'-9"	7'-9"	7'-9"	7'-9"	7'-9"	9'-9"	9'-9"	9'-9"	9'-9"	9'-9"
F_1 BARS	BAR NO. & SPACING	---	---	#4@20"	#4@20"	#4@19"	#4@20"	---	#4@18"	#4@17"	#4@19"
	LENGTH, H	---	---	7'-9"	7'-9"	7'-9"	3'-6 1/2"	---	3'-11 1/2"	9'-9"	9'-9"
G BARS	BAR NO. & SPACING	#4@12"	#4@14"	#4@12"	#4@11"	#4@14"	#4@14"	#4@13"	#4@14"	#4@14"	#4@14"
	LENGTH, H	5'-2"	2'-7 1/2"	5'-2"	5'-2"	5'-2"	6'-8"	3'-5"	6'-8"	6'-8"	6'-8"
G_1 BARS	BAR NO. & SPACING	---	---	---	---	#4@14"	#4@14"	---	#4@14"	#4@14"	#5@14"
	LENGTH, H	---	---	---	---	1'-8 1/2"	2'-1/2"	---	---	---	1'-8 1/2"
H BARS	BAR NO. & SPACING	#4@14"	#4@14"	#4@11"	#4@14"	#4@14"	#4@12"	#4@13"	#4@14"	#4@14"	#4@14"
	LENGTH, H	5'-2"	2'-7 1/2"	5'-2"	5'-2"	5'-2"	6'-8"	3'-1/2"	6'-8"	6'-8"	6'-8"
H_1 BARS	BAR NO. & SPACING	---	---	---	#4@14"	#4@14"	---	---	#4@14"	#4@14"	#5@14"
	LENGTH, H	---	---	---	1'-7"	1'-9 1/2"	---	---	2'-0"	2'-1"	2'-4 1/2"
CW BARS	BAR NO. & SPACING	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	3'-10 1/2"	3'-10 1/2"	3'-10 1/2"	3'-10 1/2"	3'-10 1/2"	1'-10 1/2"	1'-10 1/2"	1'-10 1/2"	1'-10 1/2"	2'-1"
		LONGITUDINAL REINFORCEMENT									
NO. 4 LONG BARS	NUMBER IN TOP SLAB	12	14	14	14	14	15	17	15	15	15
	NUMBER IN BOTTOM SLAB	15	14	14	14	14	15	15	15	15	15
	NUMBER IN WALLS	12	12	12	12	12	6	6	6	6	6
	TOTAL NUMBER	39	40	40	40	40	36	38	36	36	36
CONCRETE: CU. YDS. PER LIN. FT.		0.58	0.58	0.58	0.58	0.59	0.52	0.52	0.52	0.52	0.60
STEEL: LBS. PER LIN. FT.		63.8	51.6	63.8	65.4	70.1	66.0	49.2	64.2	68.7	75.4

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REINFORCED CONCRETE BOX CULVERT

STANDARD PLAN
3053-0
SHEET 13 OF 21

DOUBLE BOX SIZE		4'-0"W x 2'-0"H					4'-0"W x 3'-0"H				
		DEPTH OF COVER IN FEET									
		2'-11"	5'	10'	15'	20'	2'-11"	5'	10'	15'	20'
TOP SLAB THICKNESS, T_1		6 1/2"	6 1/2"	6 1/2"	6 1/2"	7 3/4"	6 1/2"	6 1/2"	6 1/2"	6 1/2"	8"
WALL THICKNESS, T_2		8"	8"	8"	8"	8"	8"	8"	8"	8"	8"
BOTTOM SLAB THICKNESS, T_3		7"	7"	7"	7 1/4"	8 1/2"	7"	7"	7"	7 1/4"	8 3/4"
		TRANSVERSE REINFORCEMENT									
B BARS	BAR NO. & SPACING	#4@17"	#4@20"	#4@19"	#4@17"	#4@20"	#4@17"	#4@20"	#4@19"	#4@17"	#4@20"
	LENGTH, H	9'-9"	9'-9"	9'-9"	9'-9"	9'-9"	9'-9"	9'-9"	9'-9"	9'-9"	9'-9"
B_1 BARS	BAR NO. & SPACING	#6@17"	#4@20"	#4@19"	#4@17"	#5@20"	#6@17"	#4@20"	#4@20"	#4@19"	#5@20"
	LENGTH, H	9'-9"	3'-1 1/2"	3'-10"	9'-9"	9'-9"	9'-9"	3'-3"	2'-11"	9'-9"	9'-9"
C BARS	BAR NO. & SPACING	#4@10"	#4@14"	#4@11"	#4@10"	#4@10"	#4@10"	#4@14"	#4@12"	#4@10"	#4@10"
	HOR. LENGTH, H	2'-8 1/2"	1'-3 1/2"	2'-8 1/2"	2'-8 1/2"	2'-8 1/2"	2'-8 1/2"	1'-5"	2'-8 1/2"	2'-8 1/2"	2'-8 1/2"
	VERT. LENGTH, V	1'-11 1/2"	1'-11 1/2"	1'-11 1/2"	1'-11 1/2"	2'-1"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	3'-1"
C_1 BARS	BAR NO. & SPACING	---	---	---	---	---	---	---	---	---	---
	HOR. LENGTH, H	---	---	---	---	---	---	---	---	---	---
	VERT. LENGTH, V	---	---	---	---	---	---	---	---	---	---
C_2 BARS	BAR NO. & SPACING	#4@10"	#4@14"	#4@11"	#4@10"	#4@10"	#4@10"	#4@14"	#5@12"	#4@10"	#4@10"
	HOR. LENGTH, H	2'-8 1/2"	1'-3 1/2"	2'-8 1/2"	2'-8 1/2"	2'-8 1/2"	2'-8 1/2"	1'-5"	3'-0"	2'-8 1/2"	2'-8 1/2"
	VERT. LENGTH, V	2'-0"	2'-0"	2'-0"	2'-1/2"	2'-1"1/2"	2'-0"	2'-0"	2'-0"	2'-1/2"	2'-2"
C_3 BARS	BAR NO. & SPACING	---	---	---	---	---	---	---	---	---	---
	HOR. LENGTH, H	---	---	---	---	---	---	---	---	---	---
	VERT. LENGTH, V	---	---	---	---	---	---	---	---	---	---
D BARS	BAR NO. & SPACING	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	2'-10 1/2"	2'-10 1/2"	2'-10 1/2"	2'-11"	3'-1 1/2"	3'-10 1/2"	3'-10 1/2"	3'-10 1/2"	3'-11"	4'-1 1/2"
F BARS	BAR NO. & SPACING	#4@20"	#4@20"	#4@15"	#4@20"	#4@19"	#4@19"	#4@20"	#4@17"	#4@20"	#4@19"
	LENGTH, H	9'-9"	9'-9"	9'-9"	9'-9"	9'-9"	9'-9"	9'-9"	9'-9"	9'-9"	9'-9"
F_1 BARS	BAR NO. & SPACING	#4@20"	---	#4@18"	#5@20"	#5@19"	#4@19"	#4@20"	#4@17"	#5@20"	#5@19"
	LENGTH, H	3'-9 1/2"	---	9'-9"	9'-9"	9'-9"	4'-0"	3'-9"	9'-9"	9'-9"	9'-9"
G BARS	BAR NO. & SPACING	#4@14"	#4@13"	#4@14"	#4@14"	#4@14"	#4@14"	#4@12"	#4@14"	#4@13"	#4@14"
	LENGTH, H	6'-8"	3'-3"	6'-8"	6'-8"	6'-8"	6'-8"	3'-6"	6'-8"	6'-8"	6'-8"
G_1 BARS	BAR NO. & SPACING	#4@14"	---	#4@14"	#4@14"	#5@14"	#4@14"	---	#4@14"	#4@13"	#5@14"
	LENGTH, H	2'-1"	---	2'-0"	2'-1"	2'-4 1/2"	2'-1 1/2"	---	2'-1/2"	2'-1/2"	2'-5"
H BARS	BAR NO. & SPACING	#4@12"	#4@12"	#4@14"	#4@13"	#4@14"	#4@12"	#4@12"	#4@14"	#4@13"	#4@14"
	LENGTH, H	6'-8"	3'-3 1/2"	6'-8"	6'-8"	6'-8"	6'-8"	3'-4"	6'-8"	6'-8"	6'-8"
H_1 BARS	BAR NO. & SPACING	---	---	#4@14"	#4@13"	#4@14"	---	---	#4@14"	#4@13"	#4@14"
	LENGTH, H	---	---	2'-1/2"	2'-1 1/2"	2'-5 1/2"	---	---	2'-1"	2'-1"1/2"	2'-6"
CW BARS	BAR NO. & SPACING	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	2'-10 1/2"	2'-10 1/2"	2'-10 1/2"	2'-11"	3'-1 1/2"	3'-10 1/2"	3'-10 1/2"	3'-10 1/2"	3'-11"	4'-1 1/2"
		LONGITUDINAL REINFORCEMENT									
NO. 4 LONG BARS	NUMBER IN TOP SLAB	15	15	15	15	15	17	15	15	15	15
	NUMBER IN BOTTOM SLAB	15	15	15	15	15	15	15	15	15	15
	NUMBER IN WALLS	6	6	6	6	6	12	12	12	12	12
	TOTAL NUMBER	36	36	36	36	36	42	42	42	42	42
CONCRETE: CU. YDS. PER LIN. FT.		0.60	0.60	0.60	0.60	0.68	0.51	0.67	0.67	0.68	0.77
STEEL: LBS. PER LIN. FT.		70.4	52.4	68.8	73.9	77.5	79.0	61.8	79.6	81.7	85

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REINFORCED CONCRETE BOX CULVERT

STANDARD PLAN
3053-0
SHEET 14 OF 21

DOUBLE BOX SIZE		4'-0"W x 4'-0"H					5'-0"W x 1'-0"H				
		DEPTH OF COVER IN FEET									
		2'-11"	5'	10'	15'	20'	2'-11"	5'	10'	15'	20'
TOP SLAB THICKNESS, T_1		6 1/2"	6 1/2"	6 1/2"	6 1/2"	8"	6 1/2"	6 1/2"	6 3/4"	7 1/2"	9 1/4"
WALL THICKNESS, T_2		8"	8"	8"	8"	8"	8"	8"	8"	8"	10"
BOTTOM SLAB THICKNESS, T_3		7"	7"	7"	7"	8 3/4"	7"	7"	7 1/4"	8"	8"
		TRANSVERSE REINFORCEMENT									
B BARS	BAR NO. & SPACING	#4@20"	#4@20"	#4@19"	#4@17"	#4@20"	#4@19"	#4@20"	#4@18"	#4@18"	#4@20"
	LENGTH, H	9'-9"	9'-9"	9'-9"	9'-9"	9'-9"	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"
B_1 BARS	BAR NO. & SPACING	#7@20"	#4@20"	#4@19"	#4@17"	#5@20"	#7@19"	#4@20"	#5@18"	#5@18"	#6@20"
	LENGTH, H	9'-9"	3'-4"	3'-11 1/2"	9'-9"	9'-9"	11'-9"	3'-11"	11'-9"	11'-9"	9'-9"
C BARS	BAR NO. & SPACING	#4@10"	#4@14"	#4@12"	#4@10"	#4@10"	#4@14"	#4@13"	#4@14"	#4@14"	#4@10"
	HOR. LENGTH, H	2'-8 1/2"	1'-10"	2'-8 1/2"	2'-8 1/2"	2'-8 1/2"	2'-11 1/2"	1'-10"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"
	VERT. LENGTH, V	3'-11 1/2"	3'-11 1/2"	3'-11 1/2"	3'-11 1/2"	4'-1"	0'-11 1/2"	0'-11 1/2"	1'-0"	1'-1/2"	1'-2 1/2"
C_1 BARS	BAR NO. & SPACING	---	---	---	---	---	#4@14"	#4@13"	#4@14"	#4@14"	---
	HOR. LENGTH, H	---	---	---	---	---	1'-3 1/2"	1'-9 1/2"	1'-1 1/2"	1'-1 1/2"	---
	VERT. LENGTH, V	---	---	---	---	---	0'-11 1/2"	2'-0"	1'-0"	1'-1/2"	---
C_2 BARS	BAR NO. & SPACING	#4@10"	#4@14"	#5@12"	#4@10"	#4@10"	#4@14"	#4@13"	#4@14"	#4@14"	#4@10"
	HOR. LENGTH, H	2'-8 1/2"	1'-7 1/2"	3'-0"	2'-8 1/2"	2'-8 1/2"	2'-11 1/2"	1'-9 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"
	VERT. LENGTH, V	2'-0"	2'-0"	2'-0"	2'-1/2"	2'-2"	2'-0"	2'-0"	2'-1/2"	2'-1"	2'-3"
C_3 BARS	BAR NO. & SPACING	---	---	---	---	---	---	---	#4@14"	#4@14"	---
	HOR. LENGTH, H	---	---	---	---	---	---	---	1'-1/2"	1'-1/2"	---
	VERT. LENGTH, V	---	---	---	---	---	---	---	2'-1/2"	2'-1"	---
D BARS	BAR NO. & SPACING	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	4'-10 1/2"	4'-10 1/2"	4'-10 1/2"	4'-11"	5'-1 1/2"	1'-10 1/2"	1'-10 1/2"	1'-11"	2'-1/2"	2'-4"
F BARS	BAR NO. & SPACING	#4@19"	#4@20"	#4@17"	#4@20"	#4@19"	#4@17"	#4@20"	#4@18"	#4@18"	#4@20"
	LENGTH, H	9'-9"	9'-9"	9'-9"	9'-9"	9'-9"	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"
F_1 BARS	BAR NO. & SPACING	#4@19"	#4@20"	#4@17"	#5@20"	#5@19"	#4@17"	#4@20"	#5@18"	#5@18"	#6@20"
	LENGTH, H	3'-11 1/2"	3'-10"	9'-9"	9'-9"	9'-9"	4'-4"	4'-3 1/2"	11'-9"	11'-9"	11'-9"
G BARS	BAR NO. & SPACING	#4@14"	#4@12"	#4@14"	#4@13"	#4@14"	#4@14"	#4@14"	#4@14"	#4@13"	#4@12"
	LENGTH, H	6'-8"	3'-6 1/2"	6'-8"	6'-8"	6'-8"	8'-2 1/2"	3'-5"	8'-2 1/2"	8'-2 1/2"	8'-2 1/2"
G_1 BARS	BAR NO. & SPACING	#4@14"	---	#4@14"	#4@13"	#5@14"	#5@14"	#4@14"	#5@14"	#4@13"	#5@12"
	LENGTH, H	2'-2"	---	2'-1/2"	2'-1/2"	2'-5"	2'-6 1/2"	2'-1"	2'-6"	2'-7 1/2"	2'-11 1/2"
H BARS	BAR NO. & SPACING	#4@12"	#4@11"	#4@14"	#4@13"	#4@14"	#4@14"	#4@14"	#4@14"	#4@13"	#4@12"
	LENGTH, H	6'-8"	3'-4"	6'-8"	6'-8"	6'-8"	8'-2 1/2"	3'-8"	8'-2 1/2"	8'-2 1/2"	8'-2 1/2"
H_1 BARS	BAR NO. & SPACING	---	---	#4@14"	#4@13"	#5@14"	#4@14"	#4@14"	#4@14"	#5@14"	#5@12"
	LENGTH, H	---	---	2'-1"	2'-2"	2'-6"	2'-1/2"	2'-1"	2'-6 1/2"	2'-8"	3'-1/2"
CW BARS	BAR NO. & SPACING	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@16"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	4'-10 1/2"	4'-10 1/2"	4'-10 1/2"	4'-11"	5'-1 1/2"	1'-10 1/2"	1'-10 1/2"	1'-11"	2'-1/2"	2'-4"
		LONGITUDINAL REINFORCEMENT									
NO. 4 LONG BARS	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	68.4	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

DOUBLE BOX SIZE		5'-0"W x 2'-0"H					5'-0"W x 3'-0"H				
		DEPTH OF COVER IN FEET									
		2'-11"	5'	10'	15'	20'	2'-11"	5'	10'	15'	20'
TOP SLAB THICKNESS, T_1		6 1/2"	6 1/2"	6 3/4"	7 3/4"	9 1/2"	6 1/2"	6 1/2"	7"	7 3/4"	9 1/2"
WALL THICKNESS, T_2		8"	8"	8"	8"	8"	8"	8"	8"	8"	8"
BOTTOM SLAB THICKNESS, T_3		7"	7"	7"1/2"	8 1/4"	10 1/4"	7"	7"	7 3/4"	8 1/2"	10"
		TRANSVERSE REINFORCEMENT									
B BARS	BAR NO. & SPACING	#4@18"	#4@20"	#4@19"	#4@18"	#4@20"	#4@18"	#4@20"	#4@18"	#4@17"	#4@20"
	LENGTH, H	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"
B_1 BARS	BAR NO. & SPACING	#7@18"	#4@20"	#5@18"	#5@18"	#6@20"	#7@18"	#4@20"	#5@18"	#5@17"	#6@20"
	LENGTH, H	11'-9"	4'-2"	11'-9"	11'-9"	11'-9"	11'-9"	4'-4"	11'-9"	11'-9"	11'-9"
C BARS	BAR NO. & SPACING	#4@14"	#4@14"	#4@10"	#4@10"	#4@10"	#4@14"	#4@14"	#4@10"	#4@10"	#4@11"
	HOR. LENGTH, H	2'-11 1/2"	1'-8 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	1'-6"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"
	VERT. LENGTH, V	1'-11 1/2"	1'-11 1/2"	2'-0"	2'-1"	2'-2 1/2"	2'-11 1/2"	2'-11 1/2"	3'-0"	3'-1"	3'-2 1/2"
C_1 BARS	BAR NO. & SPACING	#4@14"	---	---	---	---	#4@14"	---	---	---	---
	HOR. LENGTH, H	1'-2 1/2"	---	---	---	---	1'-1 1/2"	---	---	---	---
	VERT. LENGTH, V	1'-11 1/2"	---	---	---	---	1'-3 1/2"	---	---	---	---
C_2 BARS	BAR NO. & SPACING	#4@14"	#4@14"	#4@10"	#4@10"	#4@10"	#4@14"	#4@14"	#4@10"	#4@10"	#4@10"
	HOR. LENGTH, H	2'-11 1/2"	1'-5 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	1'-6 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"
	VERT. LENGTH, V	2'-0"	2'-0"	2'-1/2"	2'-1 1/2"	2'-3 1/2"	2'-0"	2'-0"	2'-1"	2'-1 1/2"	2'-3"
C_3 BARS	BAR NO. & SPACING	---	---	---	---	---	---	---	---	---	---
	HOR. LENGTH, H	---	---	---	---	---	---	---	---	---	---
	VERT. LENGTH, V	---	---	---	---	---	---	---	---	---	---
D BARS	BAR NO. & SPACING	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	2'-10 1/2"	2'-10 1/2"	2'-11 1/2"	3'-1"	3'-4 1/2"	3'-10 1/2"	3'-10 1/2"	3'-11 1/2"	4'-1"	4'-4 1/2"
F BARS	BAR NO. & SPACING	#4@16"	#4@20"	#4@18"	#4@17"	#4@20"	#4@16"	#4@20"	#4@17"	#4@20"	#4@19"
	LENGTH, H	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"
F_1 BARS	BAR NO. & SPACING	#4@16"	#4@20"	#5@18"	#5@17"	#6@20"	#4@16"	#4@20"	#5@17"	#6@20"	#6@19"
	LENGTH, H	4'-8 1/2"	4'-7 1/2"	11'-9"	11'-9"	11'-9"	4'-10 1/2"	4'-9 1/2"	11'-9"	11'-9"	11'-9"
G BARS	BAR NO. & SPACING	#4@14"	#4@14"	#4@13"	#4@13"	#4@12"	#4@14"	#4@14"	#4@13"	#4@13"	#4@12"
	LENGTH, H	8'-2 1/2"	3'-11 1/2"	8'-2 1/2"	8'-2 1/2"	8'-2 1/2"	8'-2 1/2"	4'-1 1/2"	8'-2 1/2"	8'-2 1/2"	8'-2 1/2"
G_1 BARS	BAR NO. & SPACING	#5@14"	#4@14"	#5@13"	#5@13"	#5@12"	#5@14"	#4@14"	#5@13"	#5@13"	#5@12"
	LENGTH, H	2'-7 1/2"	2'-1 1/2"	2'-6"	2'-8 1/2"	3'-1/2"	2'-8 1/2"	2'-2"	2'-6 1/2"	2'-9"	3'-1/2"
H BARS	BAR NO. & SPACING	#4@14"	#4@14"	#4@13"	#4@12"	#4@14"	#4@14"	#4@14"	#4@13"	#4@12"	#4@11"
	LENGTH, H	8'-2 1/2"	3'-1 1/2"	8'-2 1/2"	8'-2 1/2"	8'-2 1/2"	8'-2 1/2"	4'-0"	8'-2 1/2"	8'-2 1/2"	8'-2 1/2"
H_1 BARS	BAR NO. & SPACING	#4@14"	#4@14"	#5@13"	#5@12"	#6@14"	#4@14"	#4@14"	#5@13"	#5@12"	#5@11"
	LENGTH, H	2'-1"	2'-2"	2'-7"	2'-8 1/2"	3'-3"	2'-1"	2'-2 1/2"	2'-8"	2'-9"	3'-1/2"
CW BARS	BAR NO. & SPACING	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	2'-10 1/2"	2'-10 1/2"	2'-11 1/2"	3'-1"	3'-4 1/2"	3'-10 1/2"	3'-10 1/2"	3'-11 1/2"	4'-1"	4'-4 1/2"
		LONGITUDINAL REINFORCEMENT									
NO. 4 LONG BARS	NUMBER IN TOP SLAB	20	19	18	18	18	20	19	18	18	18
	NUMBER IN BOTTOM SLAB	18	17	18	18	18	19	19	18	18	18
	NUMBER IN WALLS	6	6	6	6	6	12	12	12	12	12
	TOTAL NUMBER	44	42	42	42	42	51	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

DOUBLE BOX SIZE		5'-0"W x 4'-0"H					5'-0"W x 5'-0"H				
		DEPTH OF COVER IN FEET									
		2'-11"	5'	10'	15'	20'	2'-11"	5'	10'	15'	20'
TOP SLAB THICKNESS, T_1		6 1/2"	6 1/2"	7"	7 3/4"	9 1/2"	6 1/2"	6 1/2"	7"	7 3/4"	9 1/4"
WALL THICKNESS, T_2		8"	8"	8"	8"	8"	8"	8"	8"	8"	10 1/4"
BOTTOM SLAB THICKNESS, T_3		7"	7"	7 3/4"	8 1/2"	10 1/4"	7"	7"	7 3/4"	8 1/2"	8"
		TRANSVERSE REINFORCEMENT									
B BARS	BAR NO. & SPACING	#4@17"	#4@20"	#4@18"	#4@17"	#4@20"	#4@17"	#4@20"	#4@18"	#4@18"	#4@20"
	LENGTH, H	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"
B_1 BARS	BAR NO. & SPACING	#7@17"	#4@20"	#5@18"	#5@17"	#6@20"	#7@17"	#4@20"	#5@18"	#5@18"	#6@20"
	LENGTH, H	11'-9"	4'-5 1/2"	11'-9"	11'-9"	11'-9"	11'-9"	4'-6"	11'-9"	11'-9"	11'-9"
C BARS	BAR NO. & SPACING	#4@14"	#4@14"	#4@10"	#4@10"	#4@10"	#4@9"	#4@14"	#4@10"	#4@10"	#4@10"
	HOR. LENGTH, H	2'-11 1/2"	1'-9 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	2'-3 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"
	VERT. LENGTH, V	3'-11 1/2"	3'-11 1/2"	4'-0"	4'-1"	4'-2 1/2"	4'-11 1/2"	4'-11 1/2"	5'-0"	5'-1"	5'-2 1/2"
C_1 BARS	BAR NO. & SPACING	#4@14"	---	---	---	---	---	---	---	---	---
	HOR. LENGTH, H	1'-1 1/2"	---	---	---	---	---	---	---	---	---
	VERT. LENGTH, V	1'-1/2"	---	---	---	---	---	---	---	---	---
C_2 BARS	BAR NO. & SPACING	#4@14"	#4@14"	#4@10"	#4@10"	#4@10"	#4@9"	#4@14"	#4@10"	#4@10"	#4@10"
	HOR. LENGTH, H	2'-11 1/2"	1'-8 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"	1'-11 1/2"	2'-11 1/2"	2'-11 1/2"	2'-11 1/2"
	VERT. LENGTH, V	2'-0"	2'-0"	2'-1"	2'-1 1/2"	2'-3 1/2"	2'-0"	2'-0"	2'-1"	2'-1 1/2"	2'-3 1/2"
C_3 BARS	BAR NO. & SPACING	---	---	---	---	---	---	---	---	---	---
	HOR. LENGTH, H	---	---	---	---	---	---	---	---	---	---
	VERT. LENGTH, V	---	---	---	---	---	---	---	---	---	---
D BARS	BAR NO. & SPACING	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	4'-10 1/2"	4'-10 1/2"	4'-11 1/2"	5'-1 1/2"	5'-5"	5'-10 1/2"	5'-10 1/2"	5'-11 1/2"	6'-1 1/2"	6'-4 1/2"
F BARS	BAR NO. & SPACING	#4@15"	#4@19"	#4@17"	#4@20"	#4@20"	#4@15"	#4@19"	#4@17"	#4@17"	#4@20"
	LENGTH, H	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"	11'-9"
F_1 BARS	BAR NO. & SPACING	#4@15"	#4@19"	#5@17"	#6@20"	#6@20"	#4@15"	#4@19"	#5@17"	#5@17"	#6@20"
	LENGTH, H	5'-0"	4'-10"	11'-9"	11'-9"	11'-9"	11'-9"	4'-10 1/2"	11'-9"	11'-9"	11'-9"
G BARS	BAR NO. & SPACING	#4@14"	#4@14"	#4@13"	#4@13"	#4@12"	#4@14"	#4@14"	#4@13"	#4@13"	#4@12"
	LENGTH, H	8'-2 1/2"	4'-2"	8'-2 1/2"	8'-2 1/2"	8'-2 1/2"	8'-2 1/2"	4'-2 1/2"	8'-2 1/2"	8'-2 1/2"	8'-2 1/2"
G_1 BARS	BAR NO. & SPACING	#5@14"	#4@14"	#5@13"	#5@13"	#5@12"	#5@14"	#4@14"	#5@13"	#5@13"	#5@12"
	LENGTH, H	2'-9"	2'-2"	2'-7"	2'-9"	3'-1/2"	2'-9 1/2"	2'-2 1/2"	2'-7"	2'-8 1/2"	3'-0"
H BARS	BAR NO. & SPACING	#4@14"	#4@14"	#4@13"	#4@12"	#4@11"	#4@12"	#4@14"	#4@13"	#4@12"	#4@12"
	LENGTH, H	8'-2 1/2"	4'-0"	8'-2 1/2"	8'-2 1/2"	8'-2 1/2"	8'-2 1/2"	3'-11 1/2"	8'-2 1/2"	8'-2 1/2"	8'-2 1/2"
H_1 BARS	BAR NO. & SPACING	#4@14"	#4@14"	#5@13"	#5@12"	#5@11"	#4@12"	#4@14"	#5@13"	#5@12"	#5@12"
	LENGTH, H	2'-1 1/2"	2'-3"	2'-8"	2'-9"	3'-1/2"	2'-2"	2'-3"	2'-8"	2'-9"	3'-1"
CW BARS	BAR NO. & SPACING	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	4'-10 1/2"	4'-10 1/2"	4'-11 1/2"	5'-1 1/2"	5'-5"	5'-10 1/2"	5'-10 1/2"	5'-11 1/2	6'-1 1/2"	6'-4 1/2"
		LONGITUDINAL REINFORCEMENT									
NO. 4 LONG BARS	NUMBER IN TOP SLAB	20	19	18	18	18	20	19	18	18	18
	NUMBER IN BOTTOM SLAB	19	19	18	18	18	19	19	18	18	18
	NUMBER IN WALLS	12	12	12	12	12	18	18	18	18	18
	TOTAL NUMBER	51	50	48	48	48	57	56	54	54	54
CONCRETE: CU. YDS. PER LIN. FT.		0.83	0.83	0.88	0.93	1.06	0.9	0.90	0.95	1.01	1.13
STEEL: LBS. PER LIN. FT.		99.3	77.3	102.8	106.0	110.2	110.3	85.2	110.2	111.5	116.7

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REINFORCED CONCRETE BOX CULVERT

STANDARD PLAN
3053-0
SHEET 17 OF 21

DOUBLE BOX SIZE		6'-0"W x 1'-0"H					6'-0"W x 2'-0"H				
		DEPTH OF COVER IN FEET									
		2'-11"	5'	10'	15'	20'	2'-11"	5'	10'	15'	20'
TOP SLAB THICKNESS, T_1		6 3/4"	6 1/2"	7 1/2"	8 3/4"	10 3/4"	6 3/4"	6 1/2"	7 3/4"	8 3/4"	11"
WALL THICKNESS, T_2		7"	8"	8"	8"	8"	8"	8"	8"	8"	8"
BOTTOM SLAB THICKNESS, T_3		8"	7"	8 1/4"	9 1/2"	11 1/2"	7"	7"	8 1/2"	9 3/4"	11 1/2"
		TRANSVERSE REINFORCEMENT									
B BARS	BAR NO. & SPACING	#4@20"	#4@20"	#4@20"	#4@19"	#4@17"	#4@19"	#4@20"	#4@20"	#4@19"	#4@17"
	LENGTH, H	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"
B_1 BARS	BAR NO. & SPACING	#8@20"	#5@20"	#6@20"	#6@19"	#6@17"	#8@19"	#5@20"	#6@20"	#6@19"	#6@17"
	LENGTH, H	13'-9"	4'-9"	13'-9"	13'-9"	13'-9"	13'-9"	5'-1/2"	13'-9"	13'-9"	13'-9"
C BARS	BAR NO. & SPACING	#4@12"	#5@13"	#4@14"	#4@14"	#4@10"	#4@12"	#4@9"	#4@9"	#4@10"	#4@11"
	HOR. LENGTH, H	3'-2 1/2"	2'-1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	2'-0"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"
	VERT. LENGTH, V	1'-0"	0'-11 1/2"	1'-1/2"	1'-2"	1'-4"	2'-0"	1'-11 1/2"	2'-1"	2'-2"	2'-4"
C_1 BARS	BAR NO. & SPACING	#5@12"	---	#4@14"	#4@14"	---	#4@12"	---	---	---	---
	HOR. LENGTH, H	1'-6"	---	1'-3 1/2"	1'-3 1/2"	---	1'-4 1/2"	---	---	---	---
	VERT. LENGTH, V	1'-0"	---	1'-1/2"	1'-2"	---	2'-0"	---	---		---
C_2 BARS	BAR NO. & SPACING	#5@12"	#5@13	#4@14"	#4@14"	#4@10"	#4@12"	#4@9"	#4@9"	#4@10"	#4@11"
	HOR. LENGTH, H	2'-0"	2'-1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	1'-10 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"
	VERT. LENGTH, V	2'-0"	2'-4"	2'-1 1/2"	2'-2 1/2"	2'-4 1/2"	2'-0"	2'-0"	2'-1 1/2"	2'-3"	2'-4 1/2"
C_3 BARS	BAR NO. & SPACING	---	---	#4@14"	#4@14"	---	---	---	---	---	---
	HOR. LENGTH, H	---	---	1'-3"	1'-2"	---	---	---	---	---	---
	VERT. LENGTH, V	---	---	2'-1 1/2"	2'-2 1/2"	---	---	---	---	---	---
D BARS	BAR NO. & SPACING	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	1'-11"	1'-10 1/2"	2'-1/2"	2'-3"	2'-7 1/2"	2'-10 1/2"	2'-10 1/2"	3'-1"	3'-3 1/2"	3'-7 1/2"
F BARS	BAR NO. & SPACING	#4@18"	#4@20"	#4@20"	#4@19"	#4@17"	#4@20"	#4@20"	#4@19"	#4@18"	#4@20"
	LENGTH, H	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"
F_1 BARS	BAR NO. & SPACING	#4@18"	#5@20"	#6@20"	#6@19"	#6@17"	#5@20"	#5@20"	#6@19"	#6@18"	#7@20"
	LENGTH, H	4'-11"	5'-1 1/2"	13'-9"	13'-9"	13'-9"	5'-5 1/2"	5'-5 1/2"	13'-9"	13'-9"	13'-9"
G BARS	BAR NO. & SPACING	#4@12"	#4@12"	#4@13"	#4@12"	#4@11"	#4@12"	#4@14"	#4@11"	#4@12"	#4@11"
	LENGTH, H	9'-8 1/2"	4'-1 1/2"	9'-8 1/2"	9'-8 1/2"	9'-8 1/2"	9'-8 1/2"	4'-7"	9'-8 1/2"	9'-8 1/2"	9'-8 1/2"
G_1 BARS	BAR NO. & SPACING	#5@12"	#4@12"	#6@13"	#6@12"	#6@11"	#5@12"	#5@14"	#5@11"	#6@12"	#6@11"
	LENGTH, H	2'-10 1/2"	2'-5 1/2"	3'-1/2"	3'-3"	3'-7 1/2"	3'-0"	2'-8"	2'-11 1/2"	3'-3 1/2"	3'-8 1/2"
H BARS	BAR NO. & SPACING	#4@13"	#4@14"	#4@13"	#4@12"	#4@11"	#4@13"	#4@14"	#4@12"	#4@12"	#4@11"
	LENGTH, H	6'-6 1/2"	4'-4"	9'-8 1/2"	9'-8 1/2"	9'-8 1/2"	9'-8 1/2"	4'-6 1/2"	9'-8 1/2"	9'-8 1/2"	9'-8 1/2"
H_1 BARS	BAR NO. & SPACING	#4@13"	#5@14"	#6@13"	#6@12"	#6@11"	#4@13"	#5@14"	#6@13"	#6@12"	#6@11"
	LENGTH, H	2'-5"	2'-7 1/2"	3'-1 1/2"	3'-4"	3'-8 1/2"	2'-5 1/2"	2'-8 1/2"	3'-2"	3'-5"	3'-9"
CW BARS	BAR NO. & SPACING	#4@12"	#4@18"	#4@18"	#4@18"	#4@18"	#4@13"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	1'-11"	1'-10 1/2"	2'-1/2"	2'-3"	2'-7 1/2"	2'-10 1/2"	2'-10 1/2"	3'-1"	3'-3 1/2"	3'-7 1/2"
		LONGITUDINAL REINFORCEMENT									
NO. 4 LONG BARS	NUMBER IN TOP SLAB	24	21	22	22	22	24	22	22	22	22
	NUMBER IN BOTTOM SLAB	22	21	22	22	22	22	22	22	22	22
	NUMBER IN WALLS	6	6	6	6	6	6	6	6	6	6
	TOTAL NUMBER	52	48	50	50	50	52	50	50	50	50
CONCRETE: CU. YDS. PER LIN. FT.		0.71	0.69	0.79	0.90	1.07	0.78	0.77	0.89	0.98	1.16
STEEL: LBS. PER LIN. FT.		106.3	82.0	110.7	115.6	122.5	111.7	86.5	116.1	118.3	125.9

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REINFORCED CONCRETE BOX CULVERT

STANDARD PLAN
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SHEET 18 OF 21

DOUBLE BOX SIZE		6'-0"W x 3'-0"H					6'-0"W x 4'-0"H				
		DEPTH OF COVER IN FEET									
		2'-11"	5'	10'	15'	20'	2'-11"	5'	10'	15'	20'
TOP SLAB THICKNESS, T_1		6 1/2"	6 1/2"	7 3/4"	9"	11"	6 1/2"	6 1/2"	7 3/4"	9"	11"
WALL THICKNESS, T_2		8"	8"	8"	8"	8"	8"	8"	8"	8"	8"
BOTTOM SLAB THICKNESS, T_3		7"	7"	8 3/4"	9 3/4"	11 3/4"	7"	7"	8 3/4"	9 3/4"	12"
		TRANSVERSE REINFORCEMENT									
B BARS	BAR NO. & SPACING	#4@19"	#4@20"	#4@19"	#4@18"	#4@17"	#4@18"	#4@19"	#4@19"	#4@18"	#4@17"
	LENGTH, H	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"
B_1 BARS	BAR NO. & SPACING	#8@19"	#5@20"	#6@19"	#6@18"	#6@17"	#8@18"	#5@19"	#6@19"	#6@18"	#6@17"
	LENGTH, H	13'-9"	5'-2 1/2"	13'-9"	13'-9"	13'-9"	13'-9"	5'-3"	13'-9"	13'-9"	13'-9"
C BARS	BAR NO. & SPACING	#4@13"	#4@11"	#4@14"	#4@11"	#4@11"	#4@14"	#4@11"	#4@10"	#4@11"	#4@11"
	HOR. LENGTH, H	3'-2 1/2"	1'-11"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	1'-10 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"
	VERT. LENGTH, V	2'-11 1/2"	2'-11 1/2"	3'-1"	3'-2"	3'-4"	3'-11 1/2"	3'-11 1/2"	4'-1"	4'-2"	4'-4"
C_1 BARS	BAR NO. & SPACING	#4@13"	---	#4@14"	---	---	#4@14"	---	---	---	---
	HOR. LENGTH, H	1'-4"	---	1'-1"	---	---	1'-3 1/2"	---	---	---	---
	VERT. LENGTH, V	2'-11 1/2"	---	1'-2 1/2"	---	---	2'-3"	---	---	---	---
C_2 BARS	BAR NO. & SPACING	#4@13"	#4@11"	#5@14"	#4@11"	#4@11"	#4@14"	#4@11"	#4@10"	#4@11"	#4@11"
	HOR. LENGTH, H	3'-2 1/2"	3'-2 1/2"	3'-6"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	1'-9 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"
	VERT. LENGTH, V	2'-0"	2'-0"	2'-2"	2'-3"	2'-5"	2'-0"	2'-0"	2'-2"	2'-3"	2'-5"
C_3 BARS	BAR NO. & SPACING	---	---	---	---	---	---	---	---	---	---
	HOR. LENGTH, H	---	---	---	---	---	---	---	---	---	---
	VERT. LENGTH, V	---	---	---	---	---	---	---	---	---	---
D BARS	BAR NO. & SPACING	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	3'-10 1/2"	3'-10 1/2"	4'-1 1/2"	4'-4"	4'-8"	4'-10 1/2"	4'-10 1/2"	5'-1 1/2"	5'-3 1/2"	5'-8"
F BARS	BAR NO. & SPACING	#4@17"	#4@19"	#4@19"	#4@18"	#4@20"	#4@17"	#4@19"	#4@18"	#4@18"	#4@17"
	LENGTH, H	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"
F_1 BARS	BAR NO. & SPACING	#4@17"	#5@19"	#6@19"	#6@18"	#7@20"	#4@17"	#5@19"	#6@18"	#6@18"	#6@17"
	LENGTH, H	5'-5 1/2"	5'-7"	13'-9"	13'-9"	13'-9"	5'-7 1/2"	5'-8 1/2"	13'-9"	13'-9"	13'-9"
G BARS	BAR NO. & SPACING	#4@12"	#4@14"	#4@12"	#4@12"	#4@11"	#4@12"	#4@14"	#4@12"	#4@12"	#4@11"
	LENGTH, H	9'-8 1/2"	4'-8 1/2"	9'-8 1/2"	9'-8 1/2"	9'-8 1/2"	9'-8 1/2"	4'-9"	9'-8 1/2"	9'-8 1/2"	9'-8 1/2"
G_1 BARS	BAR NO. & SPACING	#5@12"	#5@14"	#6@12"	#6@12"	#6@11"	#5@12"	#5@14"	#6@12"	#6@12"	#6@11"
	LENGTH, H	3'-1/2"	2'-8 1/2"	3'-1 1/2"	3'-4 1/2"	3'-9"	3'-2 1/2"	2'-9"	3'-1 1/2"	3'-4 1/2"	3'-8 1/2"
H BARS	BAR NO. & SPACING	#4@13"	#4@14"	#4@12"	#4@12"	#5@14"	#4@13"	#4@13"	#4@12"	#4@10"	#5@14"
	LENGTH, H	9'-8 1/2"	9'-8 1/2"	9'-8 1/2"	9'-8 1/2"	9'-8 1/2"	9'-8 1/2"	4'-7"	9'-8 1/2"	9'-8 1/2"	9'-8 1/2"
H_1 BARS	BAR NO. & SPACING	#4@13"	#5@14"	#6@12"	#6@12"	#6@14"	#4@13"	#5@13"	#6@12"	#5@10"	#6@14"
	LENGTH, H	2'-6"	2'-9 1/2"	3'-3"	3'-5 1/2"	3'-7"	2'-6 1/2"	2'-9"	3'-3"	3'-3 1/2"	3'-7 1/2"
CW BARS	BAR NO. & SPACING	#4@15"	#4@18"	#4@18"	#4@18"	#4@18"	#4@16"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	3'-10 1/2"	3'-10 1/2"	4'-1 1/2"	4'-4"	4'-8"	4'-10 1/2"	4'-10 1/2"	5'-1 1/2	5'-3 1/2"	5'-8"
		LONGITUDINAL REINFORCEMENT									
NO. 4 LONG BARS	NUMBER IN TOP SLAB	26	22	22	22	22	26	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	135.3

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REINFORCED CONCRETE BOX CULVERT

STANDARD PLAN
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SHEET 19 OF 21

DOUBLE BOX SIZE		6'-0"W x 5'-0"H					6'-0"W x 6'-0"H				
		DEPTH OF COVER IN FEET									
		2'-11"	5'	10'	15'	20'	2'-11"	5'	10'	15'	20'
TOP SLAB THICKNESS, T_1		6 1/2"	6 1/2"	8"	9"	10 3/4"	6 1/2"	6 1/2"	8"	9"	10 3/4"
WALL THICKNESS, T_2		7"	8"	8"	8"	8"	8"	8"	8"	8"	8"
BOTTOM SLAB THICKNESS, T_3		8"	7"	8 3/4"	9 3/4"	12"	7"	7"	8 3/4"	10"	12"
		TRANSVERSE REINFORCEMENT									
B BARS	BAR NO. & SPACING	#4@18"	#4@19"	#4@19"	#4@19"	#4@17"	#4@18"	#4@19"	#4@19"	#4@19"	#4@17"
	LENGTH, H	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"
B_1 BARS	BAR NO. & SPACING	#8@18"	#5@19"	#6@19"	#6@19"	#6@17"	#8@18"	#5@19"	#6@19"	#6@19"	#6@17"
	LENGTH, H	13'-9"	5'-4"	13'-9"	13'-9"	13'-9"	13'-9"	5'-4"	13'-9"	13'-9"	13'-9"
C BARS	BAR NO. & SPACING	#4@14"	#4@11"	#4@11"	#4@11"	#4@10"	#4@14"	#4@11"	#4@14"	#4@10"	#4@10"
	HOR. LENGTH, H	3'-2 1/2"	2'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	2'-10"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"
	VERT. LENGTH, V	4'-11 1/2"	4'-11 1/2"	5'-1"	5'-2"	5'-4"	5'-11 1/2"	5'-11 1/2"	6'-1"	6'-2"	6'-4"
C_1 BARS	BAR NO. & SPACING	#4@14"	---	---	---	---	#4@14"	---	#4@14"	---	---
	HOR. LENGTH, H	1'-3 1/2"	---	---	---	---	1'-3"	---	1'-2"	---	---
	VERT. LENGTH, V	2'-1 1/2"	---	---	---	---	2'-1/2"	---	1'-0"	---	---
C_2 BARS	BAR NO. & SPACING	#4@14"	#4@11"	#4@11"	#4@11"	#4@10"	#4@14"	#4@11"	#5@14"	#4@10"	#4@10"
	HOR. LENGTH, H	3'-2 1/2"	2'-0"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-2 1/2"	3'-6"	3'-2 1/2"	3'-2 1/2"
	VERT. LENGTH, V	2'-0"	2'-0"	2'-2"	2'-3"	2'-5"	2'-0"	2'-0"	2'-2"	2'-3"	2'-5"
C_3 BARS	BAR NO. & SPACING	---	---	---	---	---	---	---	---	---	---
	HOR. LENGTH, H	---	---	---	---	---	---	---	---	---	---
	VERT. LENGTH, V	---	---	---	---	---	---	---	---	---	---
D BARS	BAR NO. & SPACING	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	5'-10 1/2"	5'-10 1/2"	6'-1 1/2"	6'-4"	6'-8"	6'-10 1/2"	6'-10 1/2"	7-1 1/2	7'-4"	7'-7 1/2"
F BARS	BAR NO. & SPACING	#4@20"	#4@18"	#4@18"	#4@18"	#4@17"	#4@16"	#4@18"	#4@18"	#4@18"	#4@17"
	LENGTH, H	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"	13'-9"
F_1 BARS	BAR NO. & SPACING	#5@20"	#5@18"	#6@18"	#6@18"	#6@17"	#4@16"	#5@18"	#6@18"	#6@18"	#6@17"
	LENGTH, H	6'-0"	5'-8 1/2"	13'-9"	13'-9"	13'-9"	13'-9"	5'-9 1/2"	13'-9"	13'-9"	13'-9"
G BARS	BAR NO. & SPACING	#4@12"	#4@14"	#4@12"	#4@12"	#4@11"	#4@12"	#4@13"	#4@12"	#4@12"	#4@11
	LENGTH, H	9'-8 1/2"	4'-9 1/2"	9'-8 1/2"	9'-8 1/2"	9'-8 1/2"	9'-8 1/2"	4'-9 1/2"	9'-8 1/2"	9'-8 1/2"	9'-8 1/2"
G_1 BARS	BAR NO. & SPACING	#5@12"	#5@14"	#6@12"	#6@12"	#6@11"	#5@12"	#5@13"	#6@12"	#6@12"	#6@11"
	LENGTH, H	3'-3 1/2"	2'-9 1/2"	3'-2"	3'-4 1/2"	3'-8"	3'-4 1/2"	2'-8 1/2"	3'-2"	3'-4"	3'-7 1/2"
H BARS	BAR NO. & SPACING	#4@13"	#4@13"	#4@12"	#4@10"	#5@14"	#4@12"	#4@13"	#4@12"	#4@12"	#5@14"
	LENGTH, H	9'-8 1/2"	4'-7"	9'-8 1/2"	9'-8 1/2"	9'-8 1/2"	9'-8 1/2"	9'-8 1/2"	9'-8 1/2"	9'-8 1/2"	9'-8 1/2"
H_1 BARS	BAR NO. & SPACING	#4@13"	#5@13"	#6@12"	#5@10"	#6@14"	#4@12"	#5@13"	#6@12"	#6@12"	#6@14"
	LENGTH, H	2'-6 1/2"	2'-9"	3'-3"	3'-3 1/2"	3'-7"	2'-6"	2'-9 1/2"	3'-3"	3'-6"	3'-6 1/2"
CW BARS	BAR NO. & SPACING	#4@17"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"	#4@18"
	LENGTH, H	5'-10 1/2"	5'-10 1/2"	6'-1 1/2"	6'-4"	6'-8"	6'-10 1/2"	6'-10 1/2"	7'-1 1/2"	7'-4"	7'-7 1/2"
		LONGITUDINAL REINFORCEMENT									
NO. 4 LONG BARS	NUMBER IN TOP SLAB	26	22	22	22	22	26	22	22	22	22
	NUMBER IN BOTTOM SLAB	22	22	22	22	22	22	22	22	22	22
	NUMBER IN WALLS	18	18	18	18	18	24	24	24	24	24
	TOTAL NUMBER	66	62	62	62	62	72	68	68	68	68
CONCRETE: CU. YDS. PER LIN. FT.		0.99	0.99	1.13	1.22	1.39	1.06	1.06	1.21	1.30	1.46
STEEL: LBS. PER LIN. FT.		130.1	105.7	133.5	134.9	144.4	137.1	119.3	142.6	144.1	151.7

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REINFORCED CONCRETE BOX CULVERT

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NOTES

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.

6. IN ALL SECTIONS LAP C AND C_2 BARS. THE VERTICAL LENGTH OF THE C AND C_2 BARS HAS BEEN CALCULATED FOR A 4" STARTER WALL. IF THE HEIGHT OF THE STARTER WALL IS VARIED, THE VERTICAL BAR LENGTHS ARE TO BE VARIED SO AS TO MAINTAIN A 30 DIAMETER LAP BETWEEN THE TWO BARS. LENGTH OF THE C AND C_2 BARS SHALL BE VARIED CORRESPONDINGLY THE LAPS SHALL BE BASED ON THE SMALLER BAR. THIS ALSO APPLIES TO C_1 AND C_3 BARS IF VERTICAL LENGTH OF C_1 = C. THE C_1 BAR SHALL LAP 30 DIAMETERS WITH THE C_3 BAR.

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 SYMMETRICALLLY 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
Ku=Ku'=0.150
Bd=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
fc = 1800 PSI
fs =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

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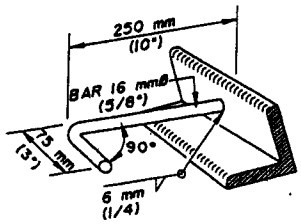
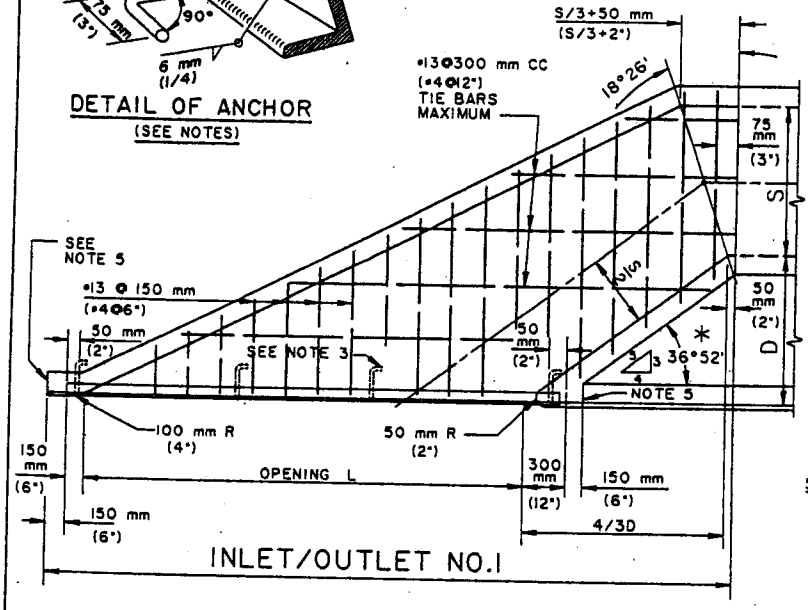
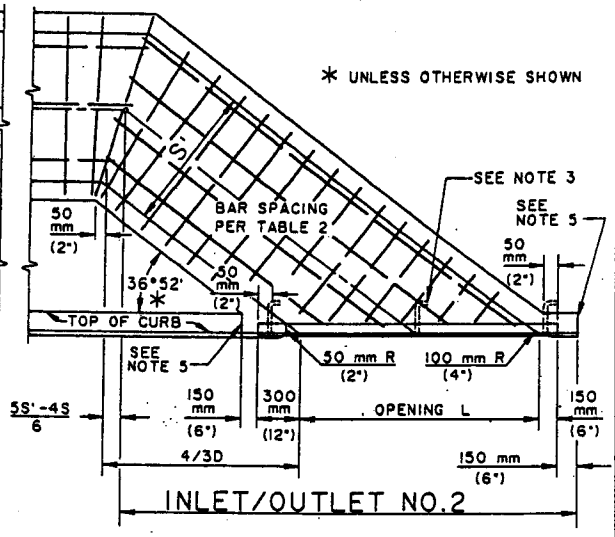
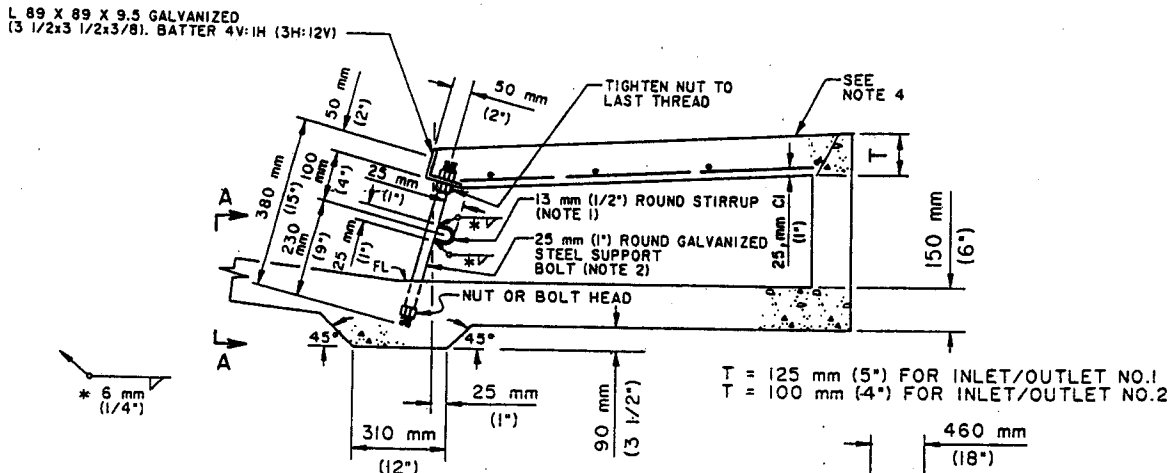
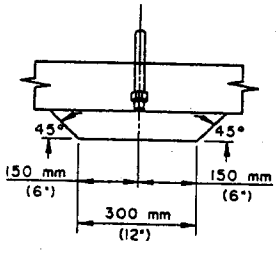


DETAIL OF ANCHOR
(SEE NOTES)

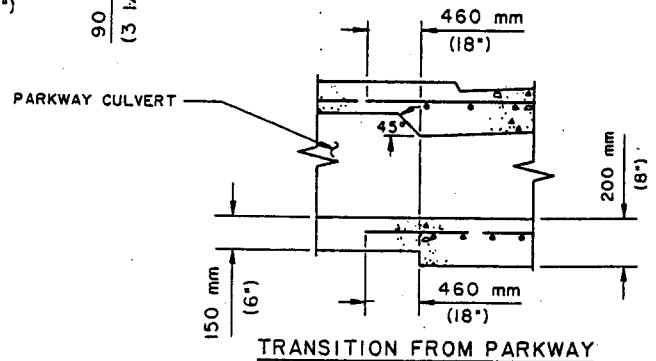








SECTION A-A



TRANSITION FROM PARKWAY CULVERT TO BOX CULVERT

SEE SHEET 3 FOR NOTES

TYPICAL SECTION INLET/OUTLET STRUCTURE

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

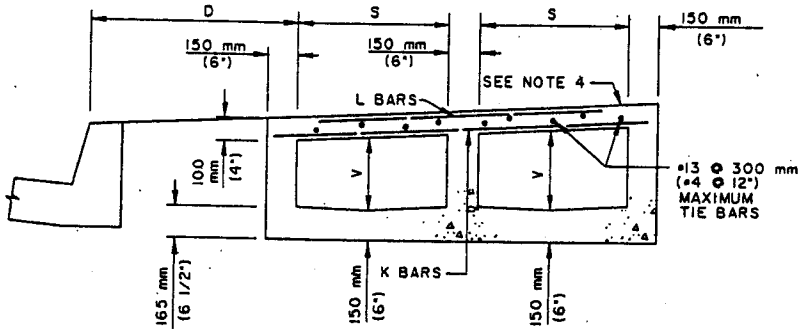
PARKWAY CULVERT

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

1999
REVISIONS

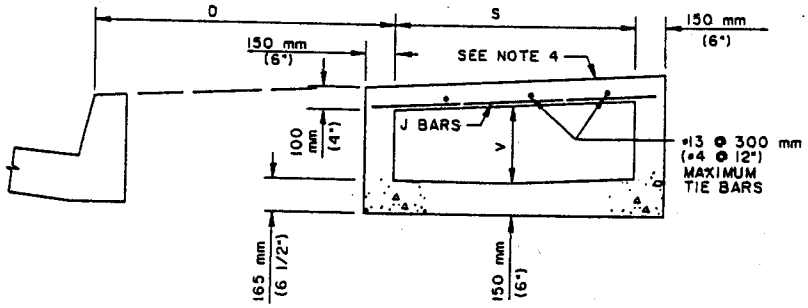
STANDARD PLAN METRIC
3055-1
SHEET 1 OF 3

STDPLNS:DPW:3055-IMETRIC



TYPICAL SECTION OF DOUBLE BOX IN PARKWAY

SEE TABLE 1



TYPICAL SECTION OF SINGLE BOX IN PARKWAY

SEE TABLE 2

TABLE 1

SPAN (S)	K-BARS			SPAN (S)	L-BARS		
	SIZE	SPACING CC	LENGTH		SIZE	SPACING CC	LENGTH
0.9 m (3'-0")	#13 (#4)	250 mm (10")	2.24 m (7'-4")	0.9 m (3'-0")	#13 (#4)	250 mm (10")	0.70 m (2'-3")
1.1 m (3'-6")	#13 (#4)	250 mm (10")	2.54 m (8'-4")	1.07 m (3'-6")	#13 (#4)	200 mm (8")	0.76 m (2'-6")
1.2 m (4'-0")	#13 (#4)	250 mm (10")	2.84 m (9'-4")	1.22 m (4'-0")	#13 (#4)	150 mm (6")	0.84 m (2'-9")
1.4 m (4'-6")	#13 (#4)	230 mm (9")	3.15 m (10'-4")	1.37 m (4'-6")	#13 (#4)	140 mm (5-1/2")	0.91 m (3'-0")
1.5 m (5'-0")	#13 (#4)	180 mm (7")	3.45 m (11'-4")	1.53 m (5'-0")	#13 (#4)	115 mm (4-1/2")	1.00 m (3'-3")
1.7 m (5'-6")	#13 (#4)	140 mm (5-1/2")	3.76 m (12'-4")	1.68 m (5'-6")	#13 (#4)	125 mm (5")	1.07 m (3'-6")
1.8 m (6'-0")	#13 (#4)	115 mm (4-1/2")	4.10 m (13'-4")	1.83 m (6'-0")	#16 (#5)	125 mm (5")	1.15 m (3'-9")

TABLE 2

J-BARS							
SPAN (S)	SIZE	SPACING CC	LENGTH	SPAN (S)	SIZE	SPACING CC	LENGTH
0.762 m (2'-6")	#13 (#4)	250 mm (10")	1.02 m (3'-4")	1.4 m (4'-6")	#13 (#4)	180 mm (7")	1.63 m (5'-4")
0.915 m (3'-0")	#13 (#4)	250 mm (10")	1.17 m (3'-10")	1.5 m (5'-0")	#13 (#4)	125 mm (5")	1.78 m (5'-10")
1.07 m (3'-6")	#13 (#4)	250 mm (10")	1.32 m (4'-4")	1.7 m (5'-6")	#13 (#4)	115 mm (4 1/2")	1.93 m (6'-4")
1.22 m (4'-0")	#13 (#4)	230 mm (9")	1.47 m (4'-10")	1.8 m (6'-0")	#13 (#4)	100 mm (4")	2.08 m (6'-10")

SEE SHEET 3 FOR NOTES

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

PARKWAY CULVERT

STANDARD PLAN METRIC

3055-1

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 MANHOLES IN SIDEWALK AREA SEE STD. PLAN 300, CURB OPENING CATCH BASIN.
9. SPACING OF TRANSVERSE REINFORCEMENT SHALL BE MEASURED ALONG ℄ 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 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 CULVERT

STANDARD PLAN
METRIC
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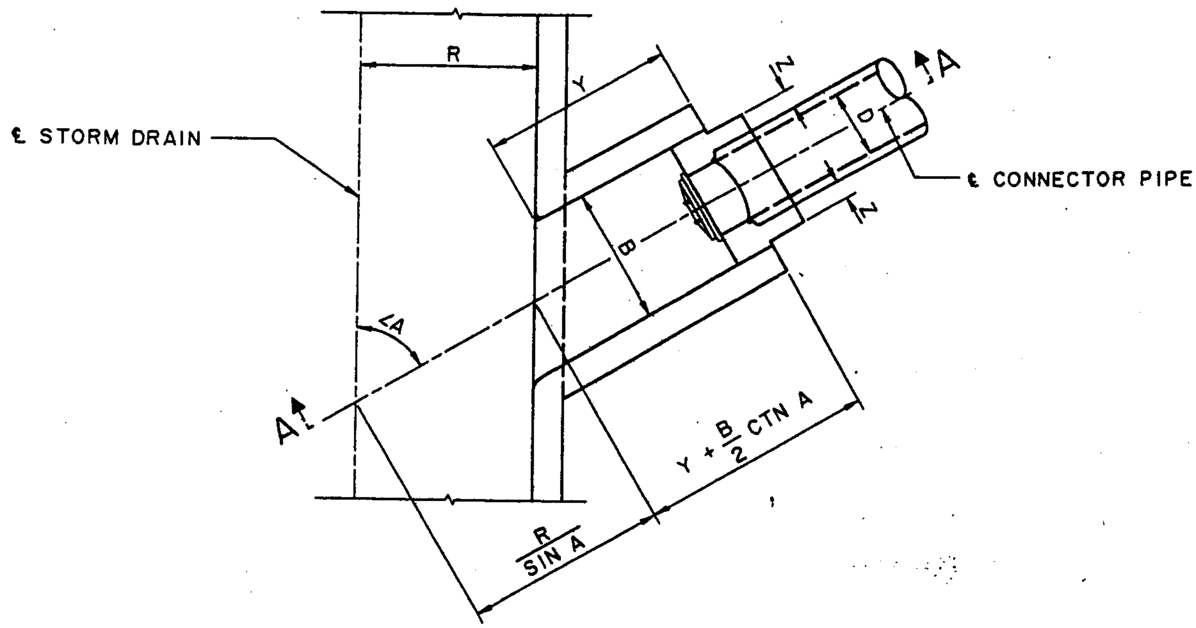
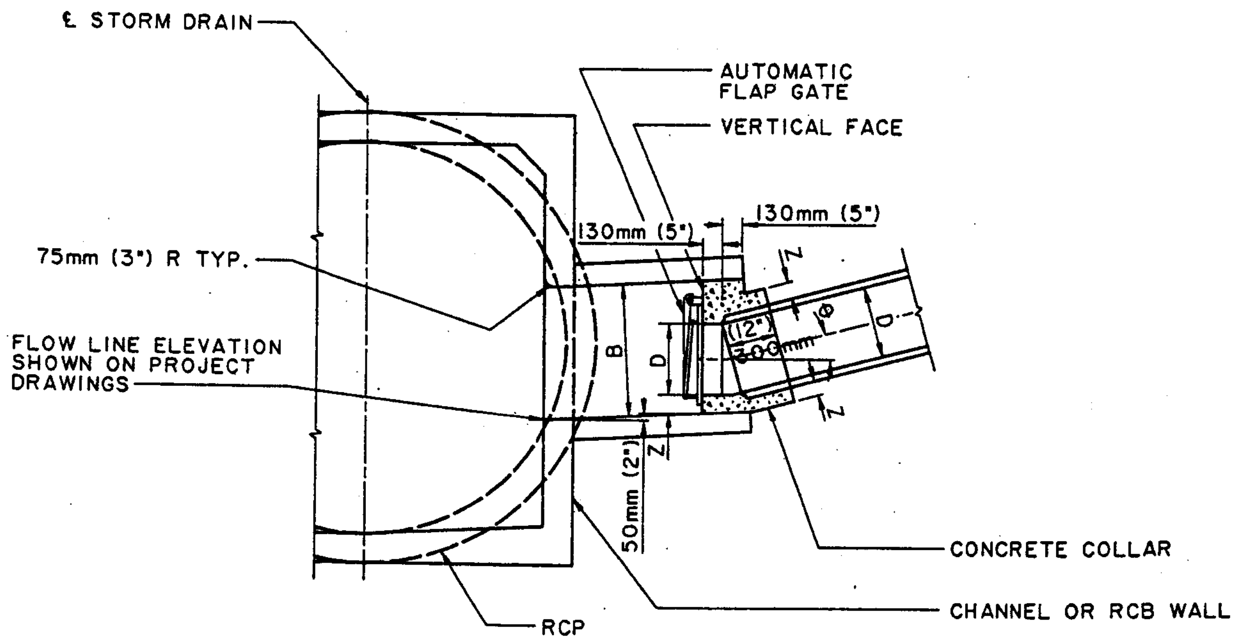


PLAN



SECTION A-A

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

AUTOMATIC FLAP GATE INLET

APPROVED *Thomas A. Tidemanson* DIRECTOR OF PUBLIC WORKS	5/31/1992 DATE	1995, 1999 REVISIONS

STANDARD PLAN
METRIC
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D (IN.)	B (IN.)	Z (IN.)	Y (FT.)
300mm (12)	600mm (24)	130mm (5)	1.20m (4)
375mm (15)	680mm (27)	130mm (5)	1.20m (4)
450mm (18)	830mm (33)	130mm (5)	1.20m (4)
525mm (21)	980mm (39)	130mm (5)	1.20m (4)
600mm (24)	1050mm (42)	130mm (5)	1.20m (4)
750mm (30)	1280mm (51)	150mm (6)	1.40m (4.5)
900mm (36)	1500mm (60)	150mm (6)	1.50m (5)
1050mm (42)	1800mm (72)	180mm (7)	1.80m (6)
1200mm (48)	2030mm (81)	180mm (7)	2.00m (6.5)
1350mm (54)	2180mm (87)	180mm (7)	2.10m (7)
1500mm (60)	2400mm (96)	200mm (8)	2.40m (8)
1650mm (66)	2700mm (108)	200mm (8)	2.60m (8.5)
1800mm (72)	2850mm (114)	200mm (8)	2.70m (9)
1950mm (78)	3150mm (126)	230mm (9)	2.90m (9.5)
2100mm (84)	3450mm (138)	230mm (9)	3.20m (10.5)
2250mm (90)	3600mm (144)	230mm (9)	3.40m (11)

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 θ 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.

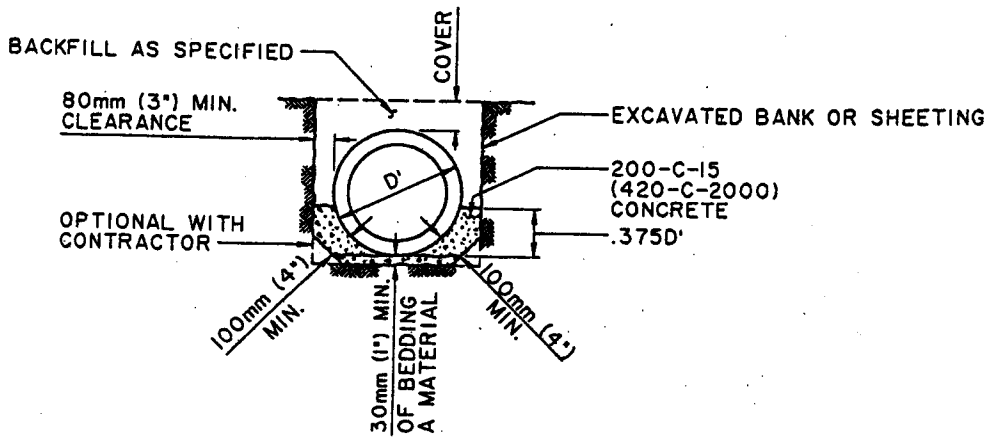
THE FOLLOWING STANDARD PLANS ARE INCORPORATED HEREIN:

331	JUNCTION STRUCTURE - PIPE TO PIPE (INLET ID ≥ 600mm (24") OR OD > .5 MAIN LINE ID)
333	JUNCTION STRUCTURE - PIPE TO RCB
380	CONCRETE COLLAR FOR PIPES 300mm (12 INCHES) THROUGH 1800mm (72 INCHES)

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

AUTOMATIC FLAP GATE

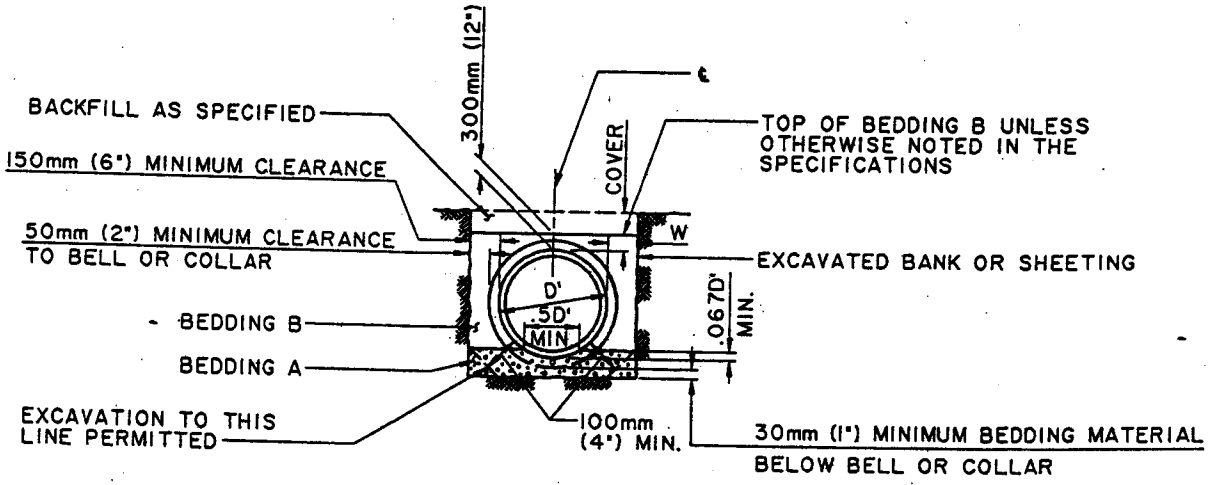
STANDARD PLAN METRIC
3061-2
SHEET 2 OF 2



CASE 1

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) SCREED BEDDING A TO FIT CURVATURE AND GRADE OF PIPE. TYPE OF SCREED AND THE METHOD OF USE TO BE APPROVED BY THE ENGINEER.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

PIPE BEDDING IN TRENCHES

STANDARD PLAN METRIC
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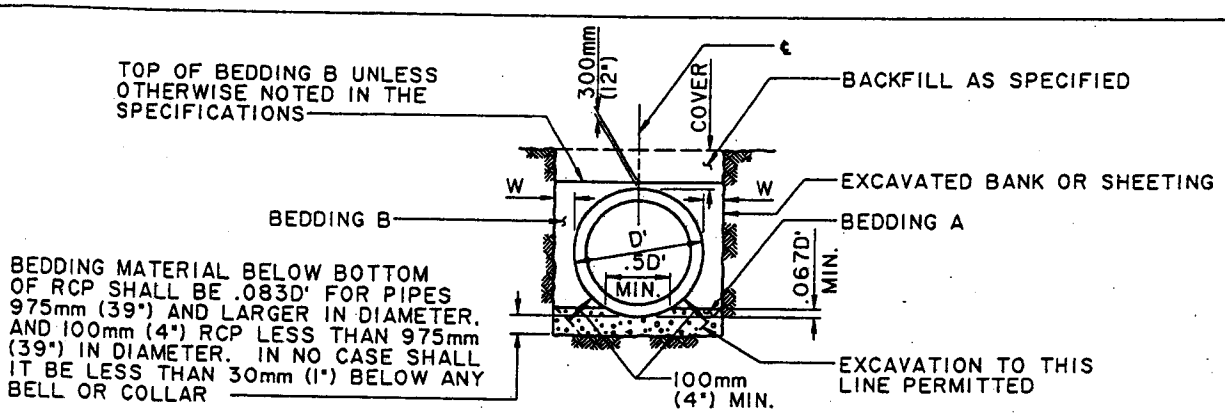
APPROVED Thomas A. Tidemanson 5/31/1992
DIRECTOR OF PUBLIC WORKS — DATE

1995, 1999
REVISIONS

STDPLNS.DPW.3080-2



CASE 3
REINFORCED CONCRETE PIPE

NOTES:

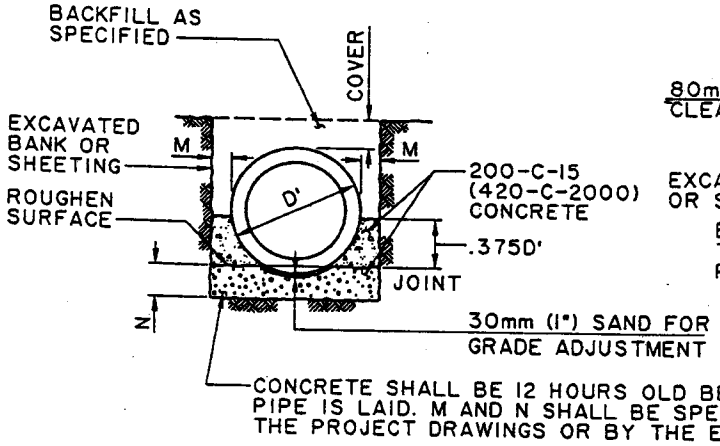
CASE 3 BEDDING & BACKFILL AROUND RCP (LOAD FACTOR 1.8)

(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 (63") TO 2700mm (108") INCLUSIVE 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.

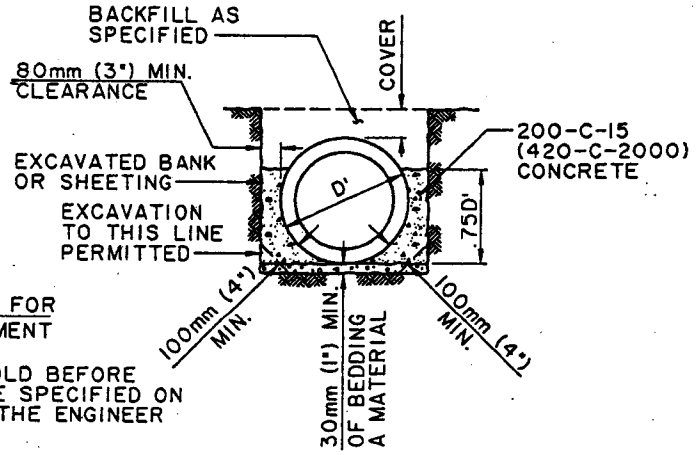


CASE 4.

NOTE:

CASE 4 BEDDING (LOAD FACTOR 3.0)

WHERE REQUIRED BY THE ENGINEER AS AN ALTERNATIVE TO CASE 1 OR CASE 5 TO MEET CONDITIONS ARISING DURING CONSTRUCTION.



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

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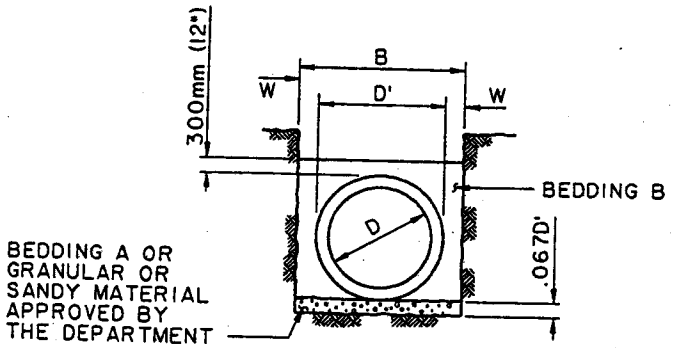

CASE 6

NOTES:

CASE 6 BEDDING (LOAD FACTOR 1.5)

(a)

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

WHERE SUBGRADE IS COMPOSED OF OTHER THAN GRANULAR OR SANDY MATERIAL, THE TRENCH SHALL BE EXCAVATED TO A DEPTH OF AT LEAST 80mm (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 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 (21") IN DIAMETER OR LESS WHERE THE COVER IS EQUAL TO OR LESS THAN 600mm (24"), FOR RCP GREATER THAN 525m (21") 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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

PIPE BEDDING IN TRENCHES

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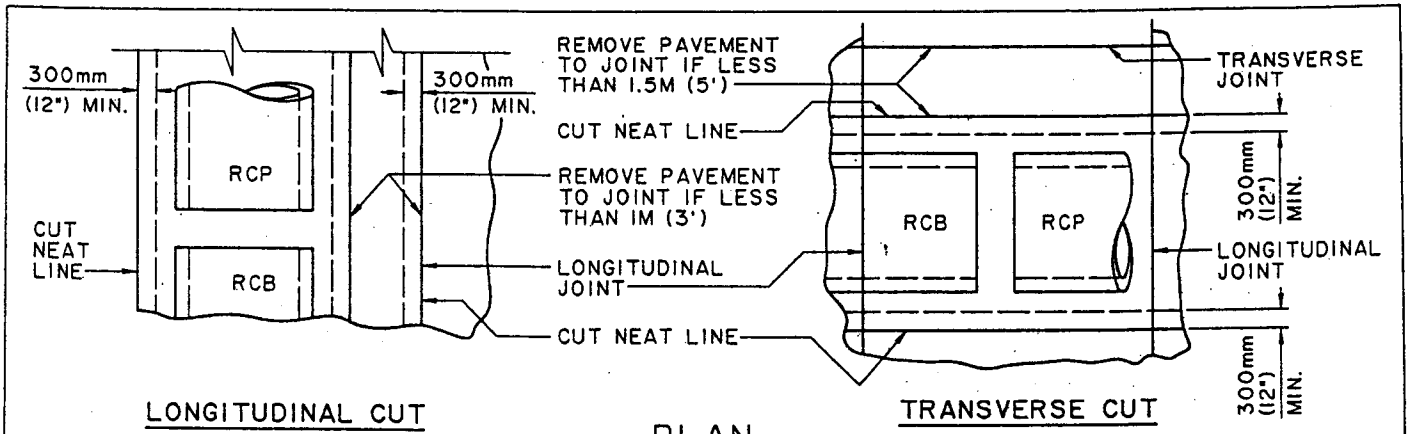
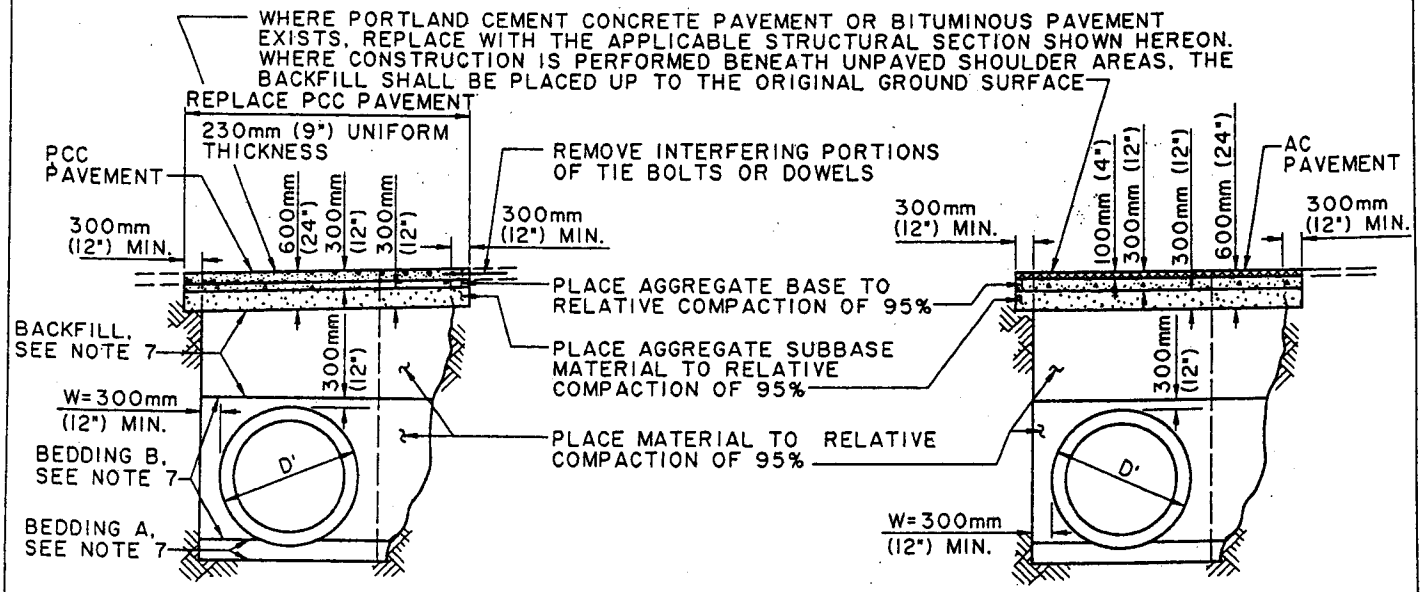


LONGITUDINAL CUT

TRANSVERSE CUT

PLAN

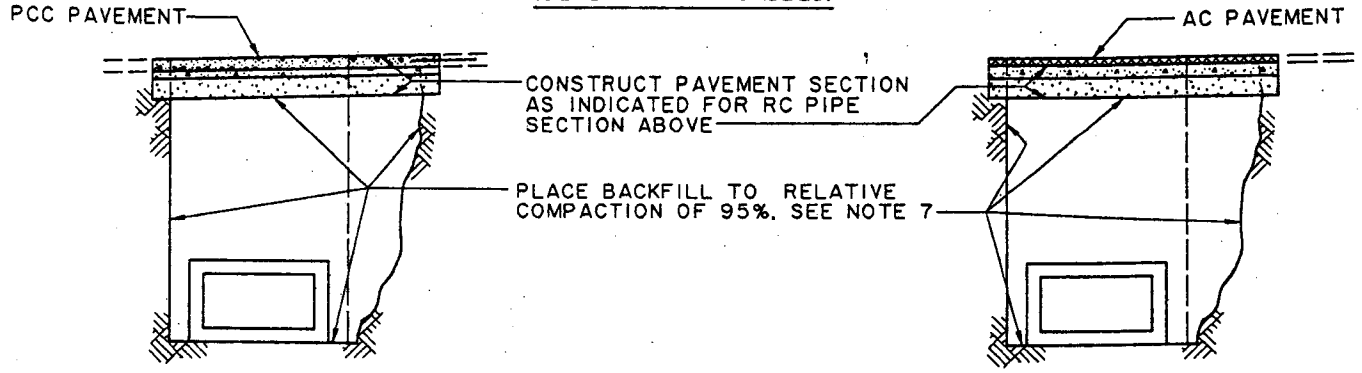


PORTLAND CEMENT CONCRETE PAVEMENT

BITUMINOUS PAVEMENT

RCP SECTION

(BENEATH ANY ROADBED)



PORTLAND CEMENT CONCRETE PAVEMENT

BITUMINOUS PAVEMENT

RCB SECTION

(BENEATH ANY ROADBED)

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

PAVEMENT REMOVAL, EXCAVATION, BACKFILL AND RESURFACING IN STATE HIGHWAYS

APPROVED Thomas A. Gilmansen 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

1999

REVISIONS

STANDARD PLAN METRIC

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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 1M (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 1 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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

PAVEMENT REMOVAL, EXCAVATION, BACKFILL AND RESURFACING IN STATE HIGHWAYS

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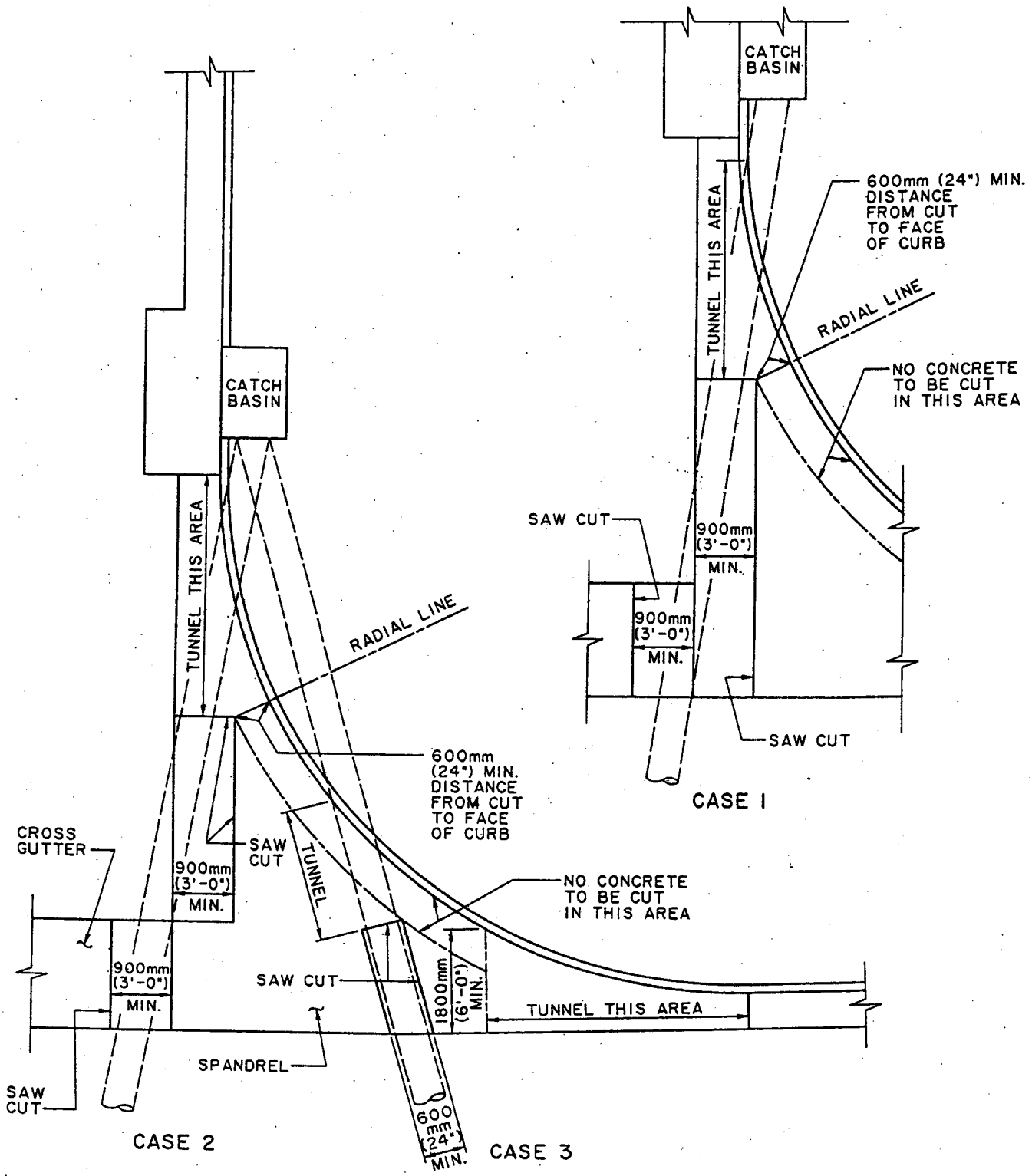
3081-1
SHEET 2 OF 2



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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

PARTIAL CONCRETE REPLACEMENT FOR CROSS GUTTERS AND SPANDRELS

STANDARD PLAN METRIC

3082-1

SHEET 1 OF 1

APPROVED Thomas A. Tidemanson 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

1999

REVISIONS

INDEX TO DRAWINGS

SHEET NO.	DESCRIPTION
1	INDEX TO DRAWINGS
2	GENERAL NOTES, STRUCTURAL NOTES AND DESIGN DATA
3	BARRIER WALL DETAILS AND STRUT DETAILS
4	END ANCHORAGE DETAILS, TYP. ROCK ABUTMENT AND SLOPING ALTERNATE
5	GROUTED ROCK AT ABUTMENTS AND ATTACHMENT DETAILS
6	LOW FLOW DETAIL
7	REMOVABLE PANEL

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

BARRIER - RAIL AND TIMBER
INDEX TO DRAWINGS

STANDARD PLAN
3085-1
SHEET 1 OF 7

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

1995
REVISIONS

GENERAL NOTES

1. CONSTRUCTION SHALL NOT BE STARTED UNTIL PROJECT ENGINEER HAS VERIFIED BARRIER LOCATION IN THE FIELD.
2. FOOTING SHALL NOT BE POURED 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 UPSTREAM.
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 AMMONIACAL 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)

f'c = 3,250 PSI @ 28 DAYS
fc = 1,460 PSI
fs = 24,000 PSI (GRADE 60)
SHEAR AND BOND STRESSES PER ACI 318.88
STRUCTURAL STEEL STRESSES PER AISC, 7TH ED.
TIMBER STRESSES PER NDS, 1982 ED.

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

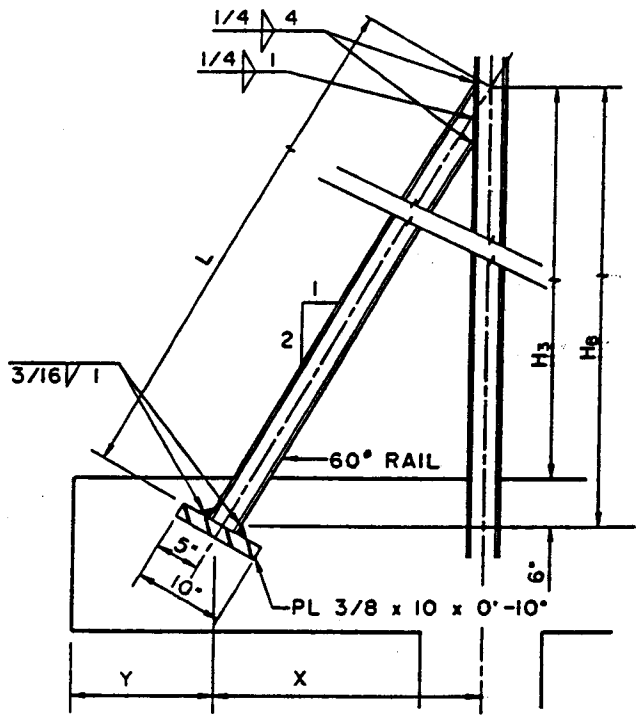
STRUT						
SECT.	WALL HT.	H_3	H_8	X	Y	L
A	15'-2"	9'-3"	9'-9"	4'-10"	2'-3"	10'-10½"
B	14'-0"	8'-4"	8'-11"	4'-5"	2'-2"	9'-11"
C	11'-8"	7'-3"	7'-9"	3'-10"	16"	8'-8"
D	9'-4"	5'-9"	6'-3"	3'-1½"	15"	7'-0"
E	7'-0"	4'-4"	4'-9½"	2'-4¾"	14½"	5'-4¾"

DIMENSION TABULATION

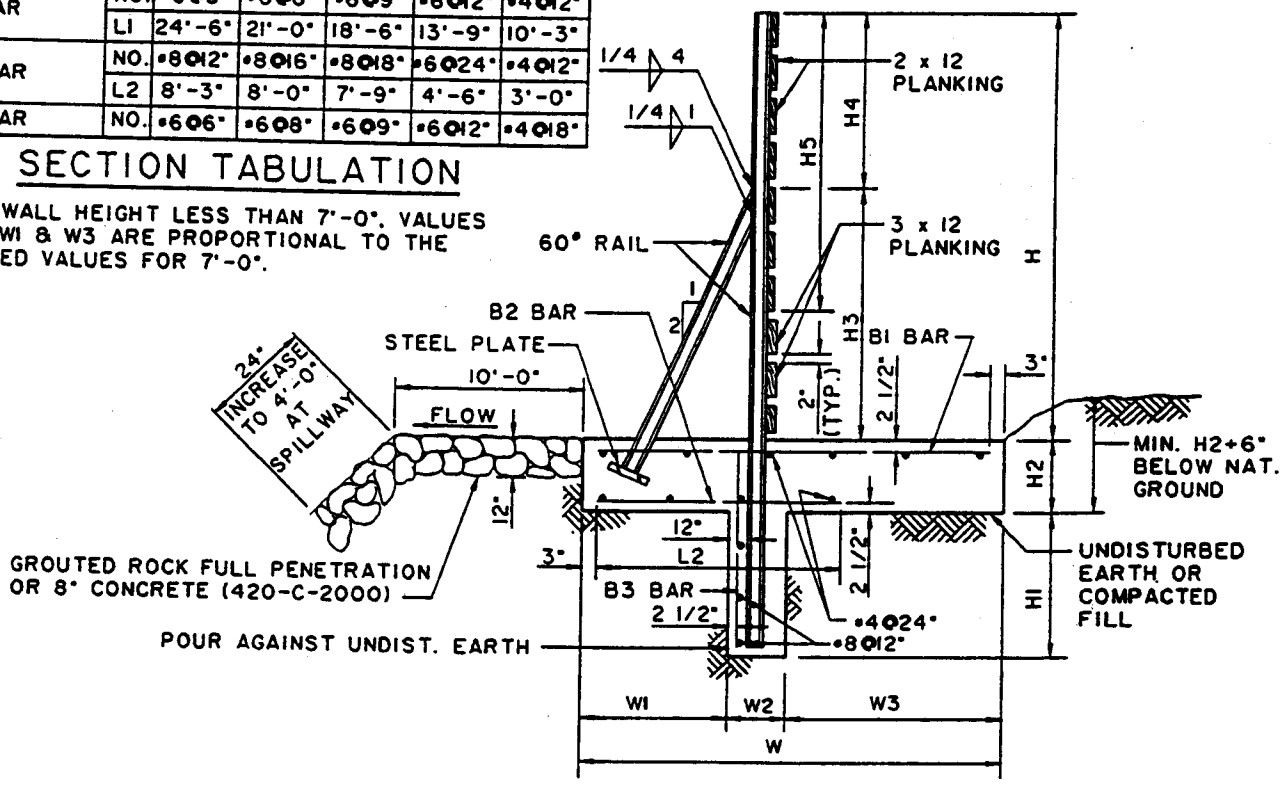
BARRIER WALL							
WALL DETAILS			SECTIONS				
			A	B	C	D	E
WALL HT.		H	15'-2"	14'-0"	11'-8"	9'-4"	7'-0"
RAIL SPAC.		S	3'-0"	3'-6"	4'-6"	4'-6"	4'-6"
KEY DEPTH		H1	7'-0"	6'-6"	5'-6"	5'-6"	4'-0"
SLAB THICK.		H2	18"	18"	15"	15"	15"
STRUT LOC.		H3	9'-3"	8'-5"	7'-3"	5'-9"	4'-4"
STRUT LOC.		H4	5'-11"	5'-7"	4'-5"	3'-7"	2'-8"
LOC. OF 3"x12"	DF #2	H5	11'-8"	8'-2"	3'-6"	3'-6"	3'-6"
	DF #3	H5	5'-10"	3'-6"	0'-0"	0'-0"	0'-0"
SLAB WIDTH		W	25'-0"	21'-6"	19'-0"	14'-3"	10'-6"
TOE LENGTH		W1	6'-0"	5'-6"	4'-0"	3'-3"	2'-6"*
KEY THICK.		W2	24"	24"	24"	24"	24"
HEEL LENGTH		W3	17'-0"	14'-0"	13'-0"	9'-0"	6'-0"*
B1 BAR		NO.	#8@6"	#8@8"	#8@9"	#6@12"	#4@12"
		L1	24'-6"	21'-0"	18'-6"	13'-9"	10'-3"
B2 BAR		NO.	#8@12"	#8@16"	#8@18"	#6@24"	#4@12"
		L2	8'-3"	8'-0"	7'-9"	4'-6"	3'-0"
B3 BAR		NO.	#6@6"	#6@8"	#6@9"	#6@12"	#4@18"

SECTION TABULATION

* FOR WALL HEIGHT LESS THAN 7'-0", VALUES FOR W1 & W3 ARE PROPORTIONAL TO THE TABLED VALUES FOR 7'-0".



STRUT DETAIL

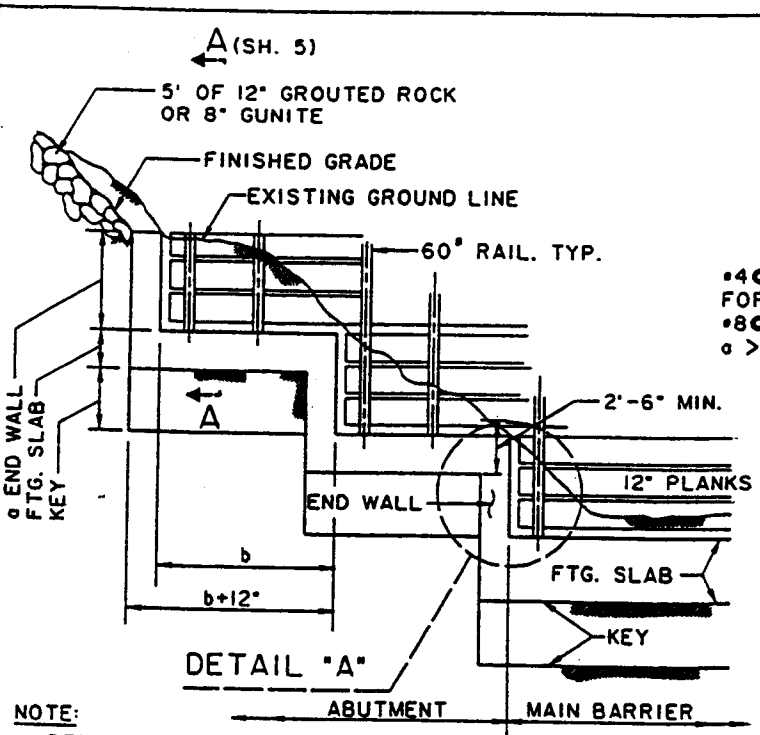


BARRIER WALL DETAIL

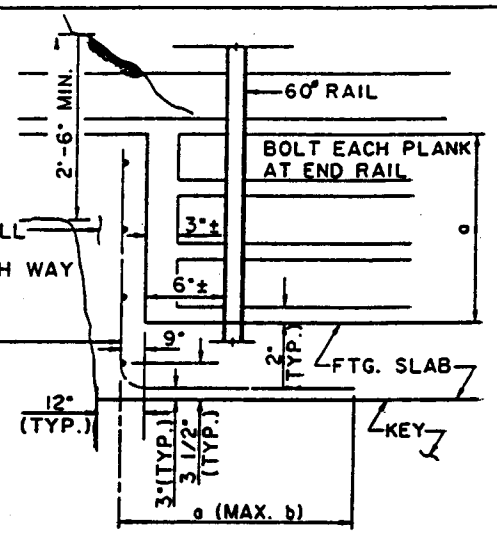
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

BARRIER - RAIL AND TIMBER
BARRIER WALL DETAILS AND STRUT DETAILS

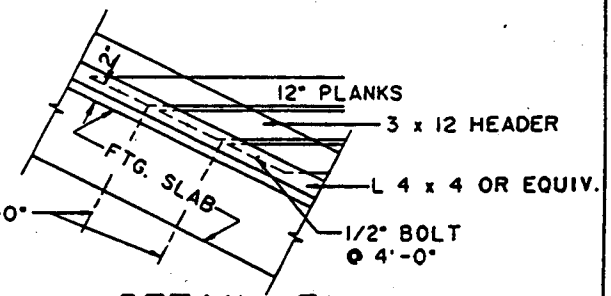
STANDARD PLAN
3085-1
SHEET 3 OF 7



ELEVATION



DETAIL "A"



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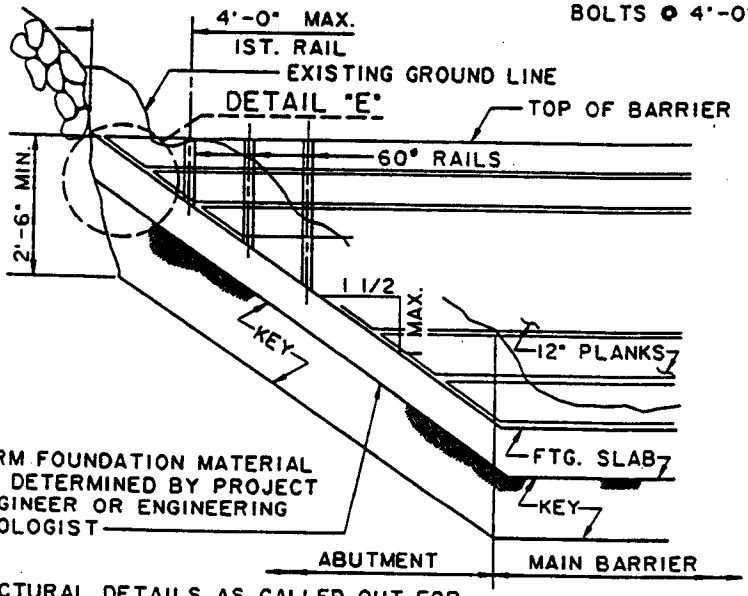
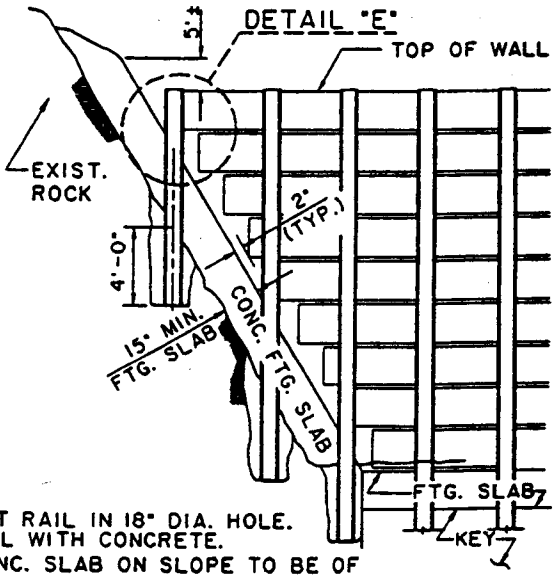


STRUCTURAL DETAILS AS CALLED OUT FOR "STEP" ABUTMENT. SLAB AND KEY DEPTH MEASURED NORMAL TO SLOPE. TAPER DEPTHS UNIFORMLY FROM TOP TO BOTTOM

NOTE:
TO BE USED ONLY WHERE BASE SLAB SLOPE IS 1 1/2 TO 1 OR FLATTER.

END ANCHORAGE FOR SLOPING ALTERNATE



NOTES:
1. SET RAIL IN 18" DIA. HOLE. FILL WITH CONCRETE.
2. CONC. SLAB ON SLOPE TO BE OF SAME WIDTH AS BARRIER FOOTING SLAB.
3. USE SUBJECT TO APPROVAL OF THE PROJECT ENGINEER.

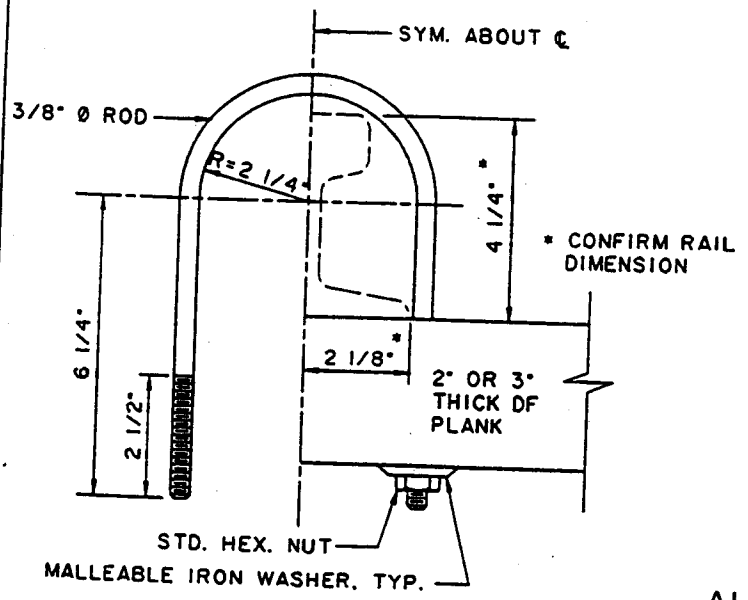
END ANCHORAGE FOR ROCK ABUTMENT

TYPICAL END ANCHORAGE

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

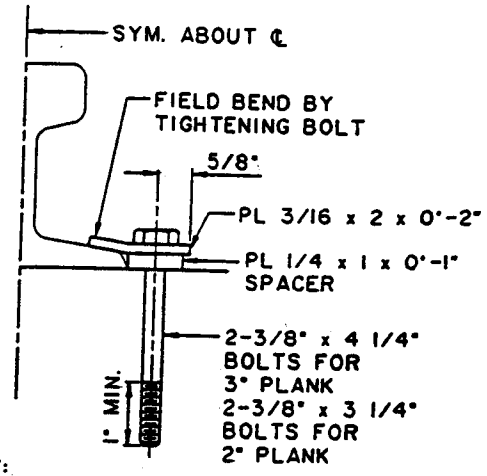
BARRIER - RAIL AND TIMBER
END ANCHORAGE DETAILS, TYP. ROCK ABUTMENT AND SLOPING ALTERNATE

STANDARD PLAN
3085-1
SHEET 4 OF 7



NOTE:
3/8" Ø ROD MAY BE BENT AROUND 4" STD. PIPE.

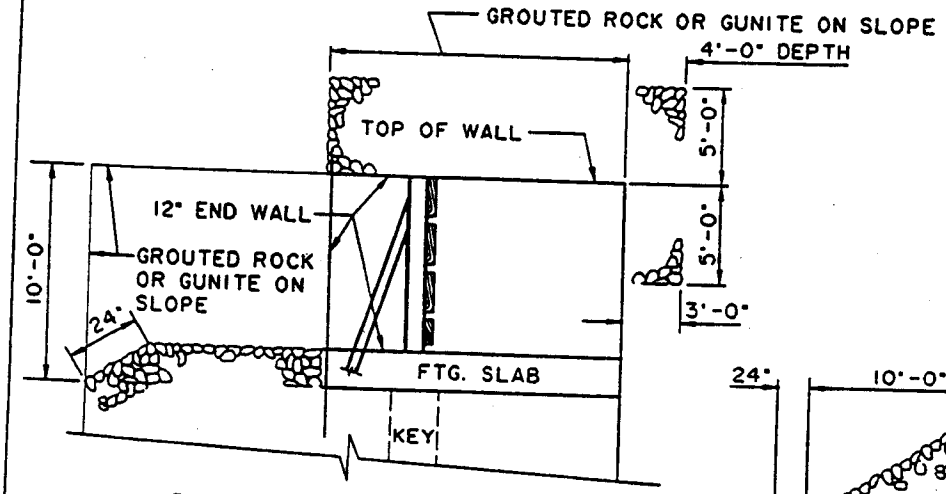
TYPICAL ATTACHMENT DETAIL



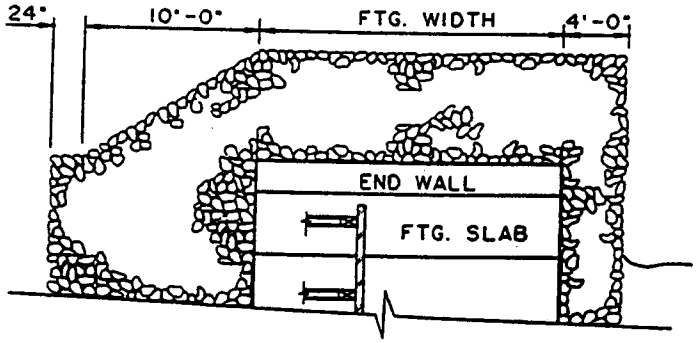
NOTE:
STANDARD HEX NUT AND MALLEABLE IRON WASHER NOT SHOWN.

ALTERNATE ATTACHMENT DETAIL

ATTACHMENT DETAILS



SECTION A-A (SH.4)



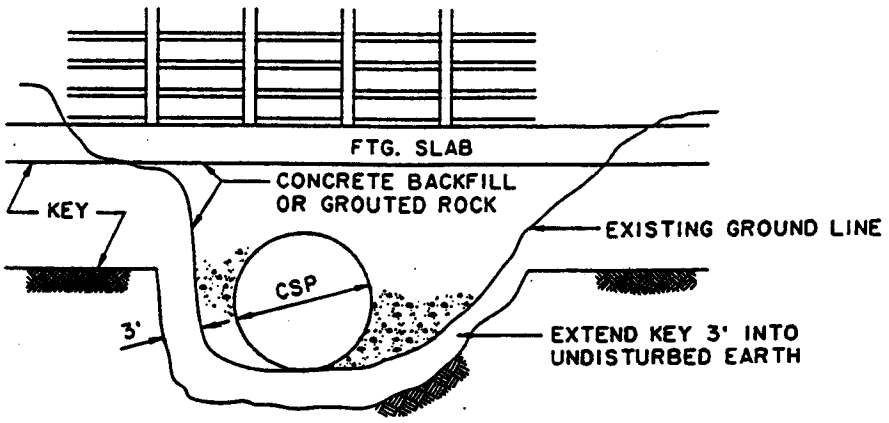
PLAN

GROUTED ROCK AT ABUTMENTS

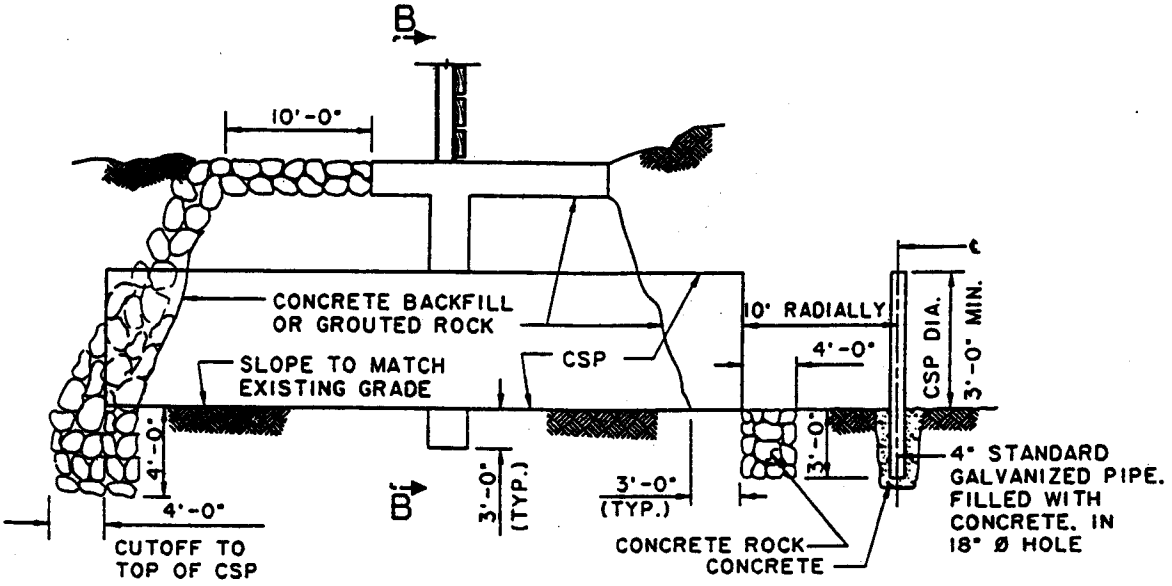
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

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

STANDARD PLAN
3085-1
SHEET 5 OF 7



SECTION B-B



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).

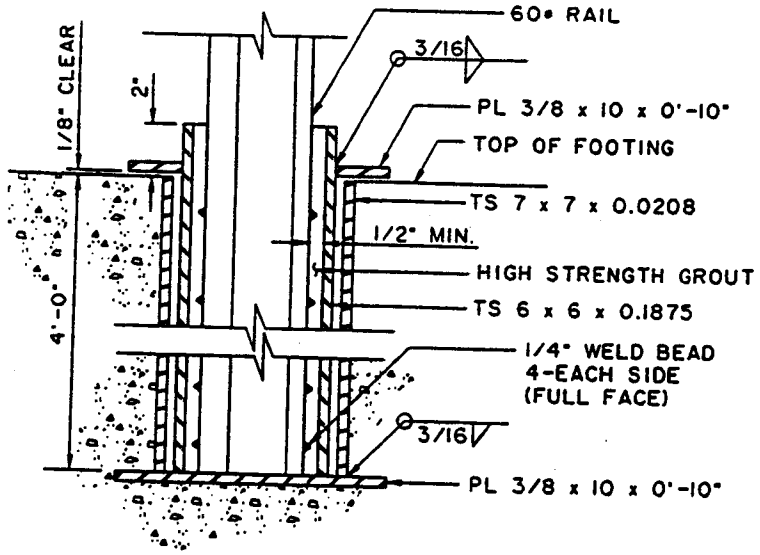
LOW FLOW DETAIL

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

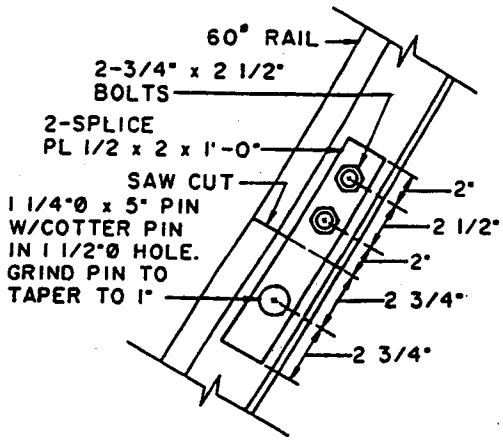
BARRIER - RAIL AND TIMBER

LOW FLOW DETAIL

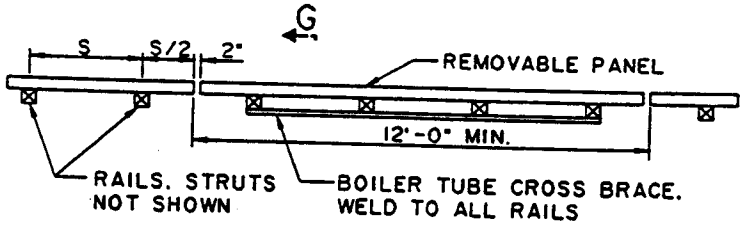
STANDARD PLAN
3085-1
SHEET 6 OF 7



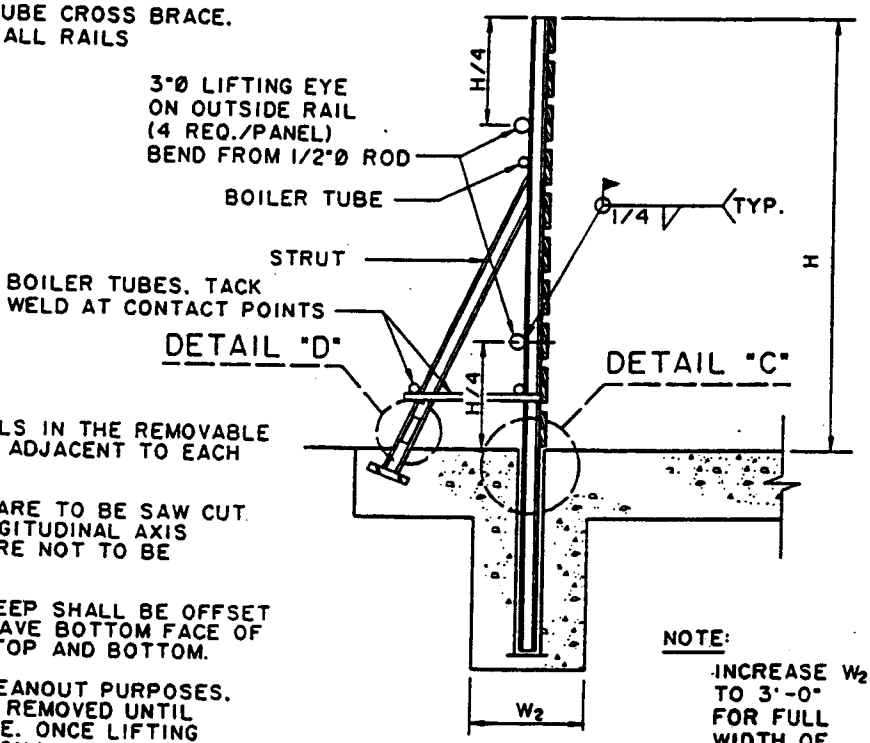
DETAIL "C"



DETAIL "D"



PLAN



SECTION G-G

NOTE:
INCREASE W_2 TO 3'-0" FOR FULL WIDTH OF REMOVABLE PANEL.

NOTES:

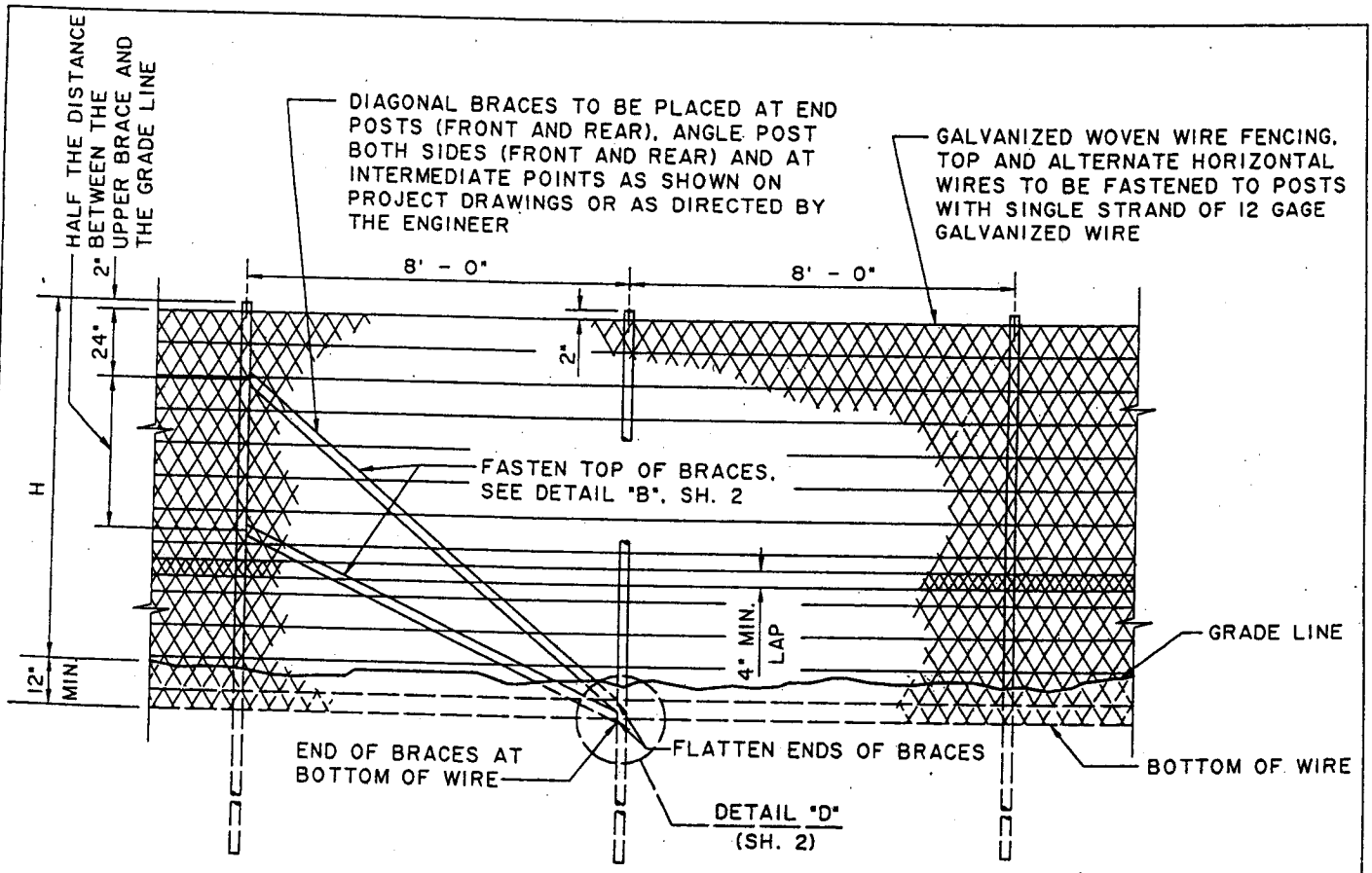
1. BOLT ALL PLANKS TO ALL RAILS IN THE REMOVABLE PANEL AND TO EXTERIOR RAIL ADJACENT TO EACH SIDE OF PANEL.
2. STRUT RAILS AT THE SPLICE ARE TO BE SAW CUT AT RIGHT ANGLES TO THE LONGITUDINAL AXIS (DO NOT BURN). SEGMENTS ARE NOT TO BE INTERCHANGED.
3. RAILS IN EXCESS OF 4 3/8" DEEP SHALL BE OFFSET IN 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

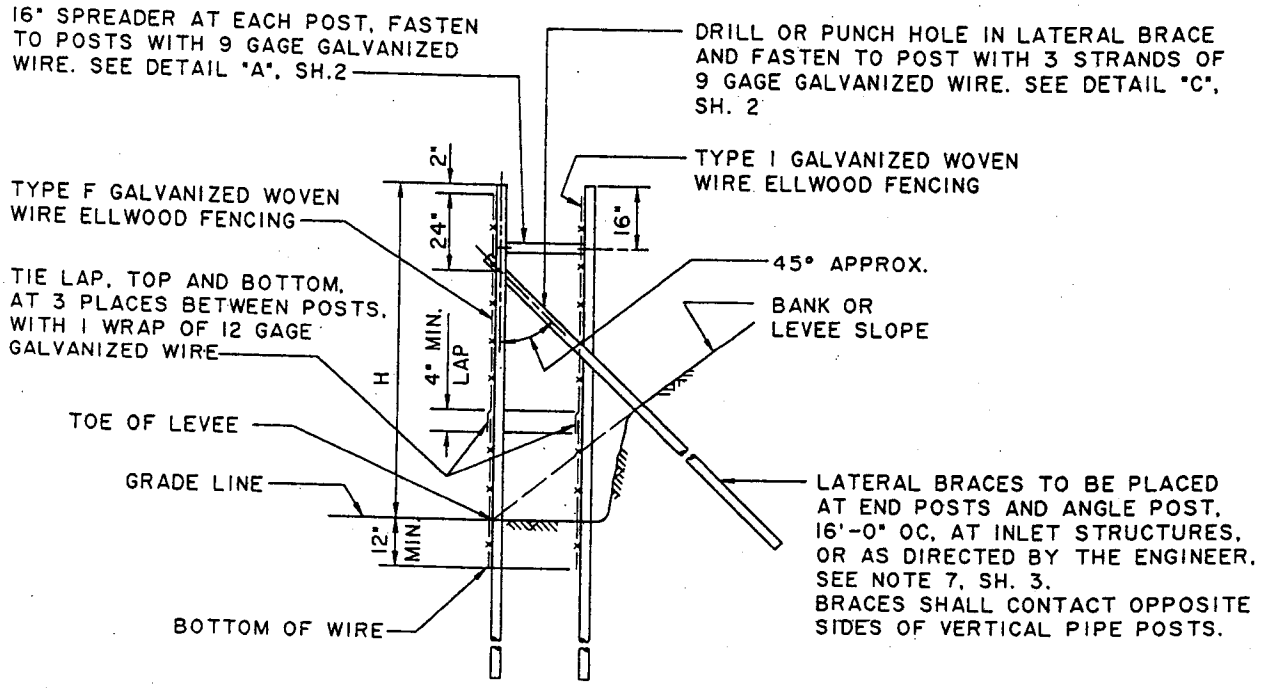
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

BARRIER - RAIL AND TIMBER REMOVABLE PANEL

STANDARD PLAN
3085-1
SHEET 7 OF 7



TYPICAL ELEVATION



TYPICAL SECTION

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

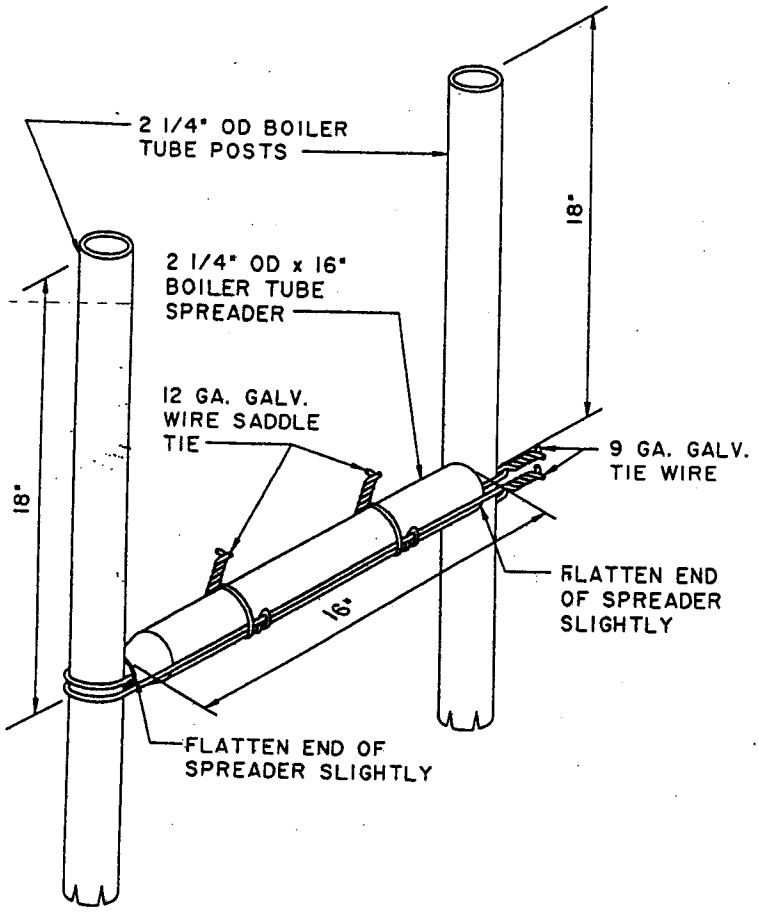
OPEN CHANNEL - REVETMENT DOUBLE PIPE AND WIRE

APPROVED Thomas A. Tidemanson
DIRECTOR OF PUBLIC WORKS

5/31/1992
DATE

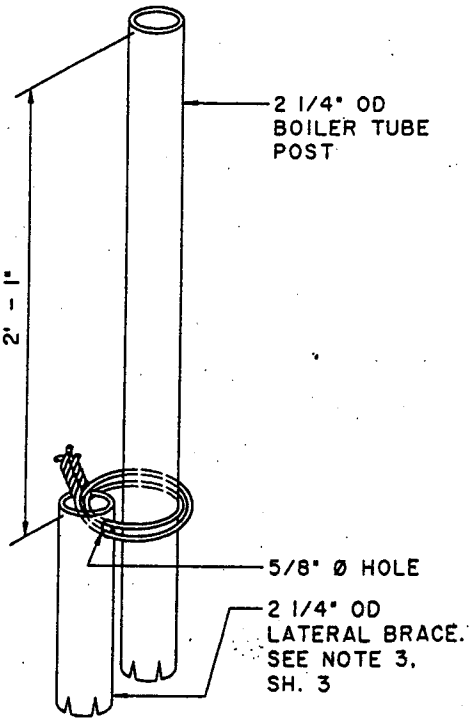
REVISIONS

STANDARD PLAN
3086-0
SHEET 1 OF 3



DETAIL "A"

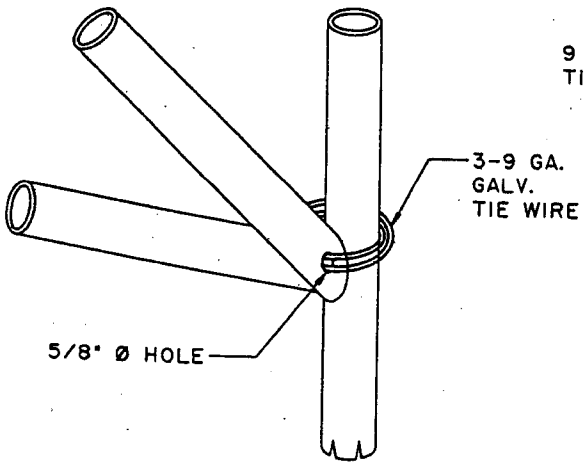
SPREADER TO POST CONNECTION



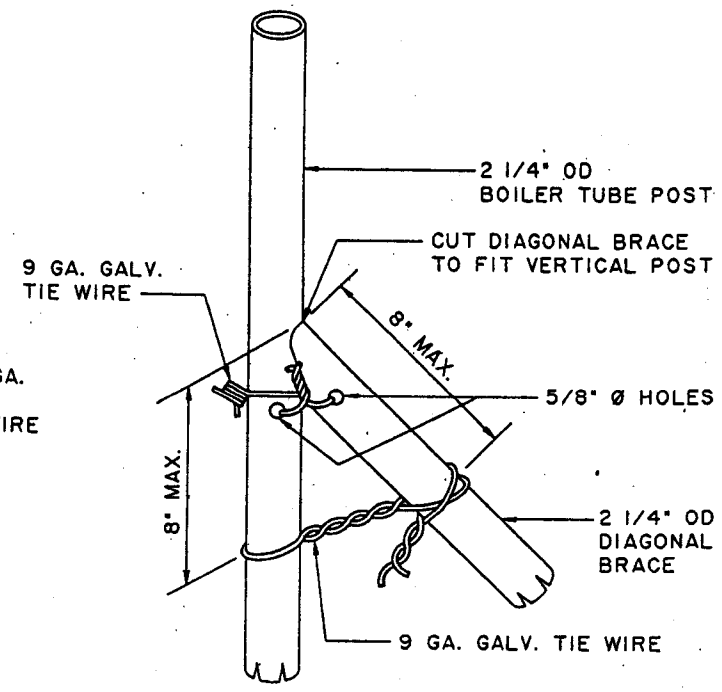
DETAIL "C"

LATERAL BRACE TIE

SHOWN VERTICALLY FOR CLARITY



DETAIL "D" (SH. 1)



DETAIL "B"

DIAGONAL BRACE TO VERTICAL POST

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

OPEN CHANNEL-REVETMENT DOUBLE PIPE AND WIRE

STANDARD PLAN

3086-0

SHEET 2 OF 3

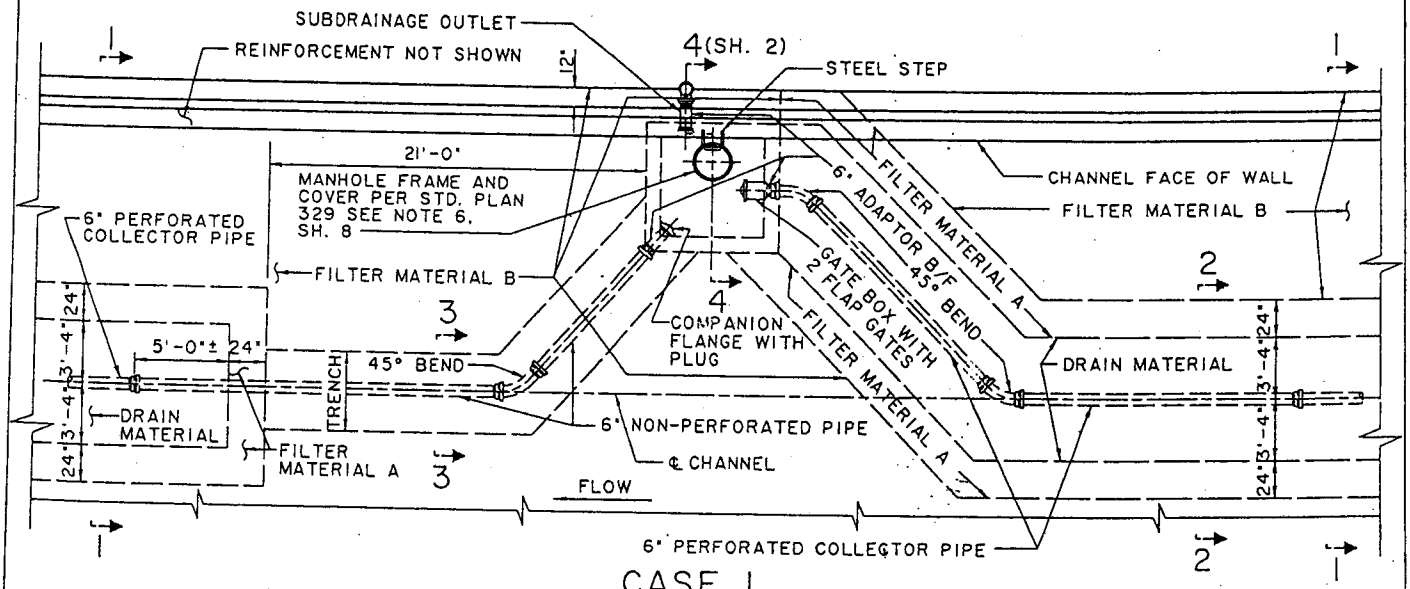
NOTES

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 VARIES, DEPENDING 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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

OPEN CHANNEL-REVETMENT DOUBLE PIPE AND WIRE

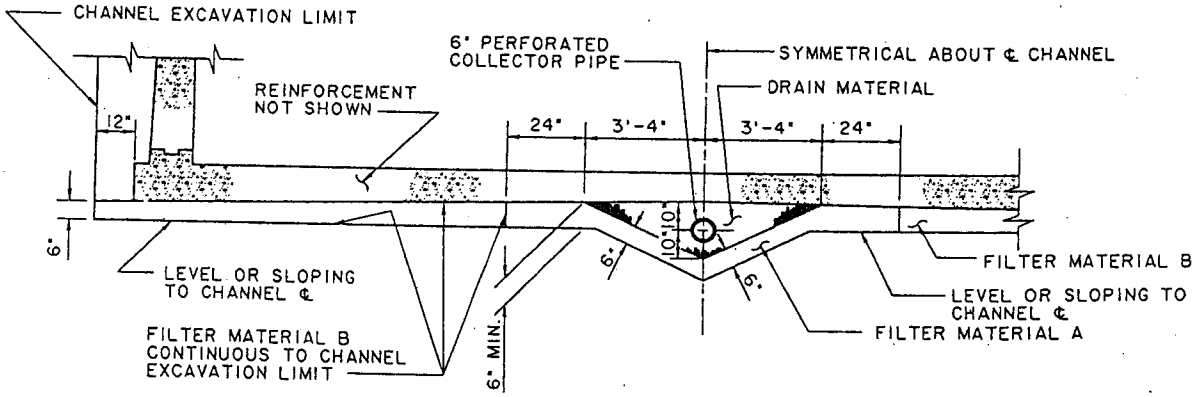
STANDARD PLAN
3086-0
SHEET 3 OF 3



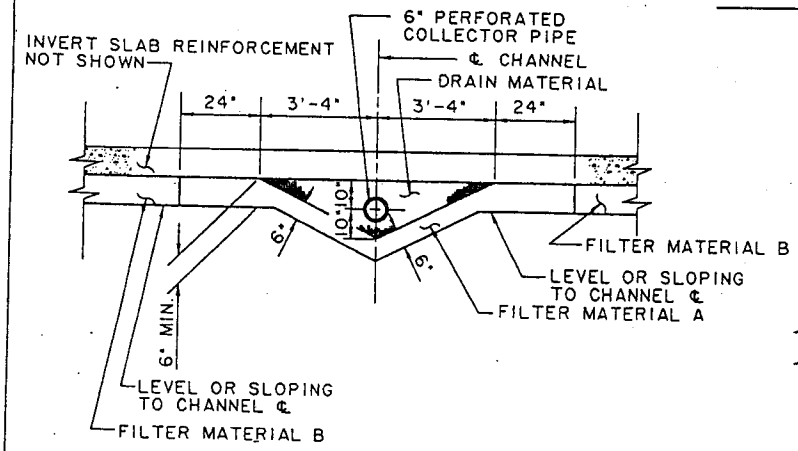
CASE 1

SUBDRAINAGE PLAN

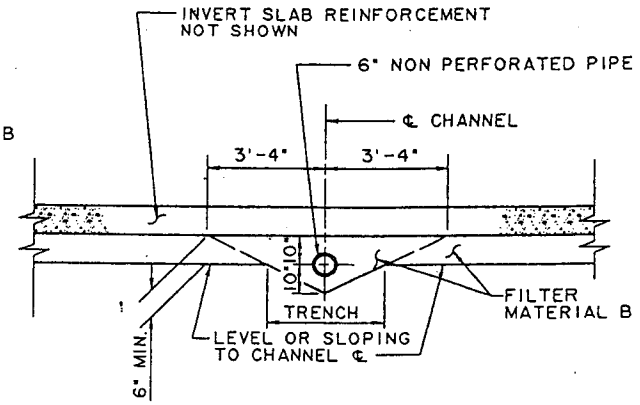
SINGLE DRAIN ON CENTER LINE AND MANHOLE ONE SIDE



SECTION 1-1



SECTION 2-2



SECTION 3-3

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SUBDRAINAGE SYSTEM FOR RC RECTANGULAR OPEN CHANNEL CASE 1

APPROVED Thomas A. Gilmansen 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

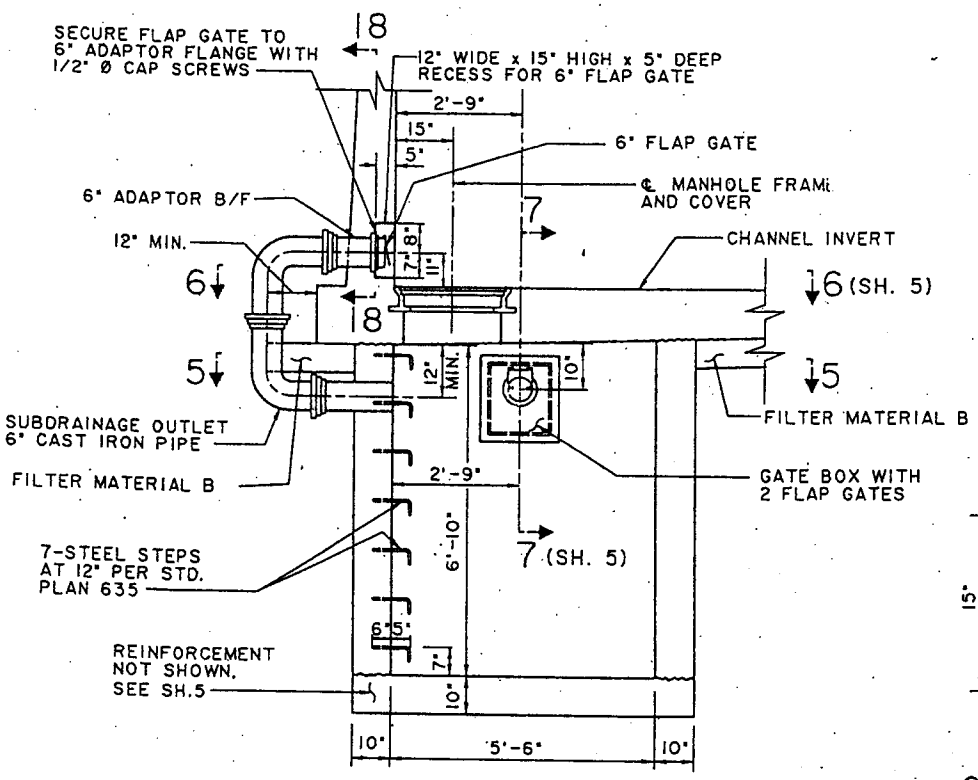
1995, 1999

REVISIONS

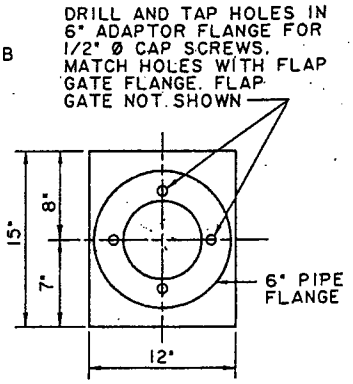
STANDARD PLAN

3087-2

SHEET 1 OF 8

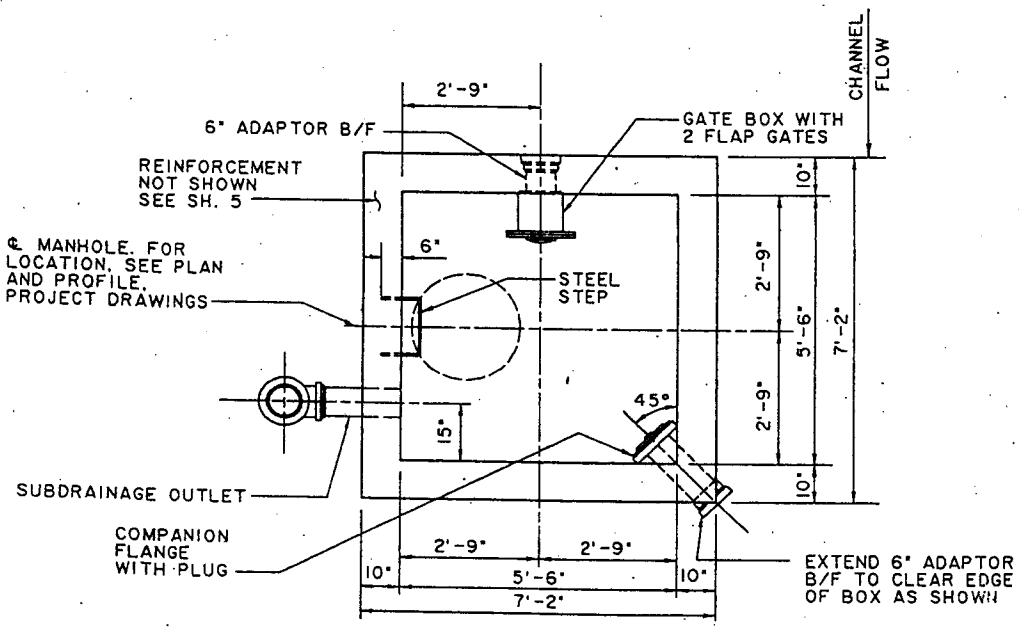


SECTION 4-4 (SH. 1)



CASES 1, 2 & 3

SECTION 18-18 (SH. 4 & 7)

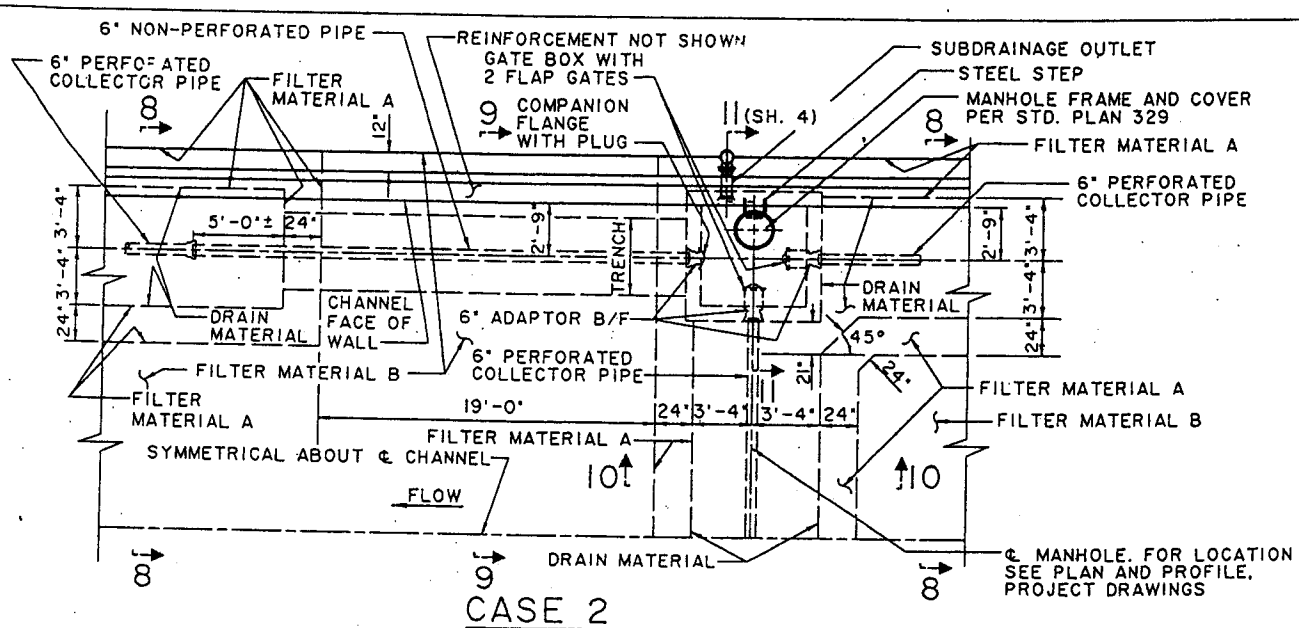


SECTION 5-5

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

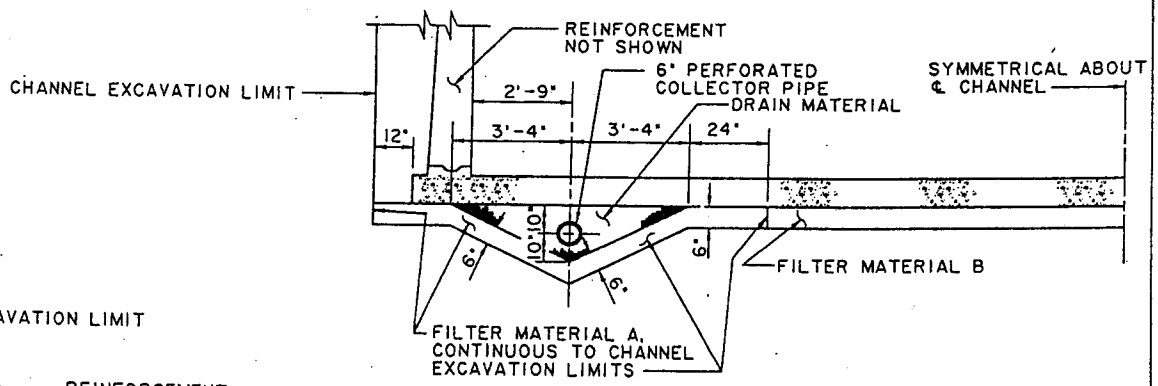
SUBDRAINAGE SYSTEM FOR RC RECTANGULAR OPEN CHANNEL CASE 1

STANDARD PLAN 3087-2

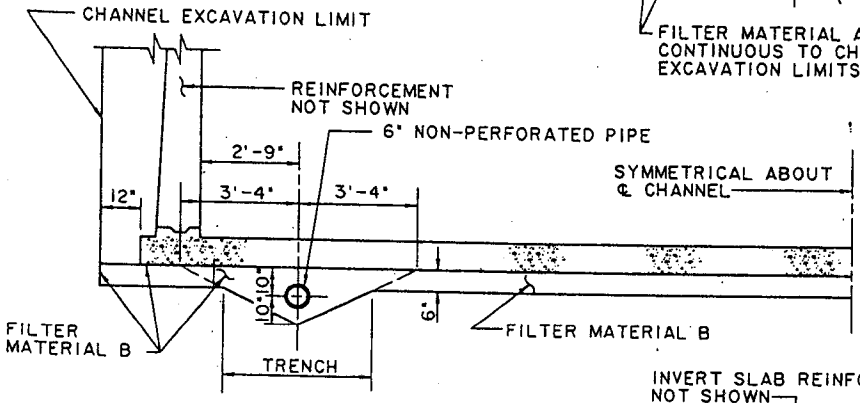


CASE 2
SUBDRAINAGE PLAN

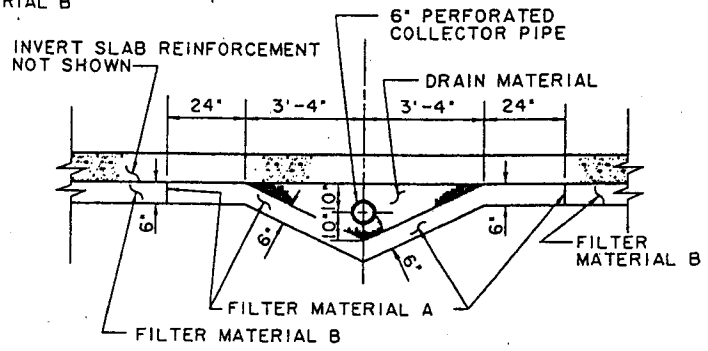
DOUBLE DRAIN (ONE EACH SIDE) AND MANHOLE EACH SIDE



SECTION 8-8



SECTION 9-9

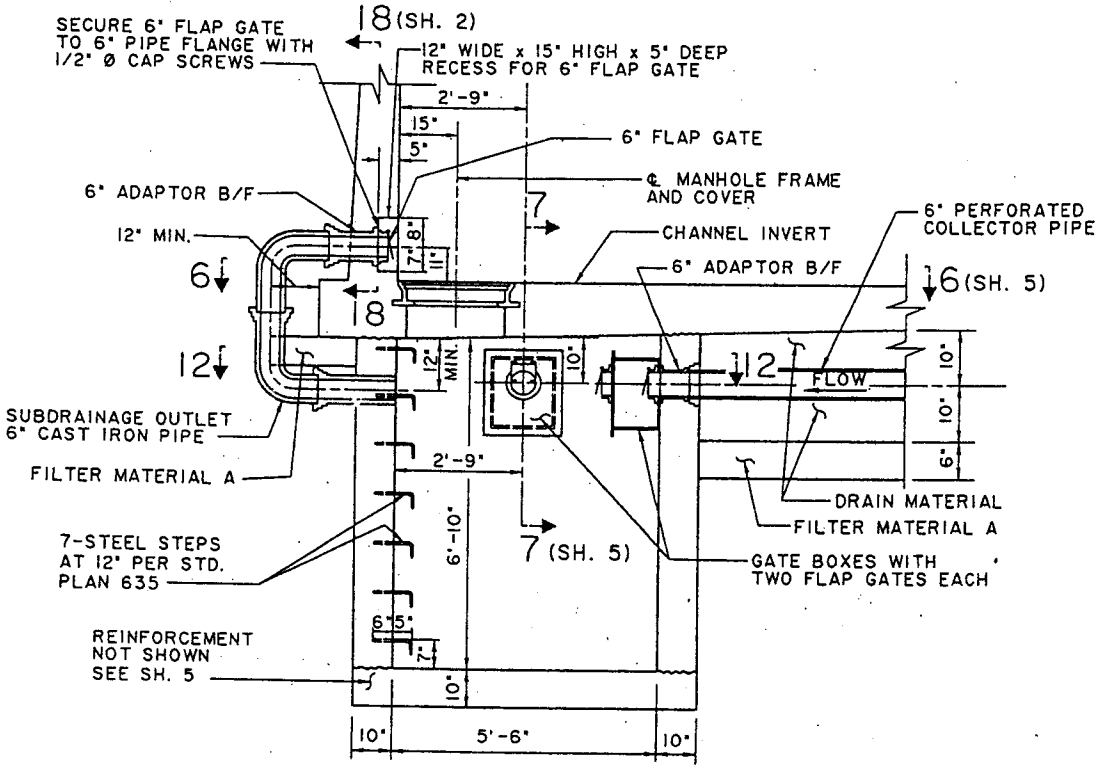


SECTION 10-10

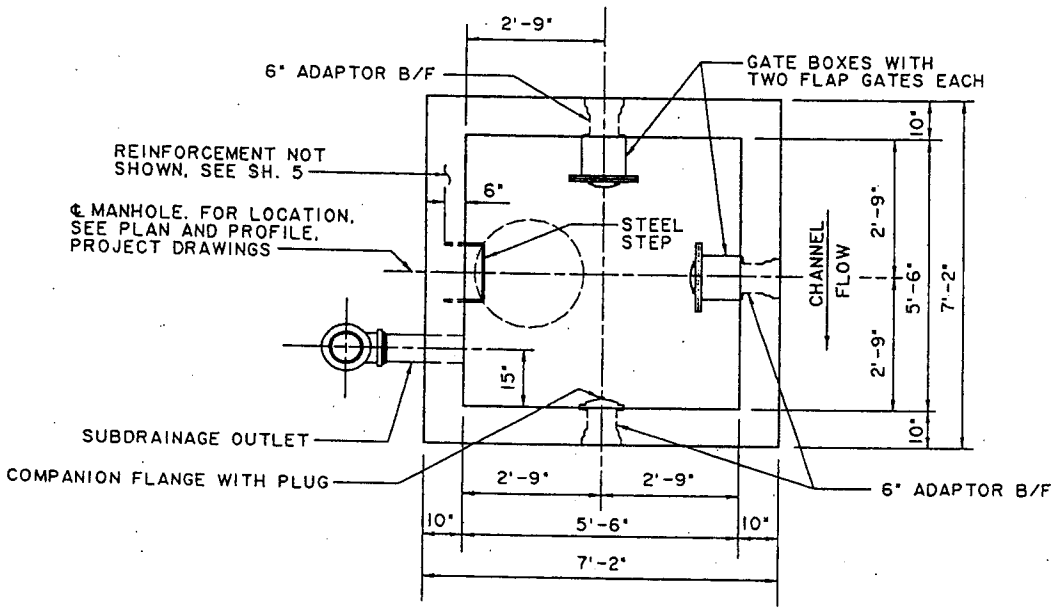
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SUBDRAINAGE SYSTEM FOR RC RECTANGULAR OPEN CHANNEL CASE 2

STANDARD PLAN
3087-2
SHEET 3 OF 8



SECTION 11-11

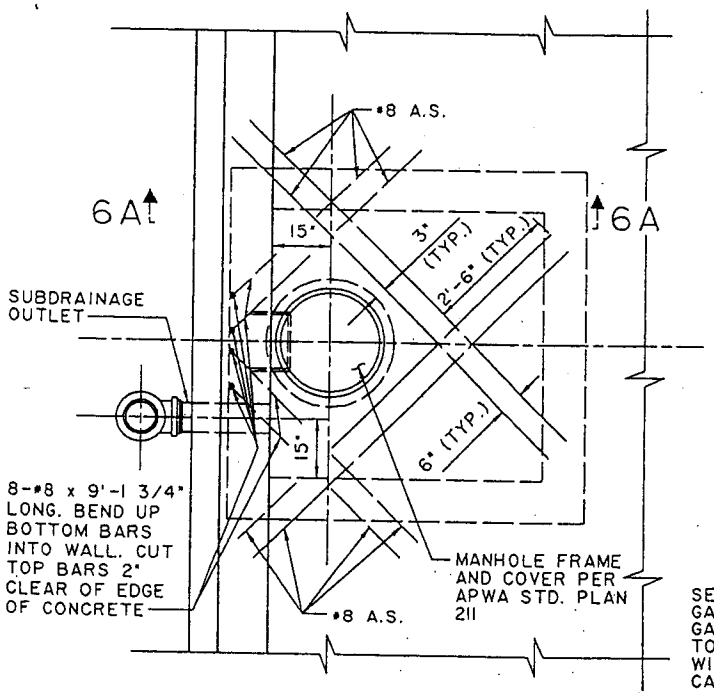


SECTION 12-12

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SUBDRAINAGE SYSTEM FOR RC RECTANGULAR OPEN CHANNEL CASE 2

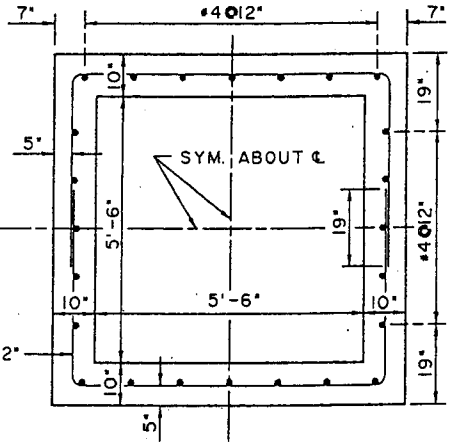
STANDARD PLAN
3087-2
SHEET 4 OF 8



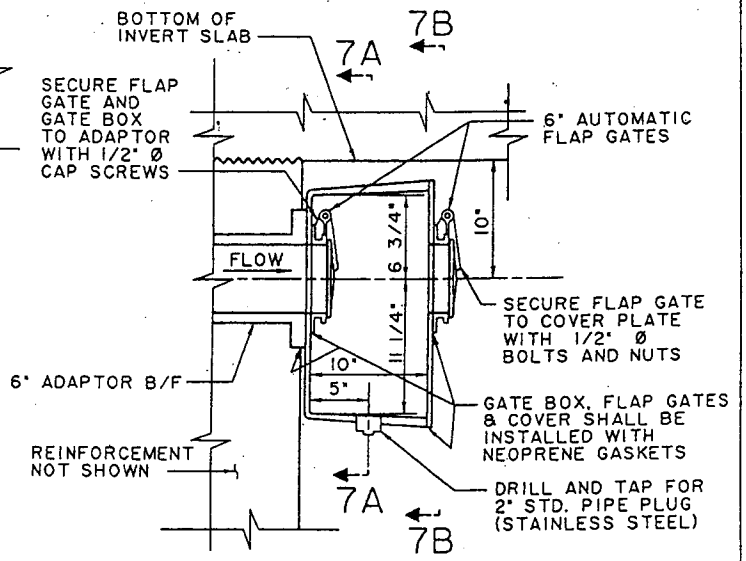
CASES 1, 2 & 3
SECTION 6-6 (SH. 2,4 & 7)

NOTE:

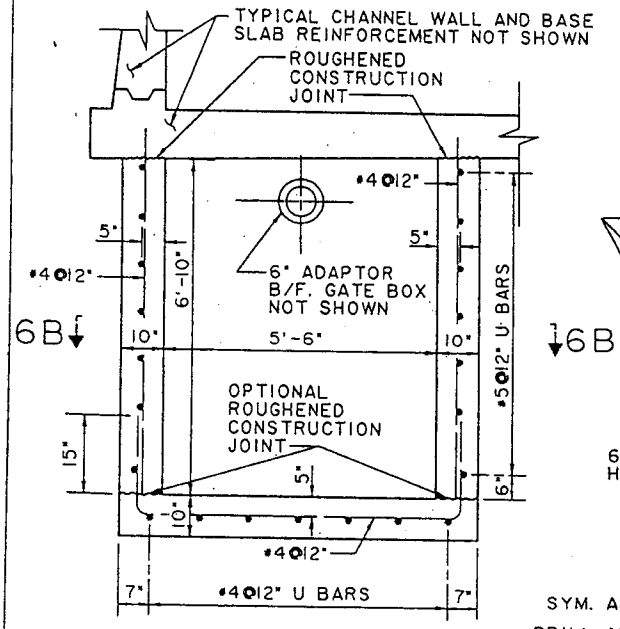
ADD #8 AS SHOWN, TOP AND BOTTOM FACES. TYPICAL CHANNEL WALL AND BASE SLAB REINFORCEMENT NOT SHOWN. CUT TYPICAL WALL BASE SLAB REINFORCEMENT 2" CLEAR OF MANHOLE FRAME. REINFORCEMENT SHOWN IS TYPICAL FOR MANHOLES.



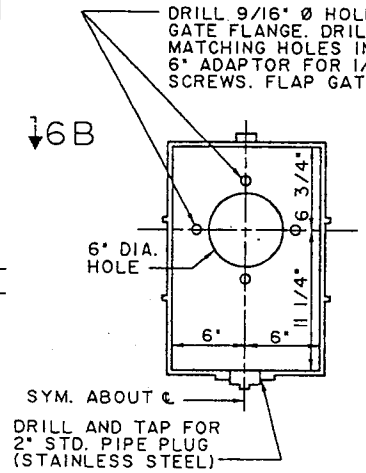
SECTION 6B-6B



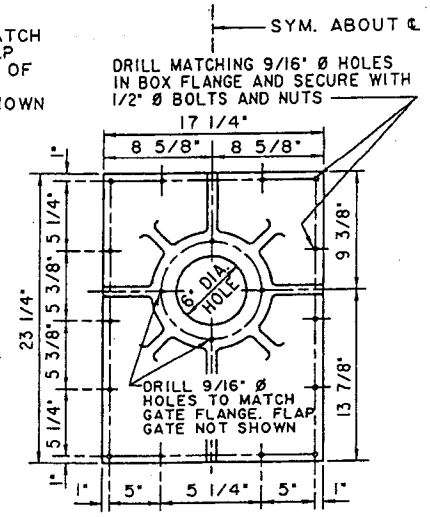
CASES 1, 2 & 3
SECTION 7-7 (SH. 2,4 & 7)



SECTION 6A-6A



SECTION 7A-7A

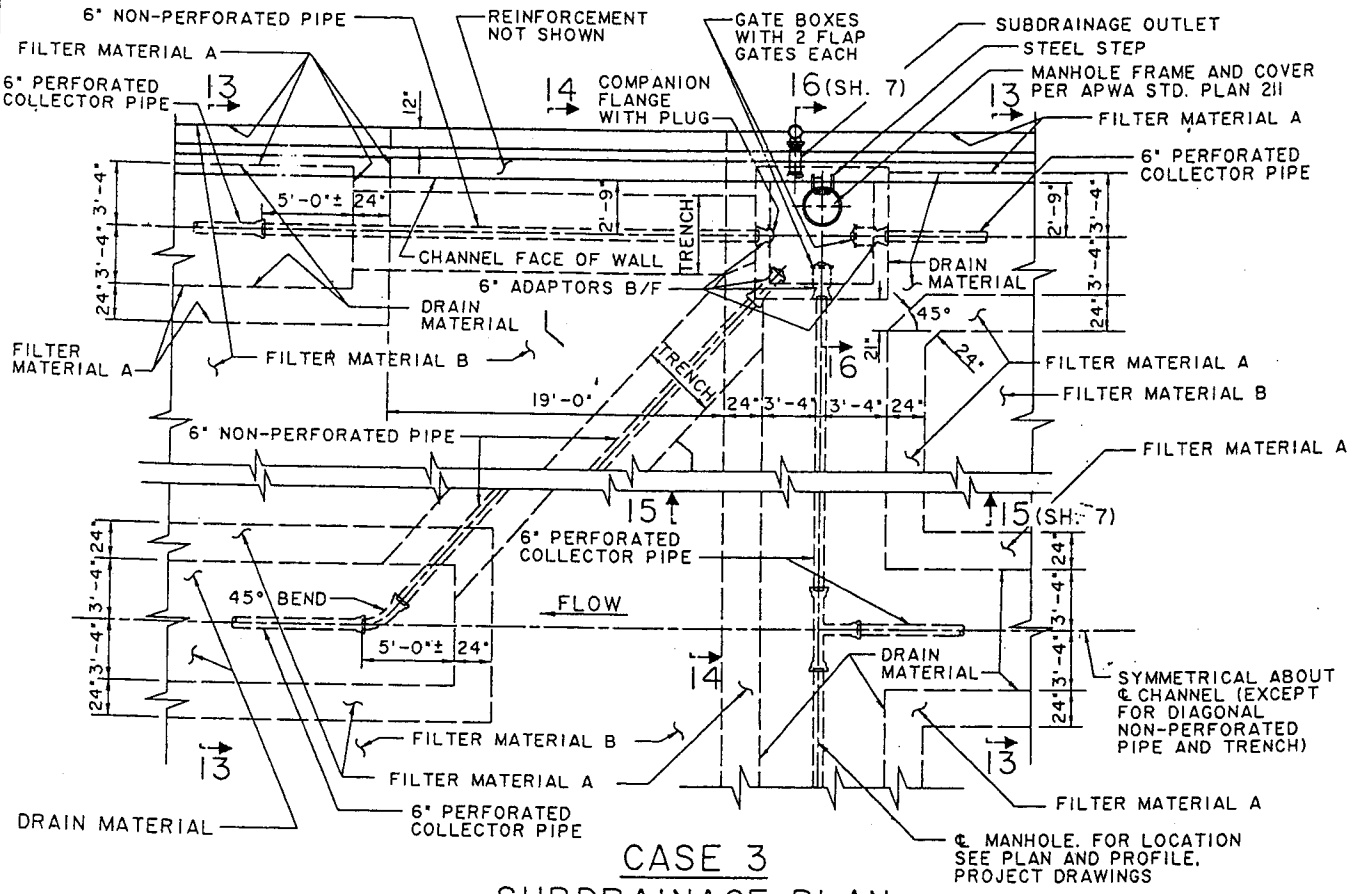


SECTION 7B-7B

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

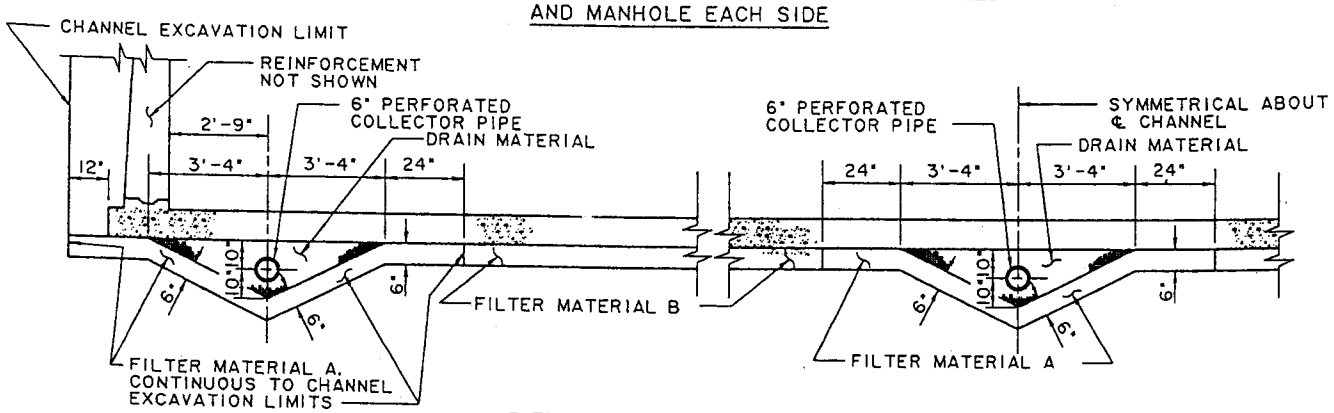
SUBDRAINAGE SYSTEM FOR RC RECTANGULAR OPEN CHANNEL CASE 2

STANDARD PLAN
3087-2
SHEET 5 OF 8

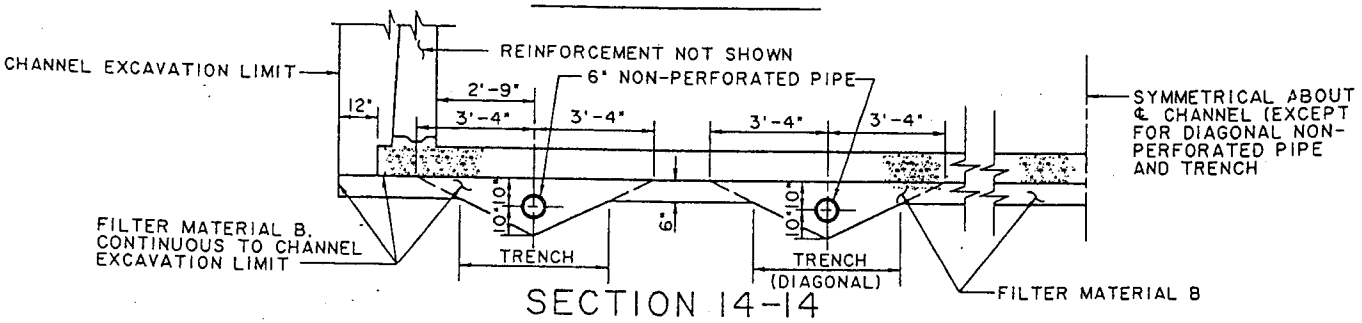


CASE 3
SUBDRAINAGE PLAN

TRIPLE DRAIN (ONE EACH SIDE AND ON CENTER LINE)
AND MANHOLE EACH SIDE



SECTION 13-13

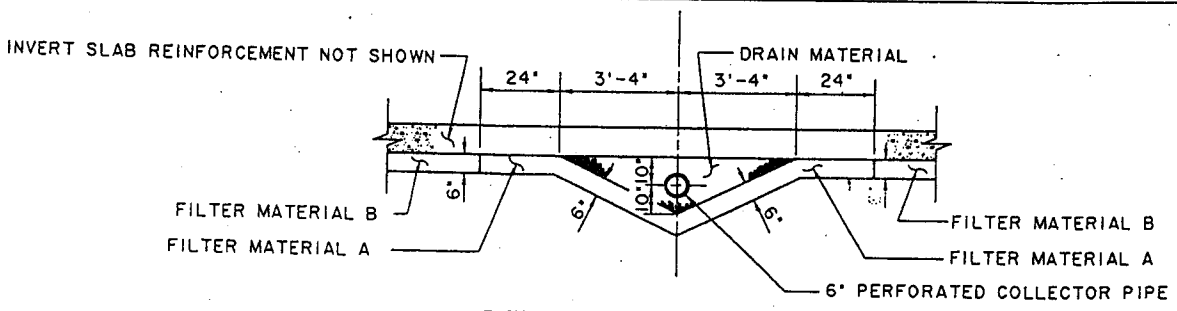


SECTION 14-14

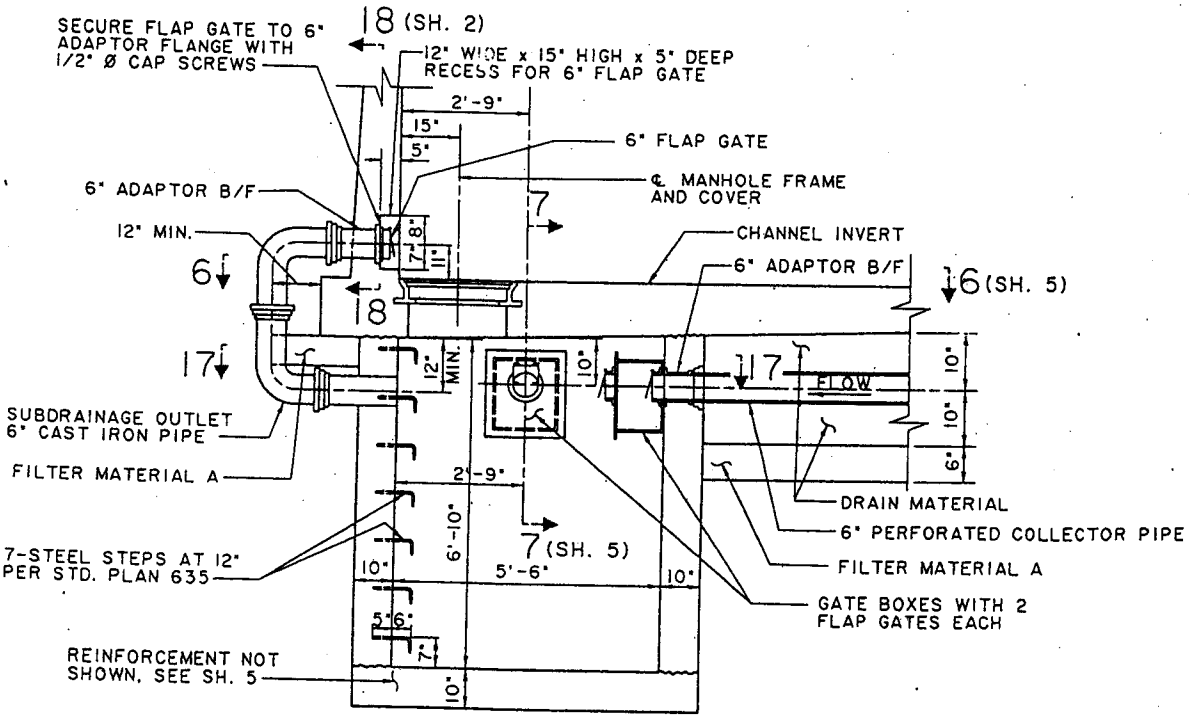
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SUBDRAINAGE SYSTEM FOR RC RECTANGULAR OPEN CHANNEL CASE 3

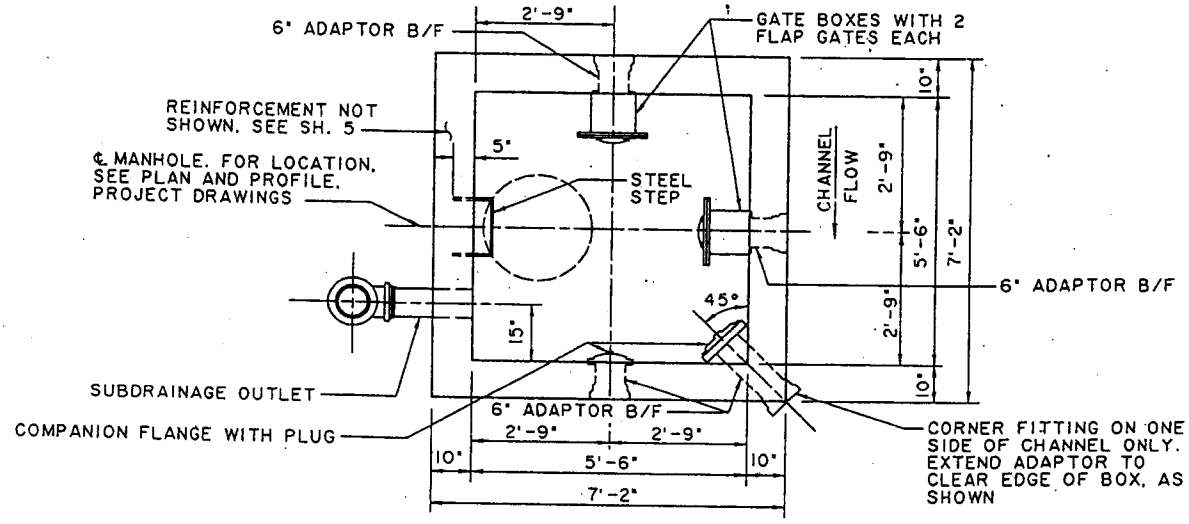
STANDARD PLAN
3087-2
SHEET 6 OF 8



SECTION 15-15 (SH. 6)



SECTION 16-16 (SH. 6)



SECTION 17-17

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.

4. SUBDRAINAGE MANHOLE APPURTENANCES AND FITTINGS WHEN TYPE I 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.

   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.

   THE BELL AND FLANGED ADAPTORS AND COMPANION FLANGES AND GATE BOXES SHALL BE CAST FROM CLASS 30, EPOXY COATED (SEE NOTE 7), GRAY IRON, ASTM A 48.

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.

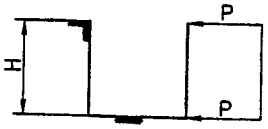
   ALL BOLTS, NUTS AND OTHER FASTENERS TO BE USED WITH THE ADAPTORS, COMPANION FLANGES AND GATE BOXES SHALL BE FABRICATED FROM TYPE 316 STAINLESS STEEL, OR EQUIVALENT.

   THE COMPANION FLANGE PLUG SHALL BE MADE FROM TYPE 316 STAINLESS STEEL, OR EQUIVALENT.

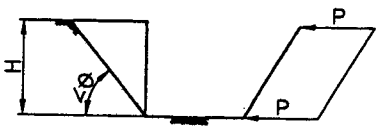
   THE PRESSURE MANHOLE FRAME AND COVER SHALL BE IN ACCORDANCE WITH APWA STANDARD PLAN 211 EXCEPT THAT THE MANHOLE FRAME SHALL BE EMBEDDED IN THE INVERT SLAB ELIMINATING THE NEED FOR THE 5/8" BY 8" ANCHOR BOLTS. THE SCREW STUDS REQUIRED TO HOLD THE STEEL PRESSURE PLATES SHALL BE STEEL.

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

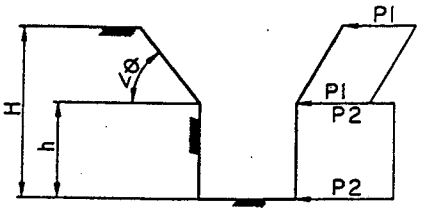
8. A PRECAST SUBDRAINAGE MANHOLE MAY BE USED SUBJECT TO THE WRITTEN APPROVAL OF THE ENGINEER.



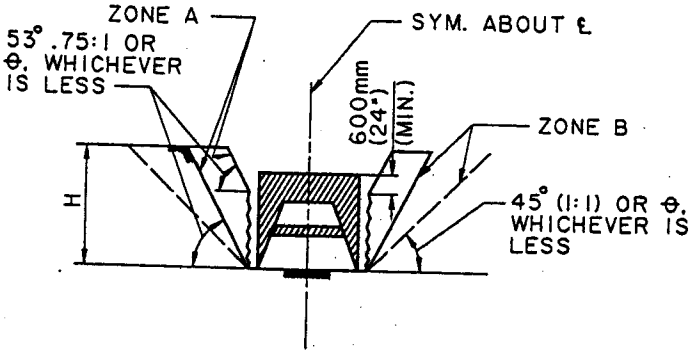
CASE 1
VERTICAL



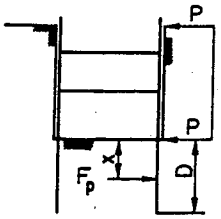
CASE 2
SLOPING



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 PERCENTAGE 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)	PERCENTAGE REDUCTION
1:5.1 TO VERTICAL	0
1:2.1 TO 1:5	33
.75:1.1 TO 1:2	67
HORIZONTAL TO .75:1	100

LEGEND

P = UNIT PRESSURE IN PSF
P1 = UNIT PRESSURE IN PSF (USE Kw VALUE REQUIRED BY THE SLOPE)
P2 = UNIT PRESSURE IN PSF (VERTICAL PORTION), VARIED FROM A VALUE EQUAL TO .8KwHT WHEN θ = 90° TO A VALUE EQUAL TO .8Kw [h+(.25(H-h)) TAN θ] WHEN θ = 53°
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
θ = 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
F_p = 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

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

1999
REVISIONS

STANDARD PLAN
METRIC
3090-1
SHEET 1 OF 4

GENERAL MINIMUM REQUIREMENTS

NOTES

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 SH. 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 PILES 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 REACTIONS 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 BRACES 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.

GENERAL MINIMUM REQUIREMENTS (CONT.)

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 PERMISSABLE FLEXURAL STRESS SHALL NOT EXCEED 15MPa(2000 PSI). THE 15MPa(2000 PSI) STRESS LIMITATION INCLUDES THE .1/3 INCREASE NOTED HEREINABOVE. NON-STRESS GRADE LUMBER FOR SOLID SUPPORT SHORES MAY BE USED WHEN Kw $\leq$ 4710N/m^3(30 PCF) PROVIDING THE FOLLOWING THICKNESS AND SPACING REQUIREMENTS ARE OBSERVED.

MINIMUM ROUGH THICKNESS OF SHEETING OR LAGGING	MAXIMUM VERTICAL SPACING OF WALERS FOR SOLID SHEETING	MAXIMUM HORIZ. SPACING OF UPRIGHTS 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.

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. ZONES 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.
2. SOIL TYPE _____
   K.w = _____ N/m3(pcf)
   θ = _____ °
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.

CALCULATIONS BY
NAME _____
R.C.E.NO. _____
ADDRESS _____
PHONE _____
DATE _____
SIGNATURE _____

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

ACCEPTED BY _____
DATE _____

PROJECT NO. _____

EXCAVATION SHORING SYSTEM

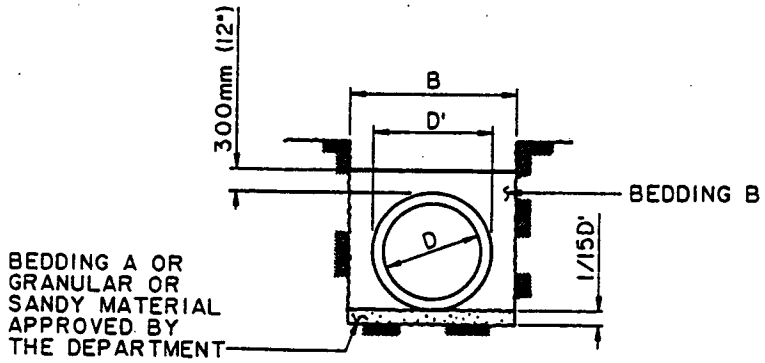
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SAMPLE SHEET
FOR USE AS A GUIDE IN PREPARING CALCULATIONS FOR SHORING OF EXCAVATIONS

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

1999
REVISIONS

STANDARD PLAN
METRIC
3091-1
SHEET 1 OF 1



LOAD FACTOR = 1.5

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 REQUIRMENTS 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 REQUIRMENTS 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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

PIPE BEDDING FOR PRIVATE DRAINS (ALTERNATE METHOD TO STD. PLAN 3080)

STANDARD PLAN METRIC

3092-1

SHEET 1 OF 1

APPROVED Thomas A. Tidemanson 5/31/1994

DIRECTOR OF PUBLIC WORKS — DATE

1999

REVISIONS

UNIFIED SOIL CLASSIFICATION
(INCLUDING IDENTIFICATION AND DESCRIPTION)

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES	FIELD IDENTIFICATION PROCEDURES (EXCLUDING PARTICLES LARGER THAN 80mm (3") AND BASING FRACTION ON ESTIMATED WEIGHTS)		
1	2		3	4	5		
COARSE-GRAINED SOILS MORE THAN HALF OF MATERIAL IS LARGER THAN 75 μm (NO. 200) SIEVE SIZE. THE 75 μm (NO. 200) SIEVE SIZE IS ABOUT THE SMALLEST PARTICLE VISIBLE TO THE NAKED EYE.	GRAVELS MORE THAN HALF OF COARSE FRACTION IS LARGER THAN 4.75mm (NO. 4) SIEVE SIZE. (FOR VISUAL CLASSIFICATION, THE 6mm (1/4") SIZE MAY BE USED AS EQUIVALENT TO THE 4.75mm (NO. 4) SIEVE SIZE)	CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES.	WIDE RANGE IN GRAIN SIZES AND SUBSTANTIAL AMOUNTS OF ALL INTERMEDIATE PARTICLE SIZES.	
			GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES.	PREDOMINATELY ONE SIZE OR A RANGE OF SIZES WITH SOME INTERMEDIATE SIZES MISSING.	
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES.	NONPLASTIC FINES OR FINES WITH LOW PLASTICITY. (FOR IDENTIFICATION PROCEDURES SEE ML BELOW)		
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES.	PLASTIC FINES (FOR IDENTIFICATION PROCEDURES SEE CL BELOW)		
	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN 4.75mm (NO. 4) SIEVE SIZE.	CLEAN SANDS (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES.	WIDE RANGE IN GRAIN SIZES AND SUBSTANTIAL AMOUNTS OF ALL INTERMEDIATE PARTICLE SIZES.		
			SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES.	PREDOMINANTLY ONE SIZE OR A RANGE OF SIZES WITH SOME INTERMEDIATE SIZES MISSING.		
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES.	NONPLASTIC FINES OR FINES WITH LOW PLASTICITY. (FOR IDENTIFICATION PROCEDURES SEE ML BELOW)		
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES.	PLASTIC FINES (FOR IDENTIFICATION PROCEDURES SEE CL BELOW)		
FINE-GRAINED SOILS MORE THAN HALF OF MATERIAL IS SMALLER THAN 75 μm (NO. 200) SIEVE SIZE.					IDENTIFICATION PROCEDURES ON FRACTION SMALLER THAN 450 μm (NO. 40) SIEVE SIZE		
					DRY STRENGTH (CRUSHING CHARACTERISTICS)	DILATANCY (REACTION TO SHAKING)	TOUGHNESS (CONSISTENCY NEAR PL)
	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY.	NONE TO SLIGHT	QUICK TO SLOW	NONE
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS.	MEDIUM TO HIGH	NONE TO VERY SLOW	MEDIUM
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY.	SLIGHT TO MEDIUM	SLOW	SLIGHT
			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS.	SLIGHT TO MEDIUM	SLOW TO NONE	SLIGHT TO MEDIUM
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS.	HIGH TO VERY HIGH	NONE	HIGH
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS.	MEDIUM TO HIGH	NONE TO VERY SLOW	SLIGHT TO MEDIUM
HIGHLY ORGANIC SOILS			PT	PEAT AND OTHER HIGHLY ORGANIC SOILS.	READILY IDENTIFIED BY COLOR, ODOR, SPONGY FEEL AND FREQUENTLY BY FIBROUS TEXTURE.		

(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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

UNIFIED SOIL CLASSIFICATION SYSTEM

STANDARD PLAN METRIC

3093-1

SHEET 1 OF 3

APPROVED Thomas A. Tidemanson 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

1999

REVISIONS

UNIFIED SOIL CLASSIFICATION
(INCLUDING IDENTIFICATION AND DESCRIPTION)

INFORMATION REQUIRED FOR DESCRIBING SOILS	LABORATORY CLASSIFICATION CRITERIA	GROUP SYMBOLS
6	7	8

FOR UNDISTURBED SOILS ADD INFORMATION ON STRATIFICATION, DEGREE OF COMPACTNESS, CEMENTATION, MOISTURE CONDITIONS AND DRAINAGE CHARACTERISTICS.

GIVE TYPICAL NAME: INDICATE APPROXIMATE PERCENTAGES OF SAND AND GRAVEL, MAX. SIZE: ANGULARITY, SURFACE CONDITION, AND HARDNESS OF THE COARSE GRAINS: LOCAL OR GEOLOGIC NAME AND OTHER PERTINENT DESCRIPTIVE INFORMATION: AND SYMBOL IN PARENTHESIS.

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% NONPLASTIC FINES WITH LOW DRY STRENGTH: WELL COMPACTED AND MOIST IN PLACE: ALLUVIAL SAND: (SM).

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(NO. 200) SIEVE SIZE) COARSE-GRAINED SOILS ARE CLASSIFIED AS FOLLOWS:

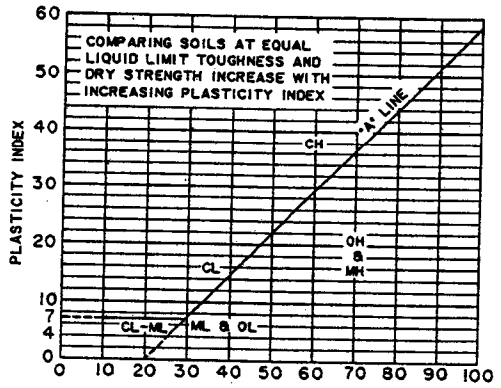
LESS THAN 5%	GW, GP, SW, SP, GM, GC, SM, SC. BORDERLINE CASES REQUIRING USE OF DUAL SYMBOLS.	$Cu = \frac{D_{60}}{D_{10}}$ GREATER THAN 4 $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ BETWEEN ONE AND 3	GW
		NOT MEETING ALL GRADATION REQUIREMENTS FOR GW	GP
MORE THAN 12%		ATTERBERG LIMITS BELOW "A" LINE OR PI LESS THAN 4 — ABOVE "A" LINE WITH PI BETWEEN 4 AND 7 ARE BORDERLINE CASES REQUIRING USE OF DUAL SYMBOLS.	GM
		ATTERBERG LIMITS ABOVE "A" LINE WITH PI GREATER THAN 7	GC
5% TO 12%		$Cu = \frac{D_{60}}{D_{10}}$ GREATER THAN 6 $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ BETWEEN ONE AND 3	SW
		NOT MEETING ALL GRADATION REQUIREMENTS FOR SW	SP
		ATTERBERG LIMITS BELOW "A" LINE OR PI LESS THAN 4 — LIMITS PLOTTING IN HATCHED ZONE WITH PI BETWEEN 4 AND 7 ARE BORDERLINE CASES REQUIRING USE OF DUAL SYMBOLS.	SM
		ATTERBERG LIMITS ABOVE "A" LINE WITH PI GREATER THAN 7	SC

GIVE TYPICAL NAME, INDICATE DEGREE AND CHARACTER OF PLASTICITY, AMOUNT AND MAX. SIZE OF COARSE GRAINS, COLOR IN WET CONDITION, ODOR IF ANY, LOCAL OR GEOLOGIC NAME, AND OTHER PERTINENT DESCRIPTIVE INFORMATION: AND SYMBOL IN PARENTHESIS.

FOR UNDISTURBED SOILS ADD INFORMATION ON STRUCTURE, STRATIFICATION, CONSISTENCY IN UNDISTURBED AND REMOLDED STATES, MOISTURE AND DRAINAGE CONDITIONS.

XAMPLE:

CLAYEY SILT, BROWN, SLIGHTLY PLASTIC, SMALL PERCENTAGE OF FINE SAND, NUMEROUS VERTICAL ROOT HOLES, FIRM AND DRY IN PLACE, LOESS, (ML).



PLASTICITY 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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

UNIFIED SOIL CLASSIFICATION SYSTEM

STANDARD PLAN METRIC
3093-1
SHEET 2 OF 3

GENERAL NOTE

1. 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 INTEREFERE WITH THE TESTS.

DILATANCY (REACTION TO SHAKING)

AFTER REMOVING PARTICLES LARGER THAN 450 μm (NO. 40) SIEVE SIZE, PREPARE A PAT OF MOIST SOIL WITH A VOLUME OF ABOUT 6.504mm^3 (1/2 CUBIC INCH). ADD ENOUGH WATER IF NECESSARY TO MAKE THE SOIL SOFT BUT NOT STICKY. PLACE THE PAT IN THE OPEN PALM OF ONE HAND AND SHAKE HORIZONTALLY, STRIKING VIGOROUSLY AGAINST THE OTHER HAND SEVERAL TIMES. A POSITIVE REACTION CONSISTS OF THE APPEARANCE OF WATER ON THE SURFACE OF THE PAT WHICH CHANGES TO A LIVERY CONSISTENCY AND BECOMES GLOSSY. WHEN THE SAMPLE IS SQUEEZED BETWEEN THE FINGERS, THE WATER AND GLOSS DISAPPEAR FROM THE SURFACE, THE PAT STIFFENS AND FINALLY IT CRACKS OR CRUMBLES. THE RAPIDITY OF APPEARANCE OF WATER DURING SHAKING AND OF ITS DISAPPEARANCE DURING SQUEEZING ASSIST IN IDENTIFYING THE CHARACTER OF THE FINES IN A SOIL.

VERY FINE CLEAN SANDS, GIVE THE QUICKEST AND MOST DISTINCT REACTION WHEREAS A PLASTIC CLAY HAS NO REACTION. INORGANIC SILTS SUCH AS A TYPICAL ROCK FLOUR, SHOW A MODERATELY QUICK REACTION.

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 OVEN, SUN, 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 6.504mm^3 (1/2 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 3mm (1/8") 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.

AFTER THE THREAD CRUMBLES, THE PIECES SHOULD BE LUMPED TOGETHER AND A SLIGHT KNEADING ACTION CONTINUED UNTIL THE LUMP CRUMBLES.

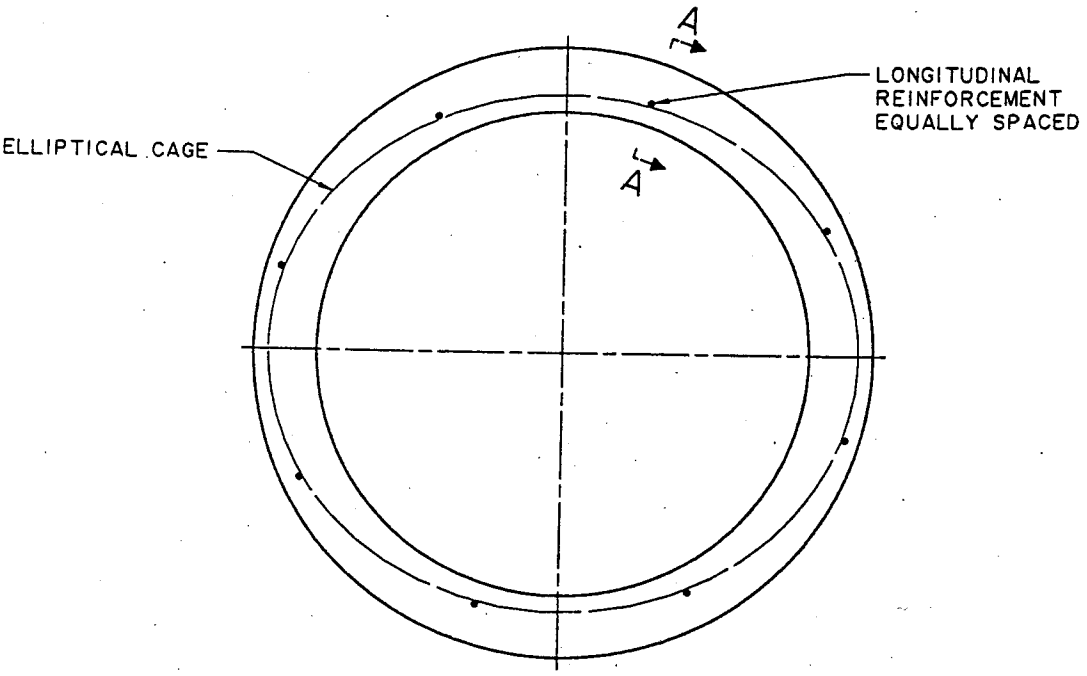
THE TOUGHER THE THREAD NEAR THE PLASTIC LIMIT AND THE STIFFER THE LUMP WHEN IT FINALLY CRUMBLES, THE MORE POTENT IS THE COLLOIDAL CLAY FRACTION IN THE SOIL. WEAKNESS OF THE THREAD AT THE PLASTIC LIMIT AND QUICK LOSS OF COHERENCE OF THE LUMP BELOW THE PLASTIC LIMIT INDICATE EITHER INORGANIC CLAY OF LOW PLASTICITY, OR MATERIALS SUCH AS KAOLIN-TYPE CLAYS AND ORGANIC CLAYS WHICH OCCUR BELOW THE A-LINE.

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

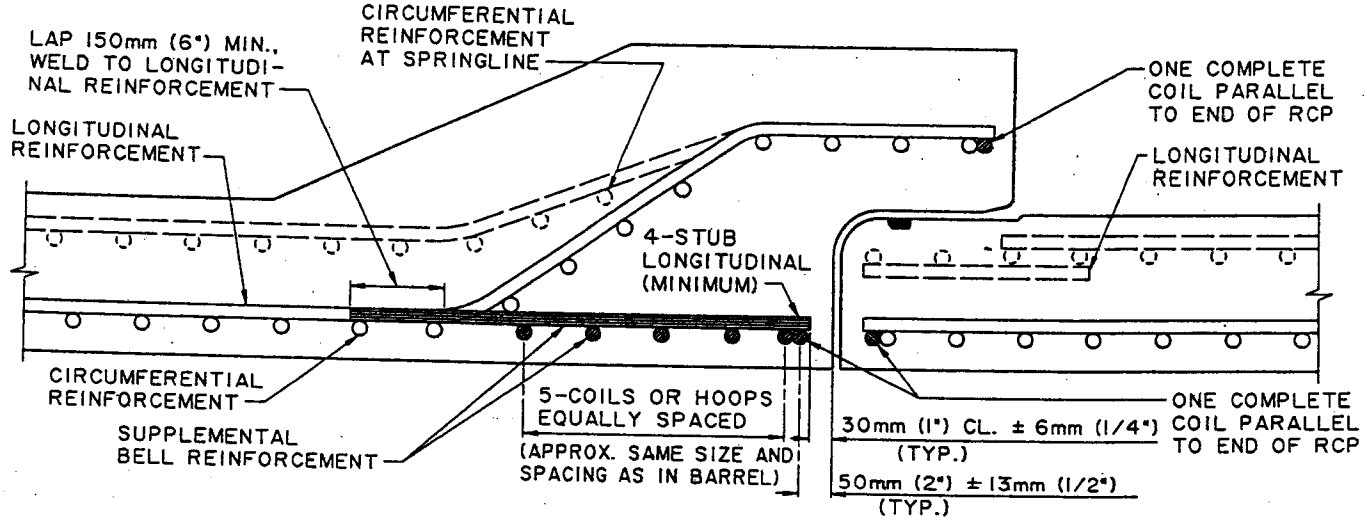
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

UNIFIED SOIL CLASSIFICATION SYSTEM

STANDARD PLAN
METRIC
3093-1
SHEET 3 OF 3



SECTION THROUGH BARREL



SECTION A-A

LEGEND			
NORMAL CIRCUMFERENTIAL REINFORCEMENT	○		NORMAL LONGITUDINAL REINFORCEMENT
ADDITIONAL CIRCUMFERENTIAL REINFORCEMENT	●		ADDITIONAL LONGITUDINAL REINFORCEMENT

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

ADDITIONAL REINFORCEMENT FOR BELL END OF RCP

STANDARD PLAN METRIC

3095-1

SHEET 1 OF 2

APPROVED Thomas A. Tidemanson 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

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.

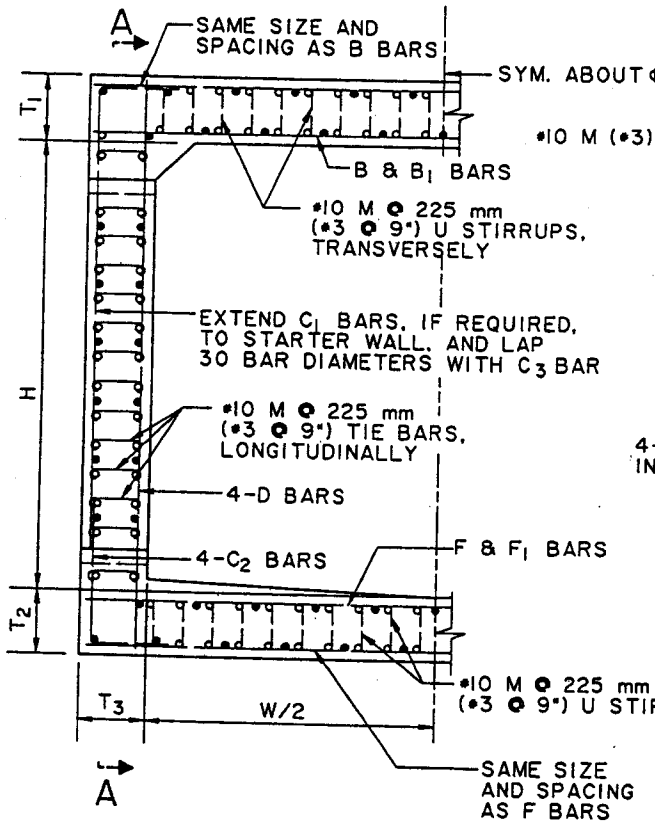
2. THE ADDITIONAL REINFORCEMENT SHOWN IS NOT REQUIRED, PROVIDED:
   A. THE NORMAL CIRCUMFERENTIAL REINFORCEMENT WITHOUT CHANGE IN DIAMETER(S) IS CARRIED TO WITHIN APPROXIMATELY 50mm (2") OF THE RCP END AND ONE COMPLETE COIL IS PLACED PARALLEL TO THE END OF THE RCP.
   B. A MINIMUM OF THREE COILS, INCLUDING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

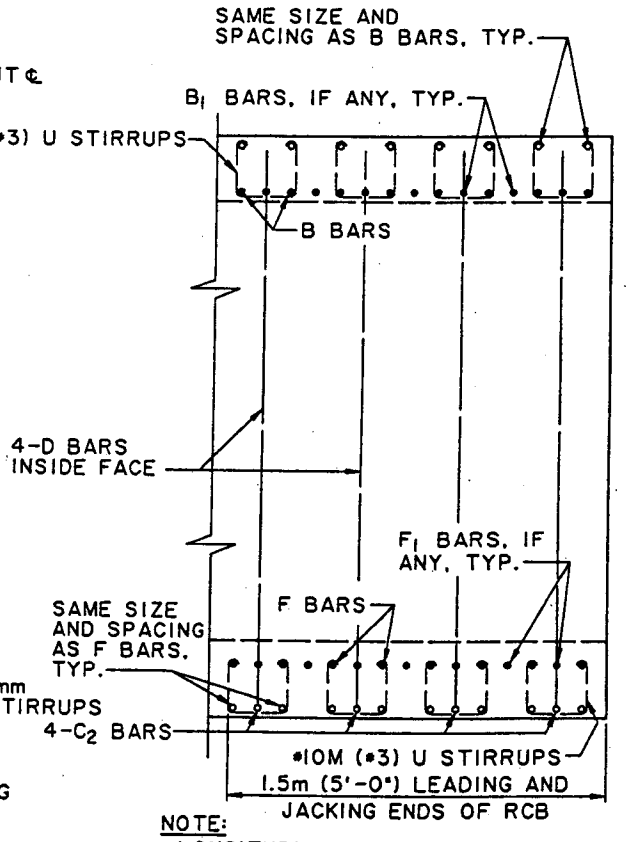
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

ADDITIONAL REINFORCEMENT FOR BELL END OF RCP

STANDARD PLAN
METRIC
3095-1
SHEET 2 OF 2

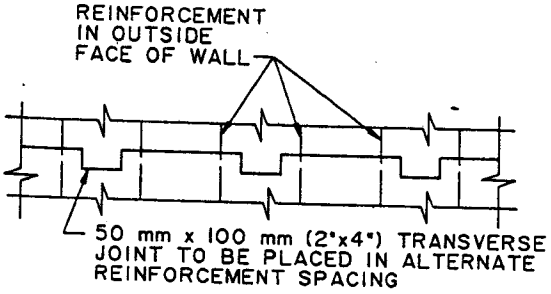


JACKED SECTION WITH ADDITIONAL REINFORCEMENT

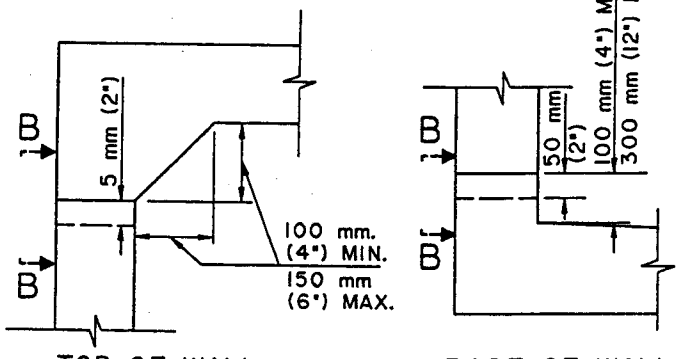


NOTE:
LONGITUDINAL AND VERTICAL NORMAL REINFORCEMENT NOT SHOWN.

SECTION A-A



SECTION B-B



TOP OF WALL

BASE OF WALL

CONSTRUCTION JOINT DETAILS FOR RCB JACKED IN PLACE

ADDITIONAL LONGITUDINAL REINFORCEMENT SCHEDULE

MEMBER THICKNESS	BAR NO. AND SPACING
165 mm - 255 mm (6 1/2" TO 10")	#13 M @ 225 mm (#4 @ 9")
260 mm - 330 mm (10 1/4" TO 13")	#16 M @ 225 mm (#5 @ 9")
340 mm PLUS (13 1/4" PLUS)	#19 M @ 225 mm (#6 @ 9")

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

STANDARD PLAN METRIC

3096-1

SHEET 1 OF 2

APPROVED Thomas A. Tidemanson 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

1999

REVISIONS

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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

ADDITIONAL REINFORCEMENT FOR JACKED RCB

STANDARD PLAN METRIC

3096-1

SHEET 2 OF 2

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
SLPB	slpb	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
		DEADMAN
		GUY POLE

NOTE:

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

STANDARD PLAN
METRIC
4000-1
SHEET 1 OF 1

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

1999
REVISIONS

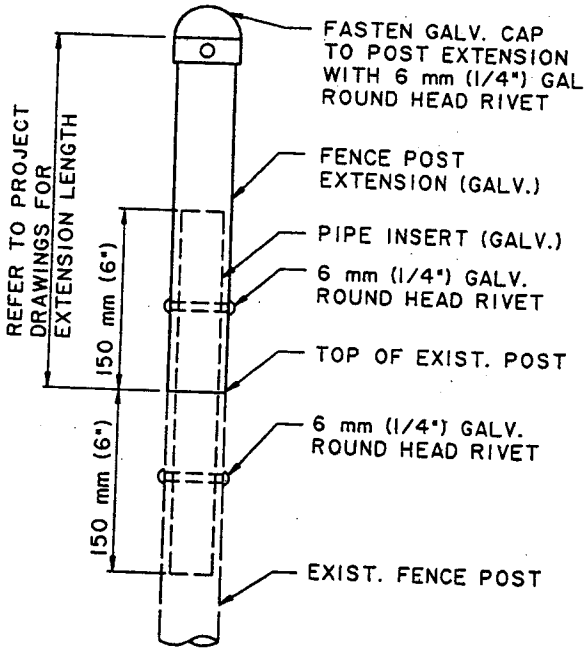
c4.IId.894012.4000-0

SECTION 5

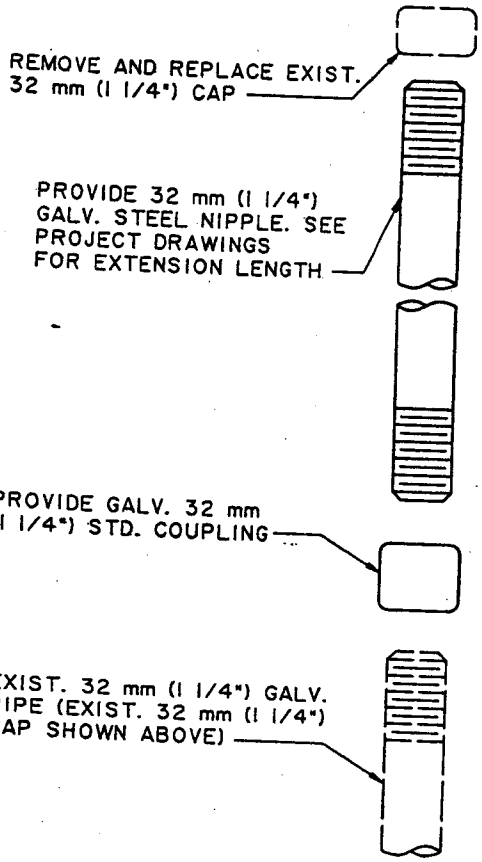
Landscaping and Irrigation Systems

SECTION 6

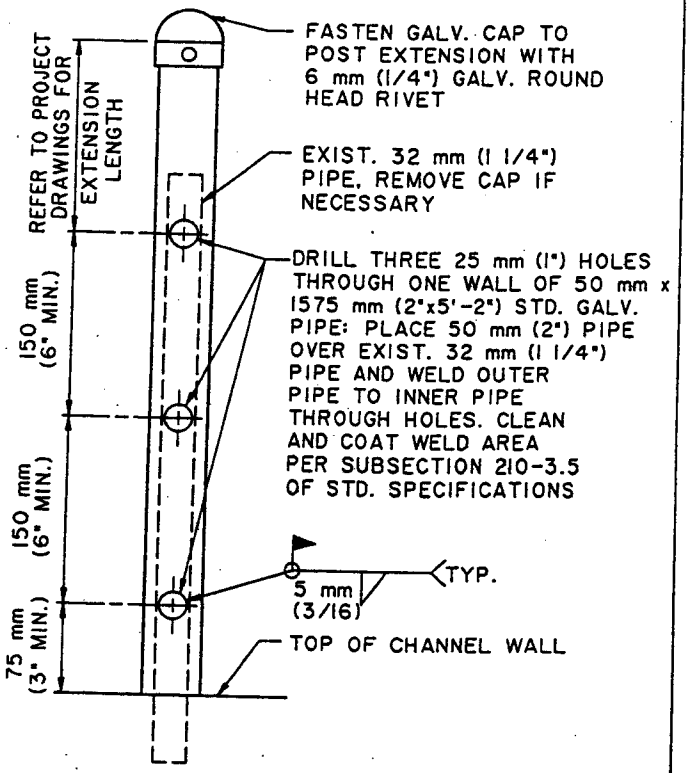
General Facilities



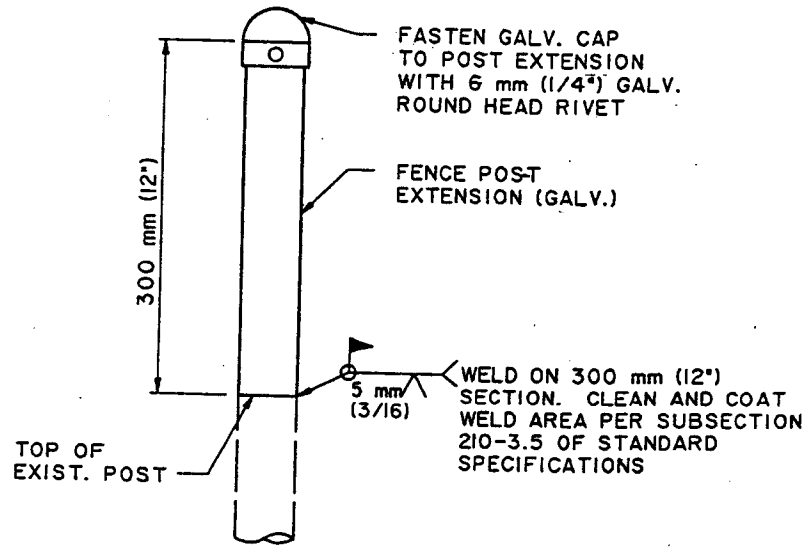
TYPE A



TYPE B



TYPE C



TYPE D

NOTE:

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

STANDARD PLAN METRIC

6000-1

SHEET 1 OF 1

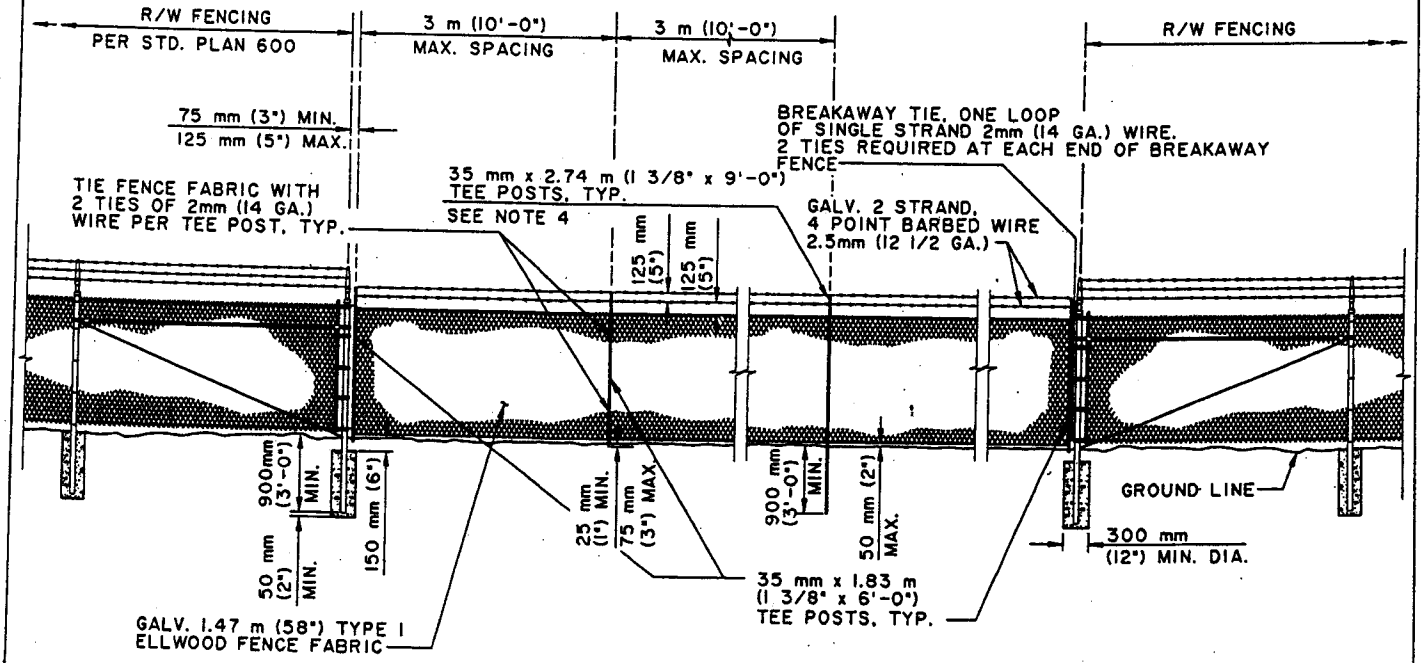
APPROVED Thomas A. Tidemanson 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

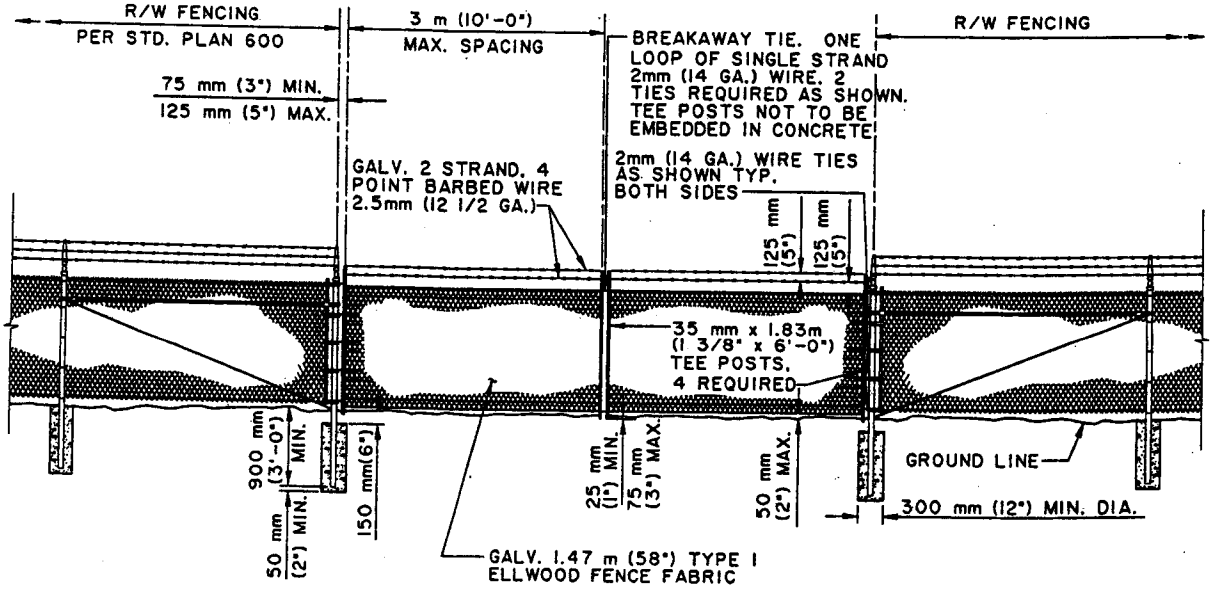
1999

REVISIONS

STDPLNS.DPW.6000-IMETRIC



DETAILS FOR LENGTHS IN EXCESS OF 6 m (20')



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

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

BREAKAWAY FENCING

STANDARD PLAN METRIC

6001-1

SHEET 1 OF 2

APPROVED Thomas A. Tidemanson 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

1999

REVISIONS

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.

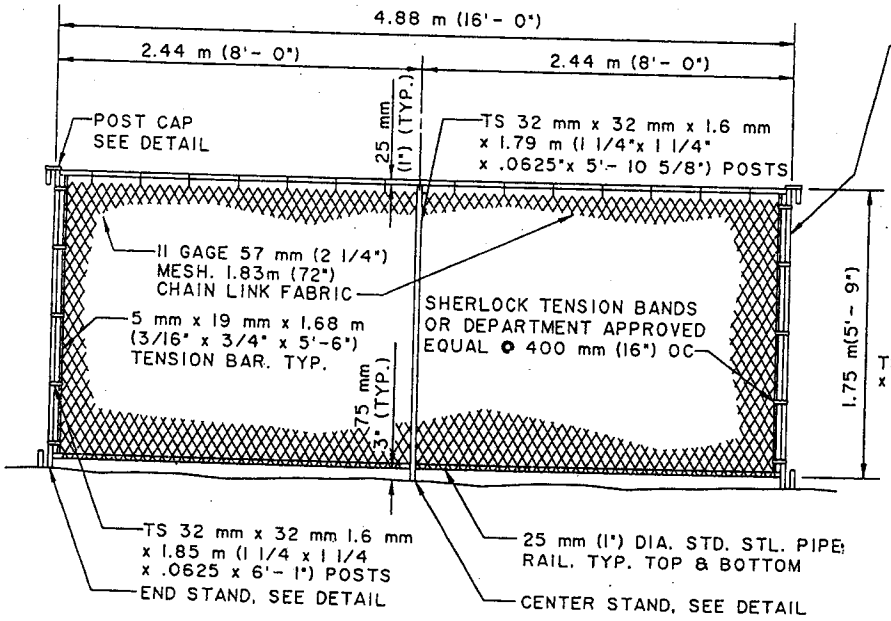
4. TEE POSTS NOT TO BE EMBEDDED IN CONCRETE. TEE POSTS SHALL BE DRIVEN 900 mm (3'-0") INTO GROUND AT 6 m (20'-0") OC. OTHER INTERMEDIATE TEE POSTS SHALL BE SET AS SHOWN.

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.

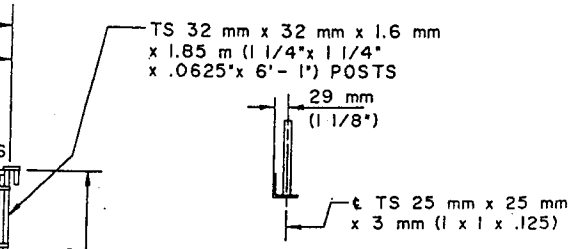
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

BREAKAWAY FENCING

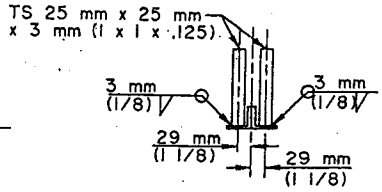
STANDARD PLAN
METRIC
6001-1
SHEET 2 OF 2



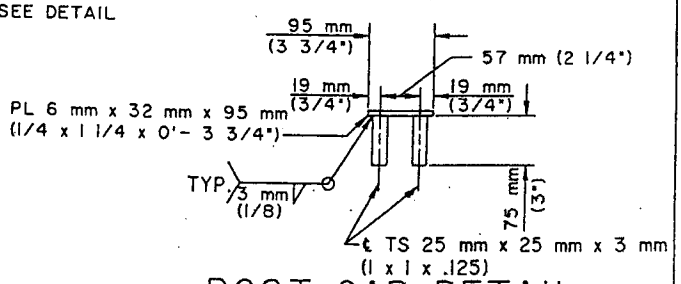
TYPICAL FENCE ELEVATION



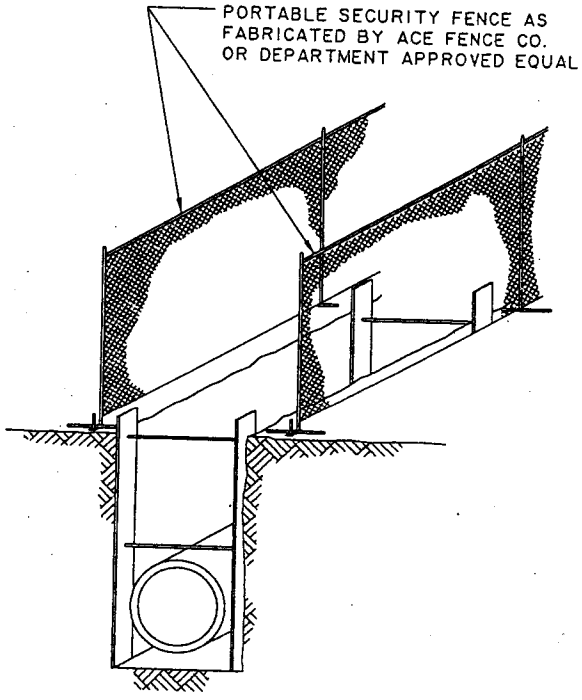
SECTION A-A



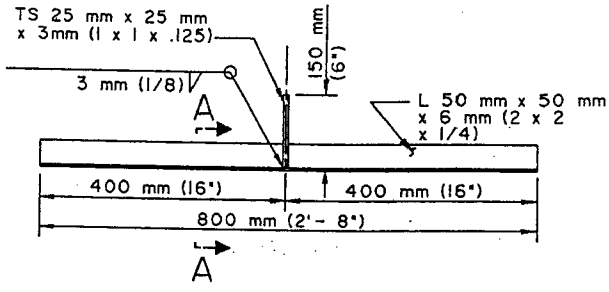
SECTION B-B



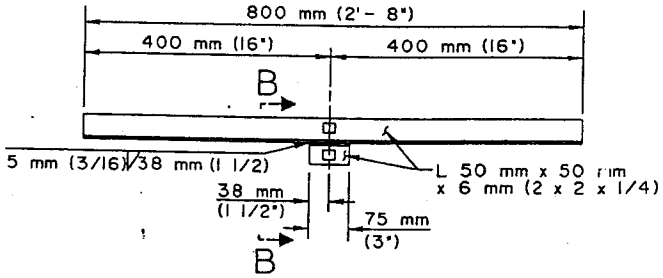
POST CAP DETAIL



TYPICAL FIELD INSTALLATION



CENTER STAND DETAIL



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 Thomas A. Tidemanson 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

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.

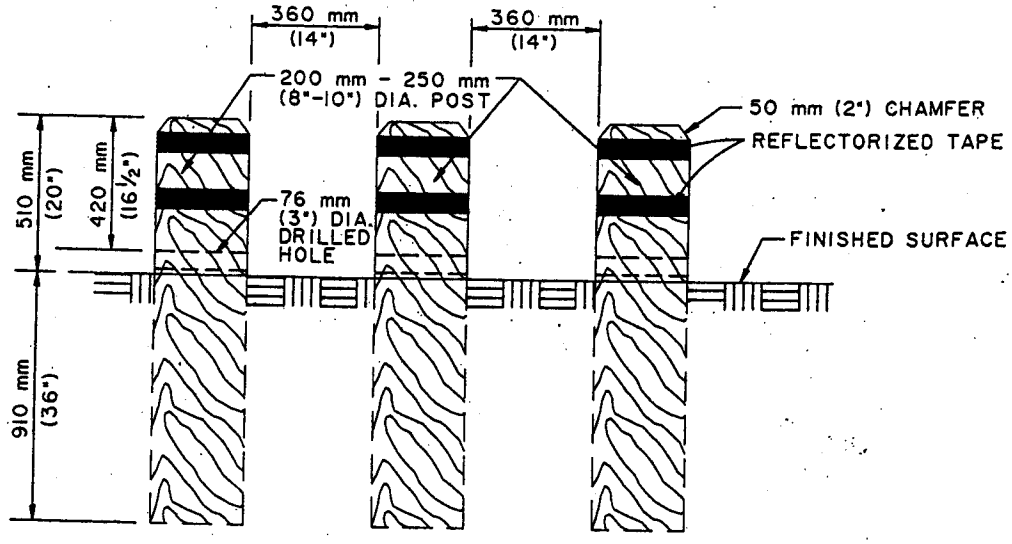
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

PORTABLE SECURITY FENCE FOR OPEN TRENCHES

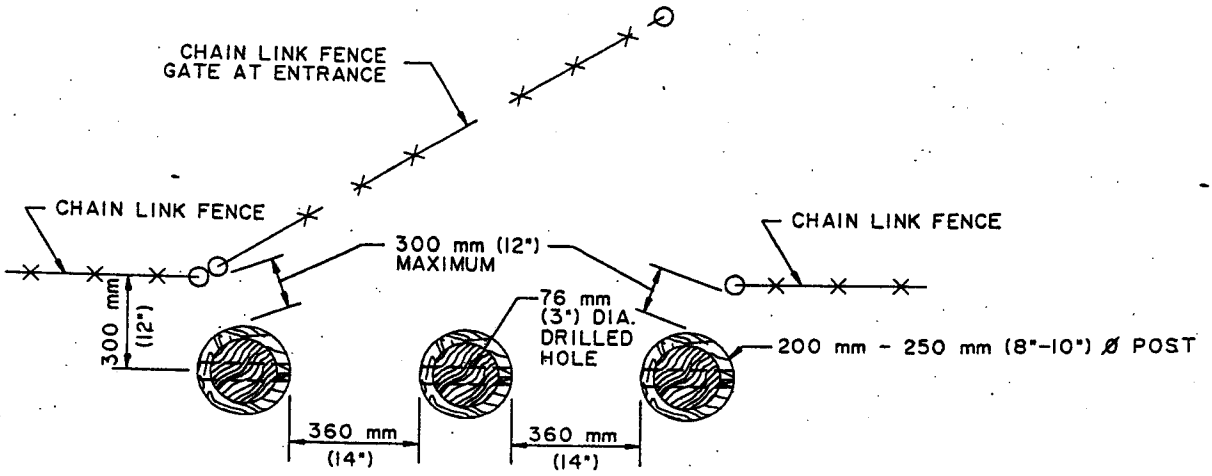
STANDARD PLAN
METRIC
6002-1
SHEET 2 OF 2

REV. 1/95: ADDED TYPE B

TYPE A



ELEVATION



PLAN

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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

EQUESTRIAN AND BICYCLE ENTRANCE

STANDARD PLAN METRIC

6003-2

SHEET 1 OF 2

APPROVED Thomas A. Tidemanson 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

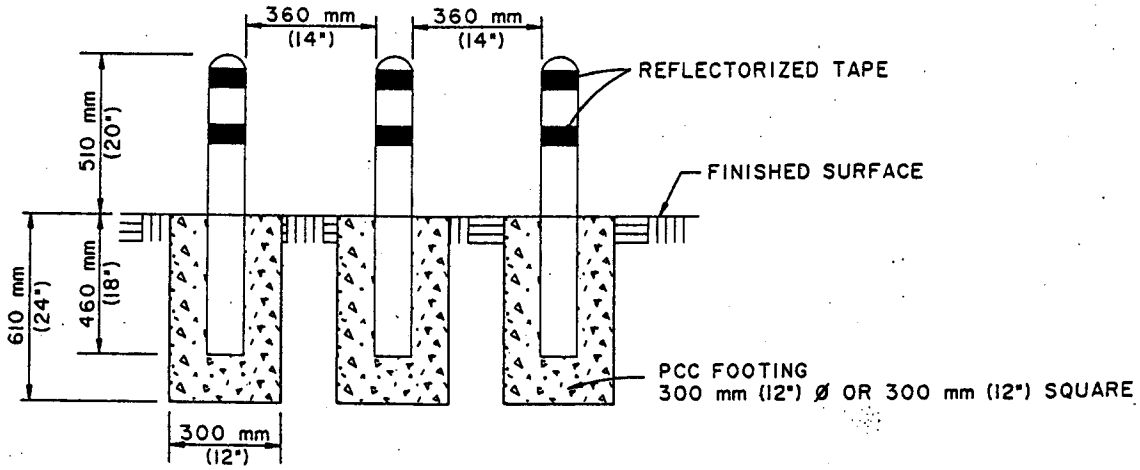
1995, 1999

REVISIONS

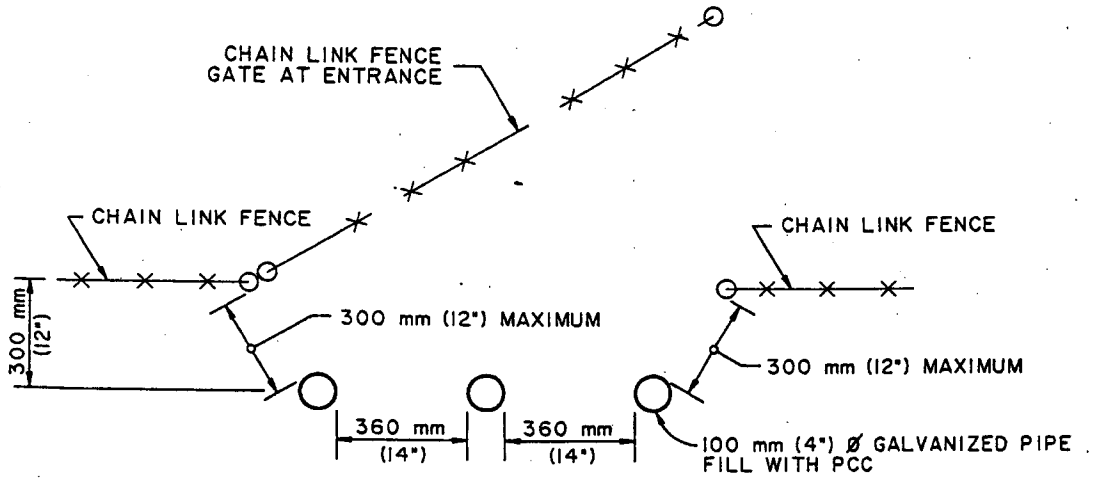
STDPLNS.DPW.6003-0 (AG)

REV. 1/95: ADDED TYPE B

TYPE B



ELEVATION



PLAN

NOTES:

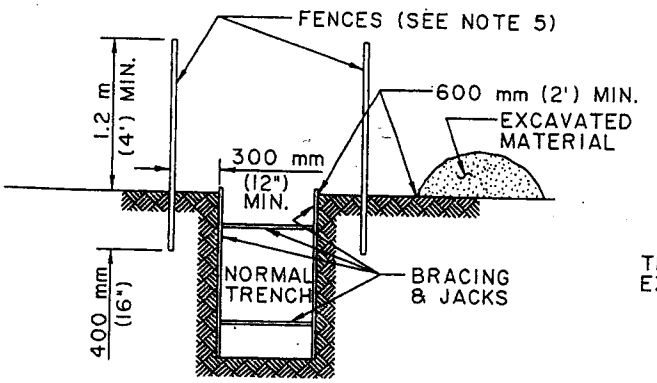
1. POSTS SHALL BE PAINTED WITH YELLOW TRAFFIC PAINT. APPLY 2 ROWS OF REFLECTORIZED TAPE 100 mm (4") APART TO THE TOP OF EACH POST.
2. THE NUMBER OF POSTS VARIES WITH THE WIDTH OF ENTRANCE.
3. DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED,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

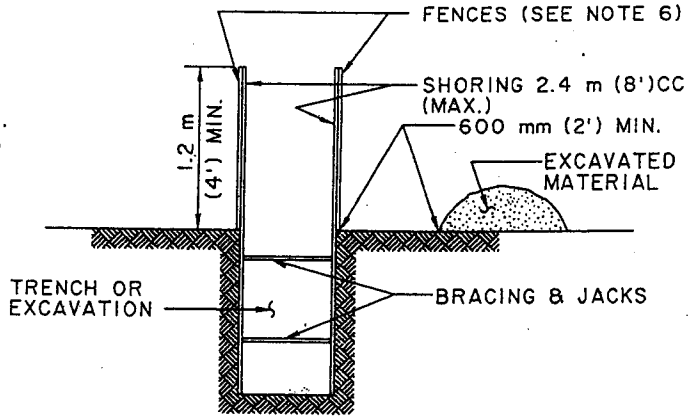
EQUESTRIAN AND BICYCLE ENTRANCE

STANDARD PLAN
METRIC
6003-2
SHEET 2 OF 2

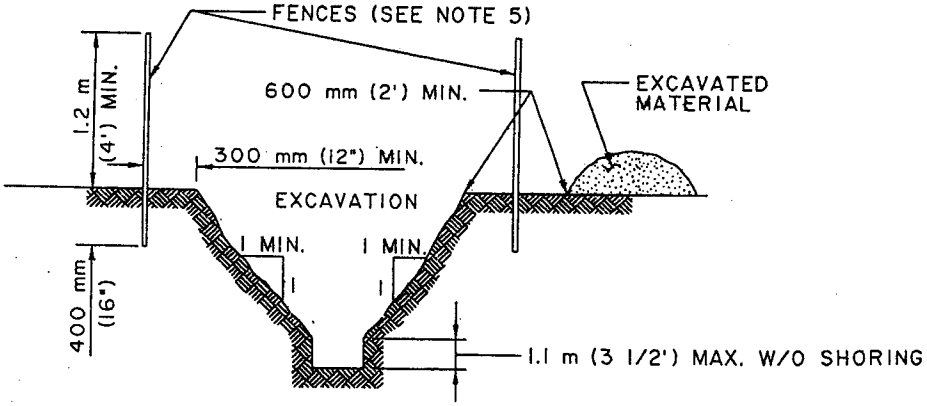
PRIOR TO THE END OF EACH WORKDAY, AND WHENEVER WORKERS ARE NOT WITHIN VISUAL SIGHT OF THE EXCAVATION, THE CONTRACTOR SHALL EITHER BACKFILL THE EXCAVATION OR ERECT AND MAINTAIN FENCES AROUND THE EXCAVATION OR COVER THE EXCAVATION. THE FOLLOWING ARE MINIMUM ACCEPTABLE MEASURES ONLY AND COMPLIANCE WITH THIS STANDARD DOES NOT RELIEVE THE CONTRACTOR OF HIS OBLIGATION TO PROTECT THE PUBLIC BY ALL NECESSARY MEANS.



CASE A

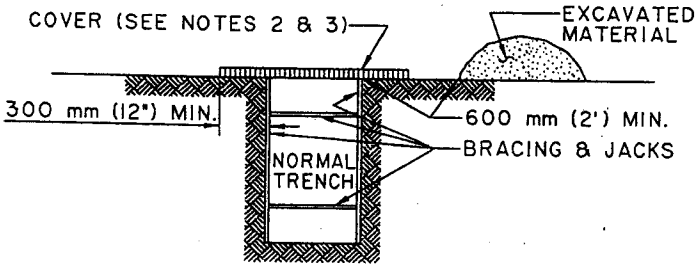


CASE C



CASE B

FENCES



COVER

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

MINIMUM PUBLIC SAFETY REQUIREMENT FOR OPEN EXCAVATIONS

STANDARD PLAN METRIC

6008-1

SHEET 1 OF 2

APPROVED *Thomas A. Tidemanson* 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

1999

REVISIONS

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 REQUIRES 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 mmx100 mm (2"x4") WOOD OR EQUIVALENT STEEL OR PIPE. IN PAVED AREAS, POSTS MAY BE FLUSH WITH SURFACE IF SUFFICIENTLY ANCHORED AND BRACED. RAILS SHALL BE 25 mmx100 mm (1"x4") 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 mmx100 mm (2"x4") POSTS 2.4 m (8') CC AND WIRE MESH.
   C. 50 mmx100 mm (2"x4") 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.

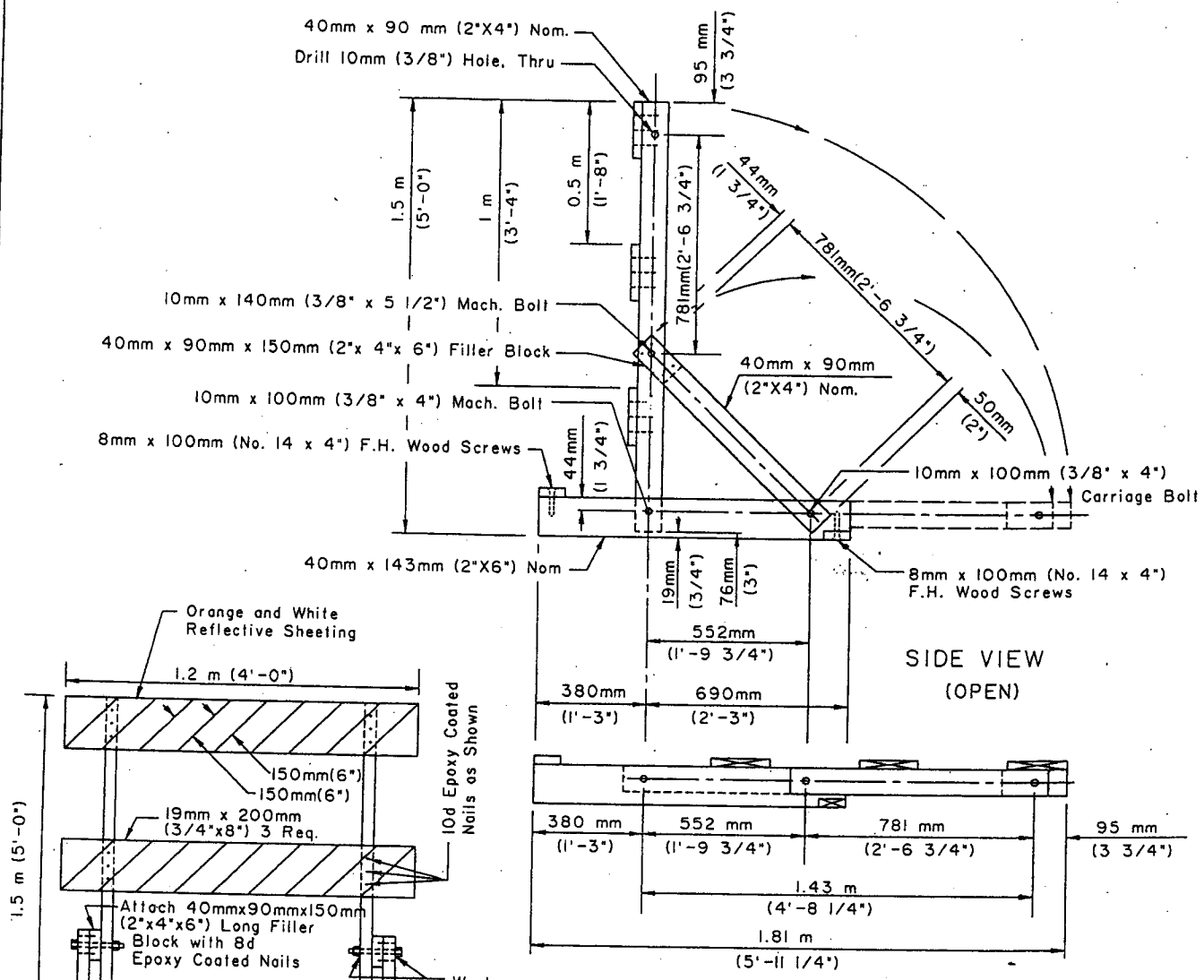
7. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE ADEQUATE SHORING, BRACING AND/OR COVERS OVER ANY EXCAVATION IN ACCORDANCE WITH SECTIONS 7-10.4 AND 306-1.1.6 OF THE STANDARD SPECIFICATIONS.

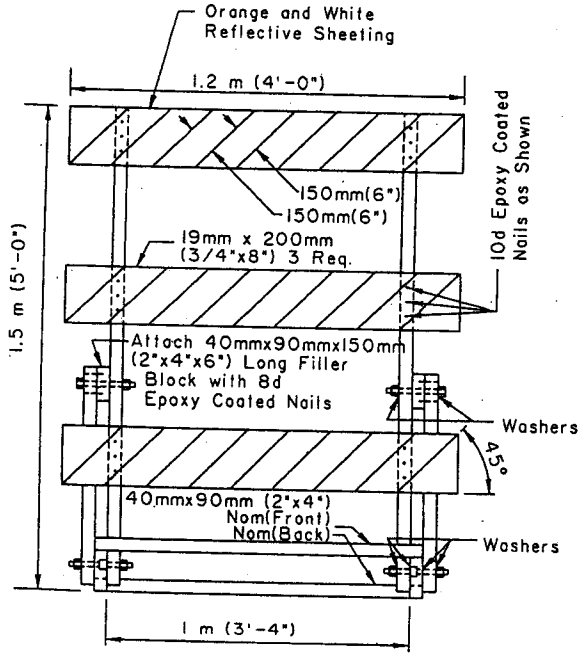
8. DIMENSIONS SHOWN ON THIS PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACT EQUAL VALUES. IF METRIC VALUES ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

MINIMUM PUBLIC SAFETY REQUIREMENT FOR OPEN EXCAVATIONS

STANDARD PLAN
METRIC
6008-1
SHEET 2 OF 2





FRONT VIEW

The Legend "Property of L.A. County Dept. of Public Works" shall be Painted on the Reverse Side of the Bottom 19mm x 200mm (3/4"x8").

PARTS LIST

LUMBER

- 3 Ea. 19mm x 200mm x 1.2m (3/4"x8"x4') Exterior D.F. Plywood, Grade A-B
- 2 Ea. 40mm x 143mm x 1.07m (2"x6"x3'-6")
- 2 Ea. 40mm x 90mm x 1.48m (2"x4"x4'-11 1/4")
- 2 Ea. 40mm x 90mm x 1.1m (2"x4"x3'-7 1/4")
- 2 Ea. 40mm x 90mm x 876mm (2"x4"x2'-10 1/2")
- 2 Ea. 40mm x 90mm x 150mm (2"x4"x6")

HARDWARE

- 2 Ea. 10mm x 140mm (3/8"x5 1/2") Hex Head Mach. Bolts.
- 2 Ea. 10mm x 100mm (3/8"x4") Hex Head Mach. Bolts.
- 2 Ea. 10mm x 100mm (3/8"x4") Carriage Bolts.
- 4 Ea. 8mm x 100mm (No. 14 x 4") Flat Head Wood Screws.
- 4 Ea. Washers 13mm (1/2")
- 10 Ea. Washers 10mm (3/8")
- 18 Ea. 10d Epoxy Coated Nails.
- 8 Ea. 8d Epoxy Coated Nails

GENERAL NOTES

1. All Wood Surfaces to be Painted with Approved LA Co. White Paint for Barricade Coating.
2. Use Std. Galvanized Cut Washers with All Bolts.
3. Weight = 46.7kg (103 lbs.) + Hardware.
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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

BARRICADE - TYPE III

STANDARD PLAN METRIC

6009-1

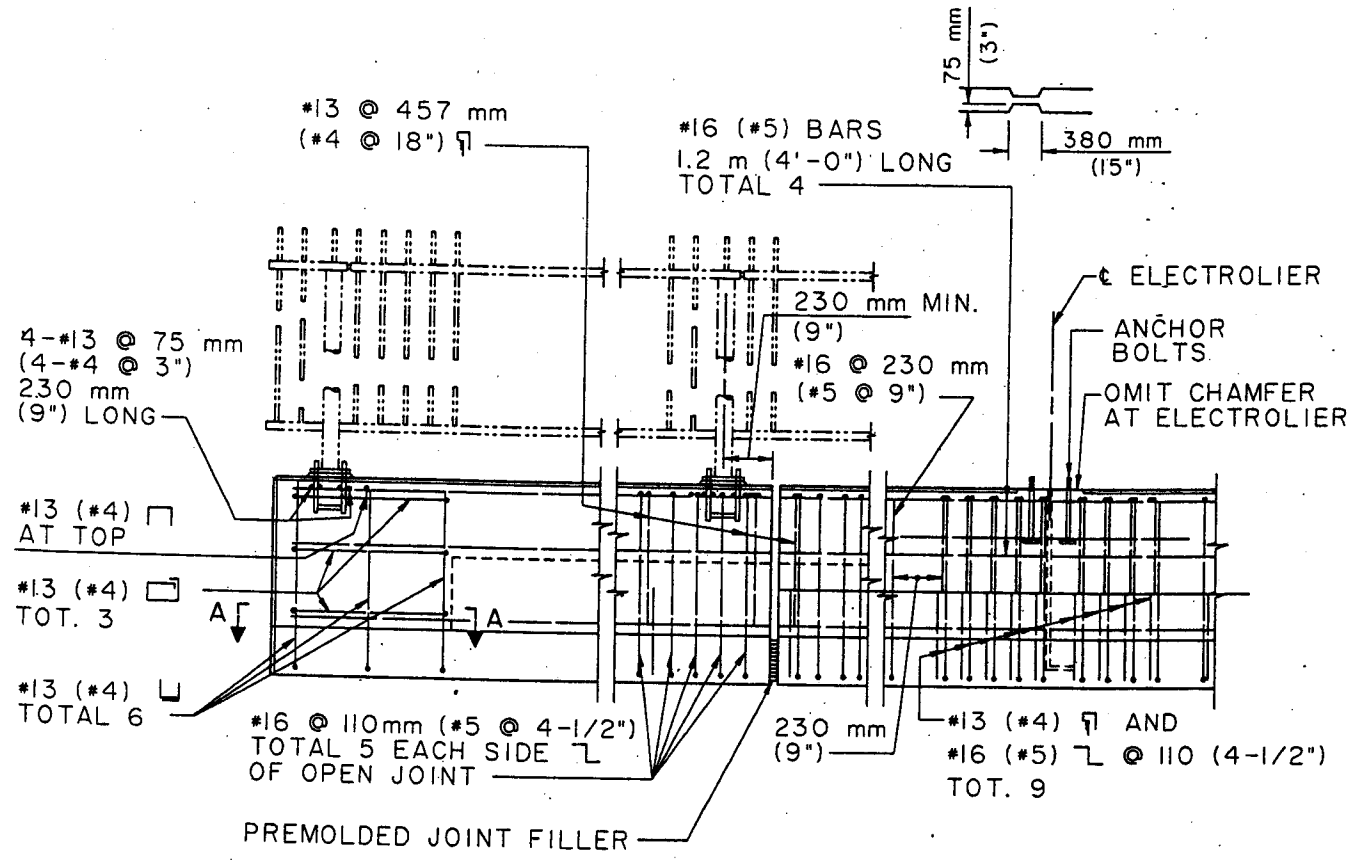
SHEET 1 OF 1

APPROVED Thomas A. Tidemanson 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

1999

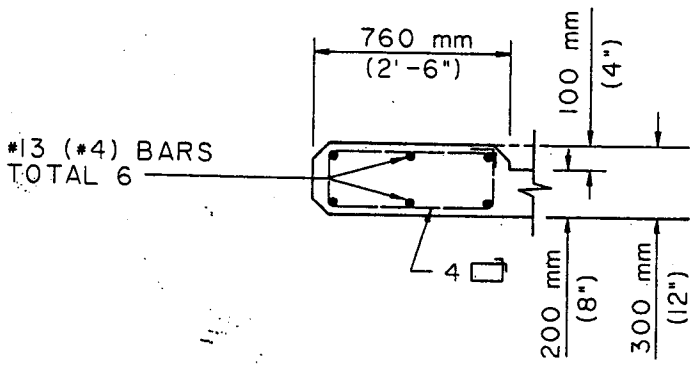
REVISIONS



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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

BARRIER RAILING TYPE 3

STANDARD PLAN METRIC

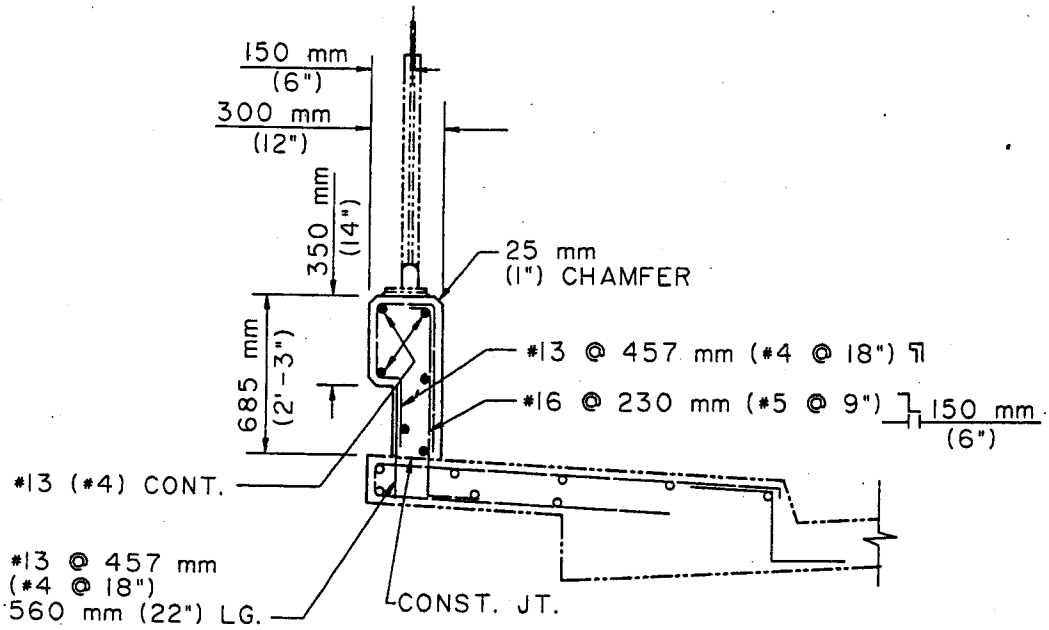
6100-1

APPROVED Thomas A. Tidemanson 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

1999 REVISIONS

SHEET 1 OF 2



TYPICAL SECTION

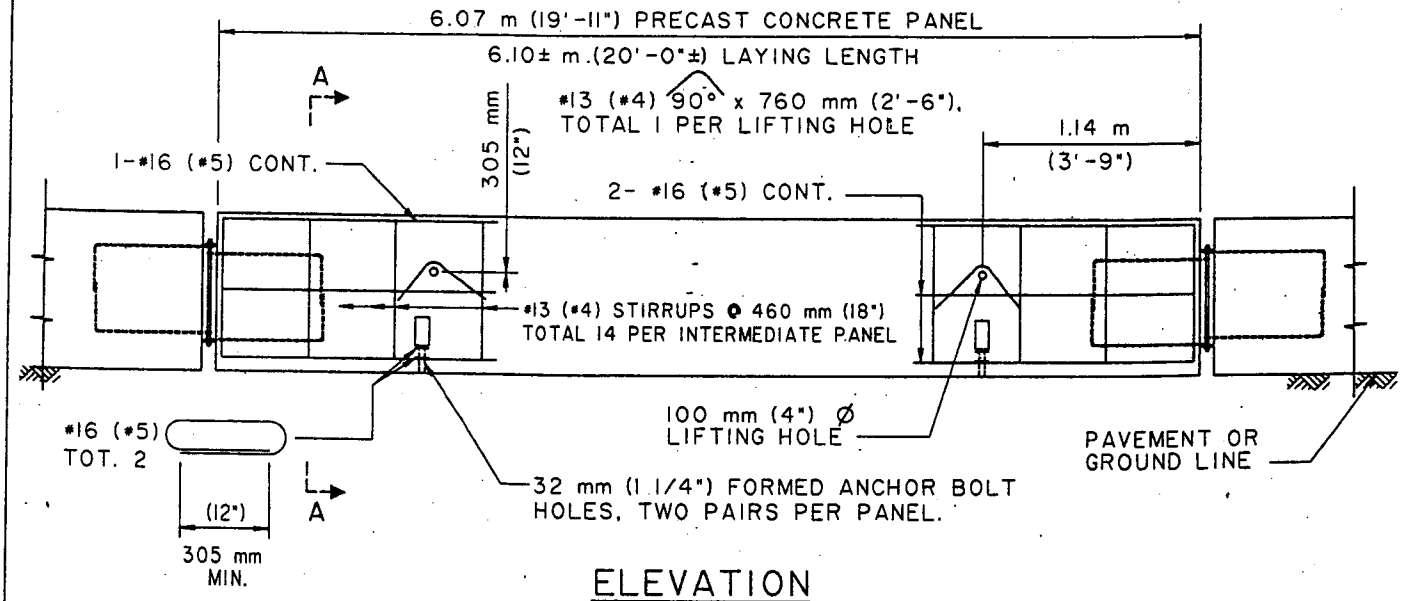
NOTE:

WALL EXPANSION JOINTS TO BE LOCATED AT ALL DECK JOINTS, AT ℄ 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.

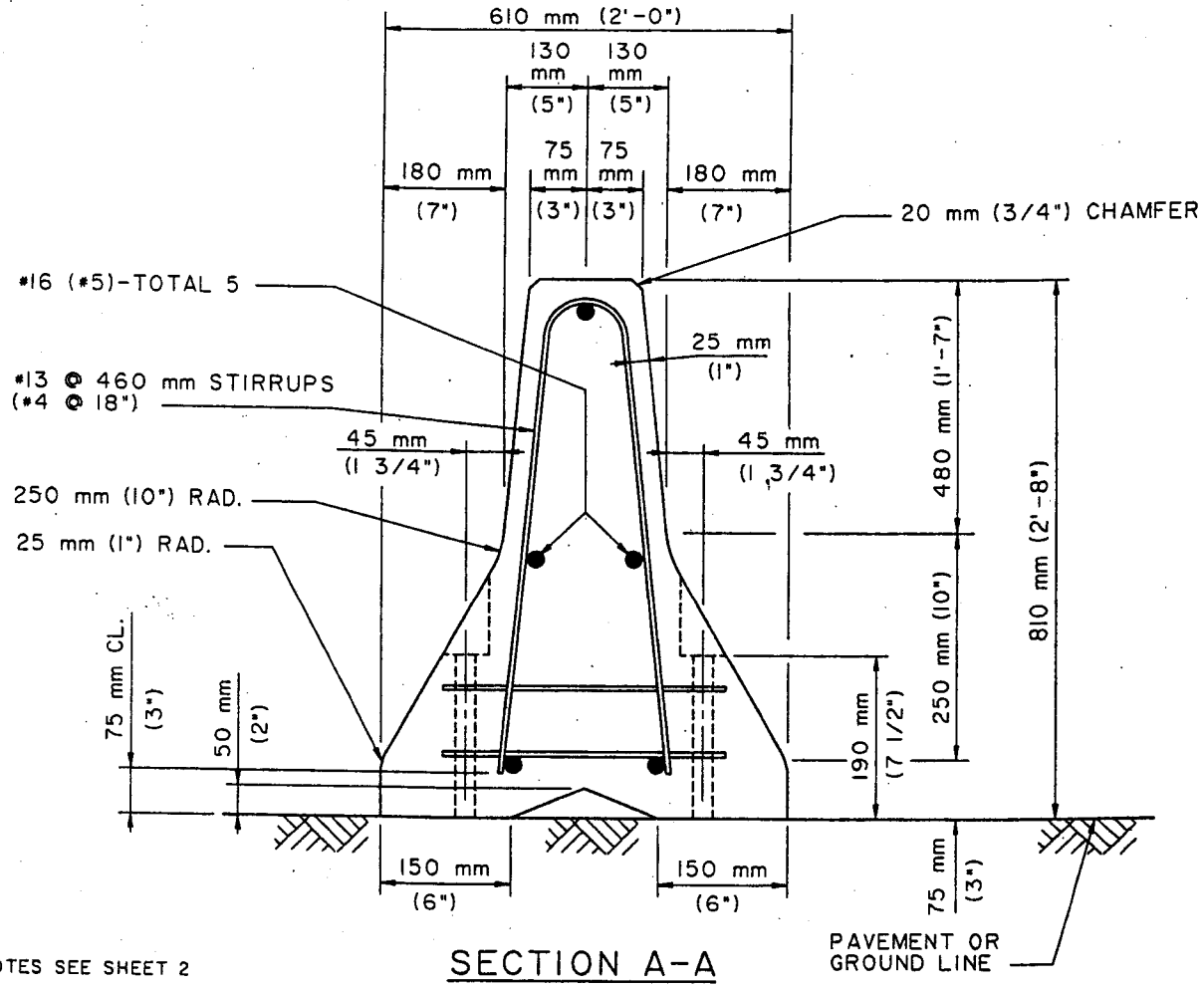
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

BARRIER RAILING TYPE 3

STANDARD PLAN
METRIC
6100-1
SHEET 2 OF 2



ELEVATION



FOR NOTES SEE SHEET 2

SECTION A-A

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

TEMPORARY CONCRETE BARRIER RAILING

STANDARD PLAN METRIC

6101-1

SHEET 1 OF 3

APPROVED Thomas A. Tidemanson 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

1999

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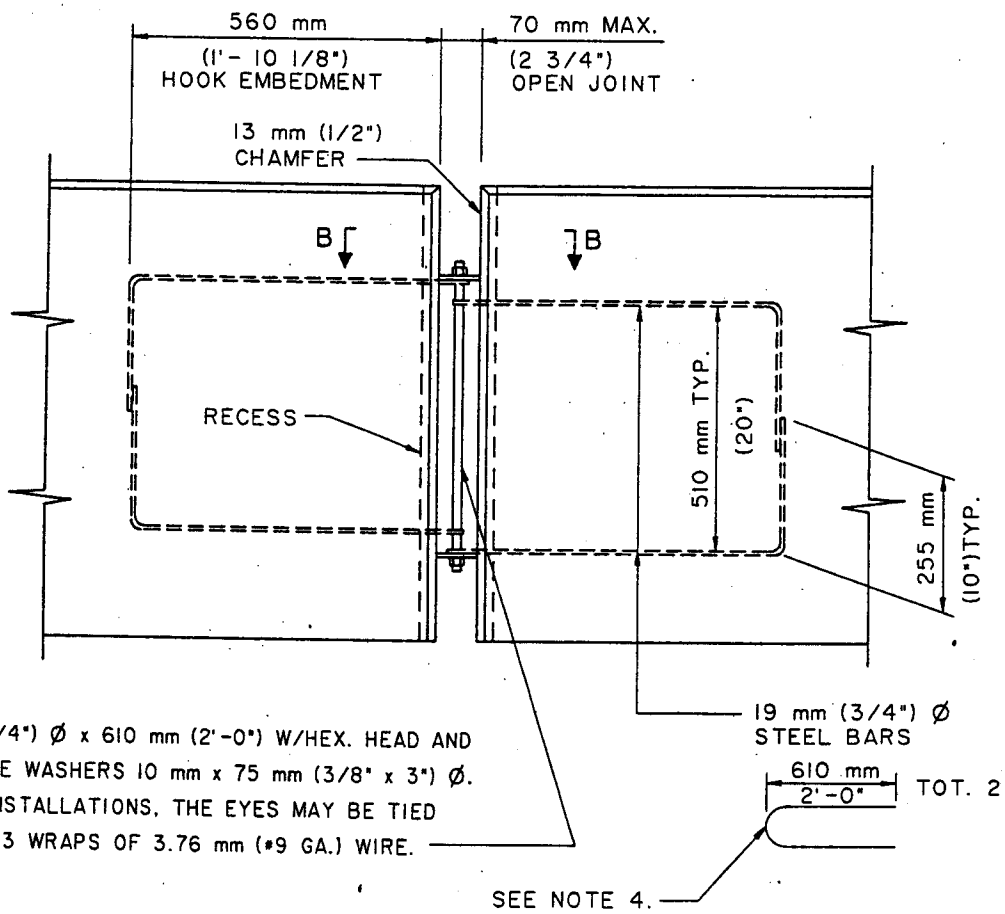
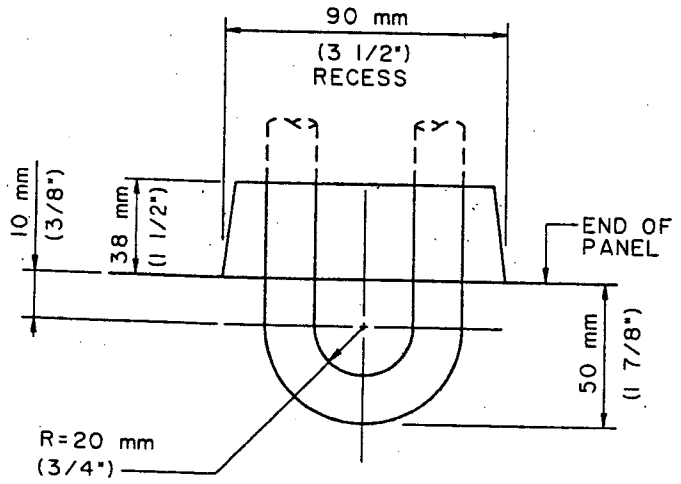


BOLT 32 mm (1 1/4") Ø x 610 mm (2'-0") W/HEX. HEAD AND NUT AND 2-PLATE WASHERS 10 mm x 75 mm (3/8" x 3") Ø. IN COFFERDAM INSTALLATIONS, THE EYES MAY BE TIED TOGETHER WITH 3 WRAPS OF 3.76 mm (#9 GA.) WIRE.

BOLT CONNECTION DETAIL



SECTION B-B

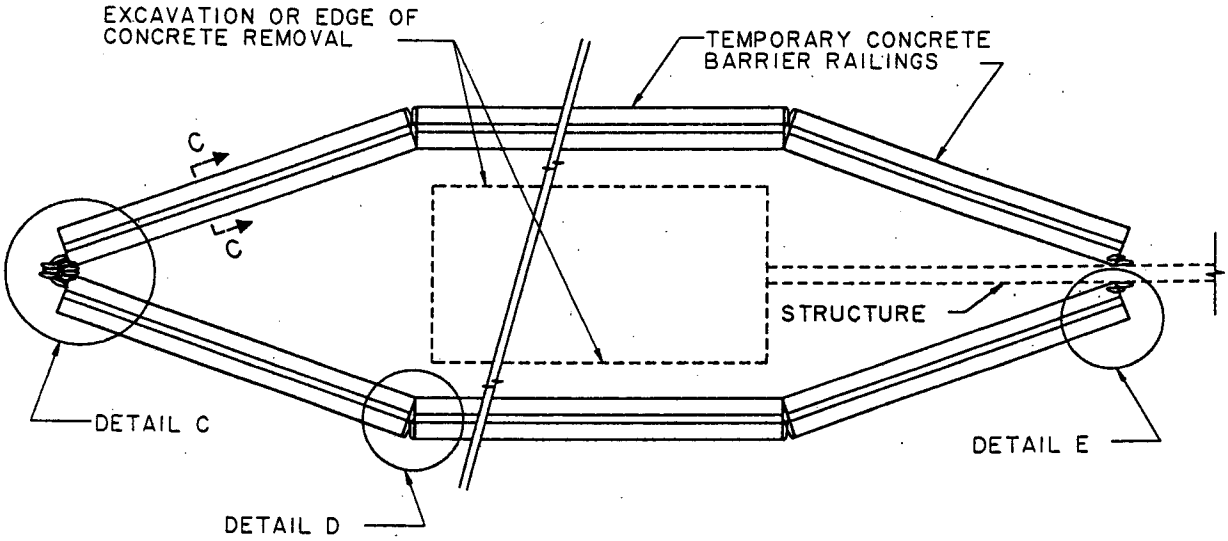
NOTES :

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.

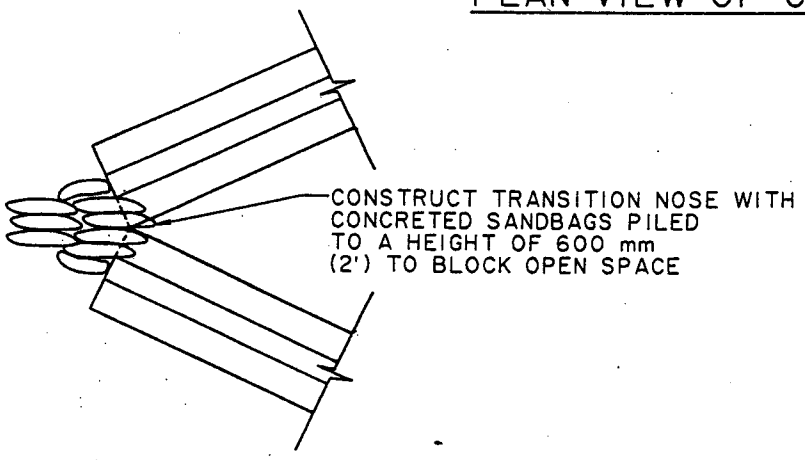
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

TEMPORARY CONCRETE BARRIER RAILING

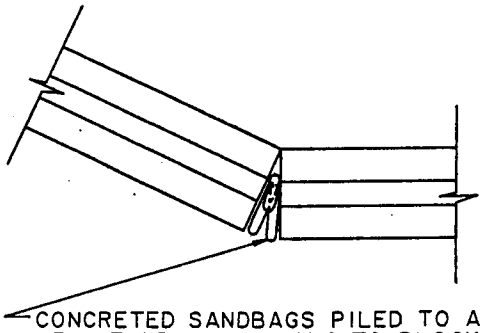
STANDARD PLAN
METRIC
6101-1



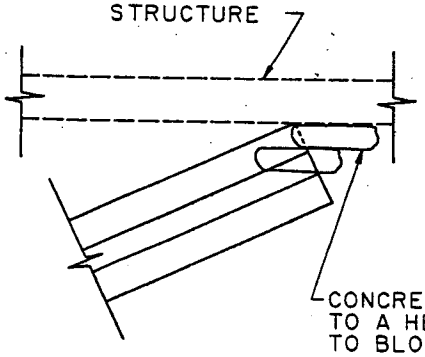
PLAN VIEW OF COFFERDAM



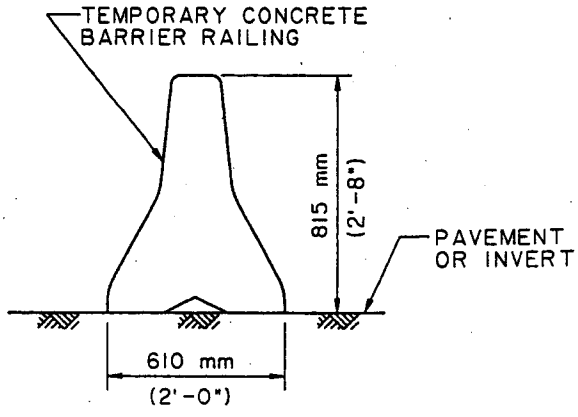
DETAIL C



DETAIL D



DETAIL E



SECTION C-C

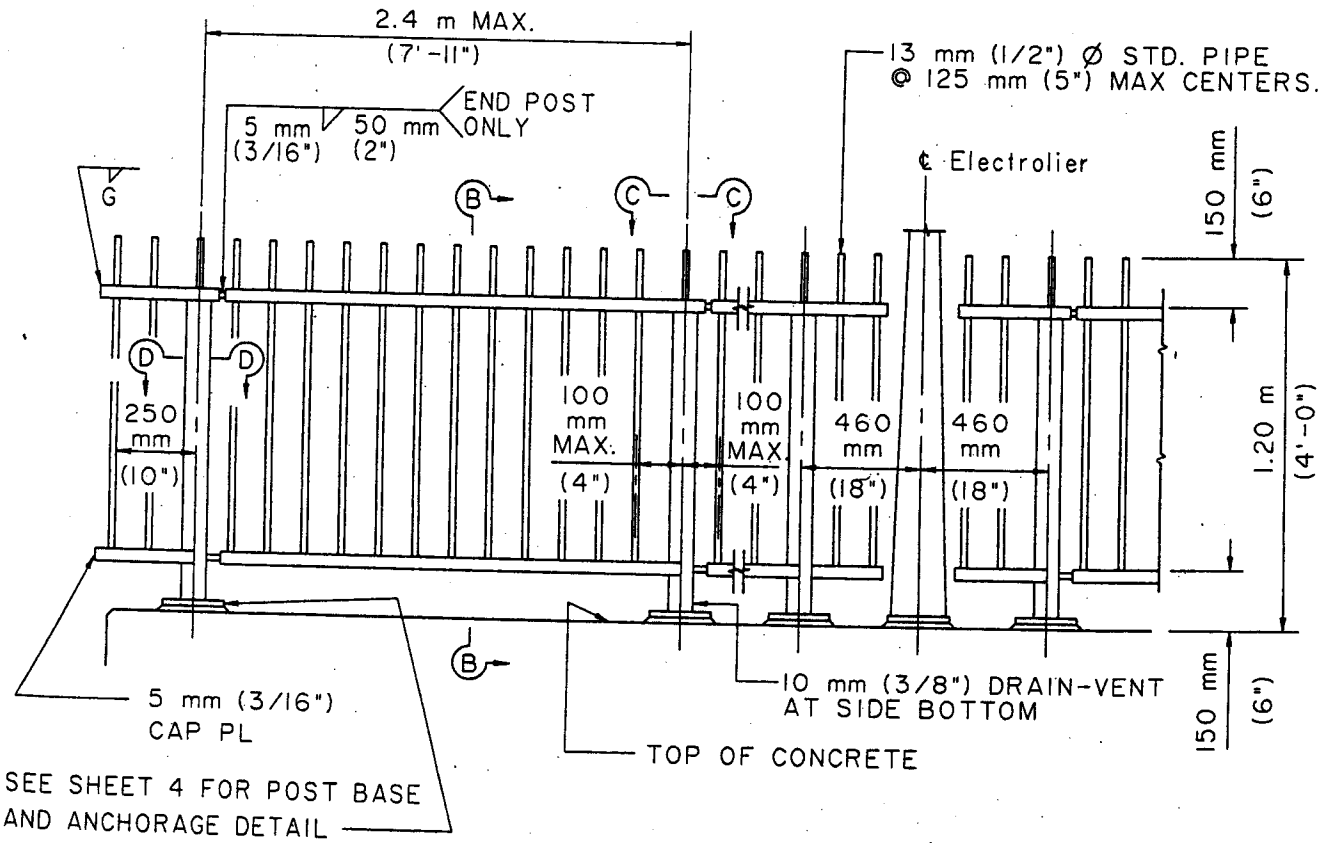
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

TEMPORARY CONCRETE BARRIER RAILING

STANDARD PLAN METRIC

6101-1

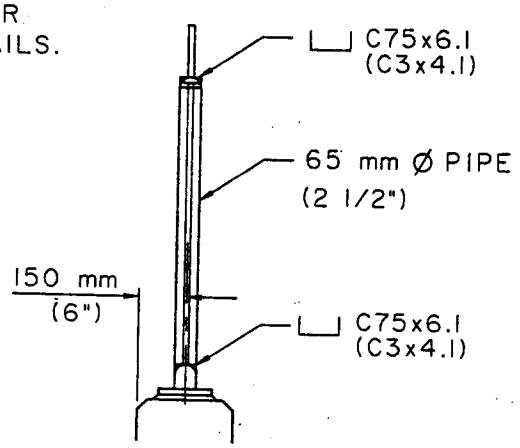
SHEET 3 OF 3



ELEVATION

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

6102-1

SHEET 1 OF 4

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

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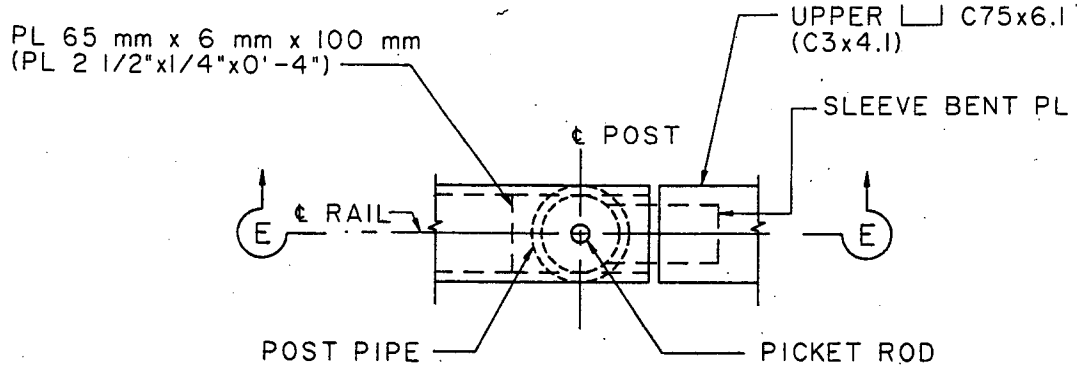
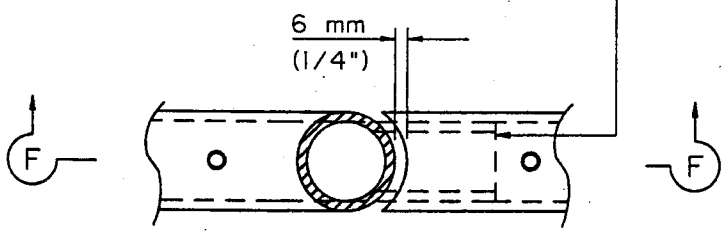
REVISIONS



VIEW C-C

SLEEVE FORMED FROM 3.42 mm
(10 GA.) BENT PL-SLIDING FIT.
WELDED AND GROUND SMOOTH.
CUT SLEEVE TO FIT AROUND PIPE.



SECTION D-D

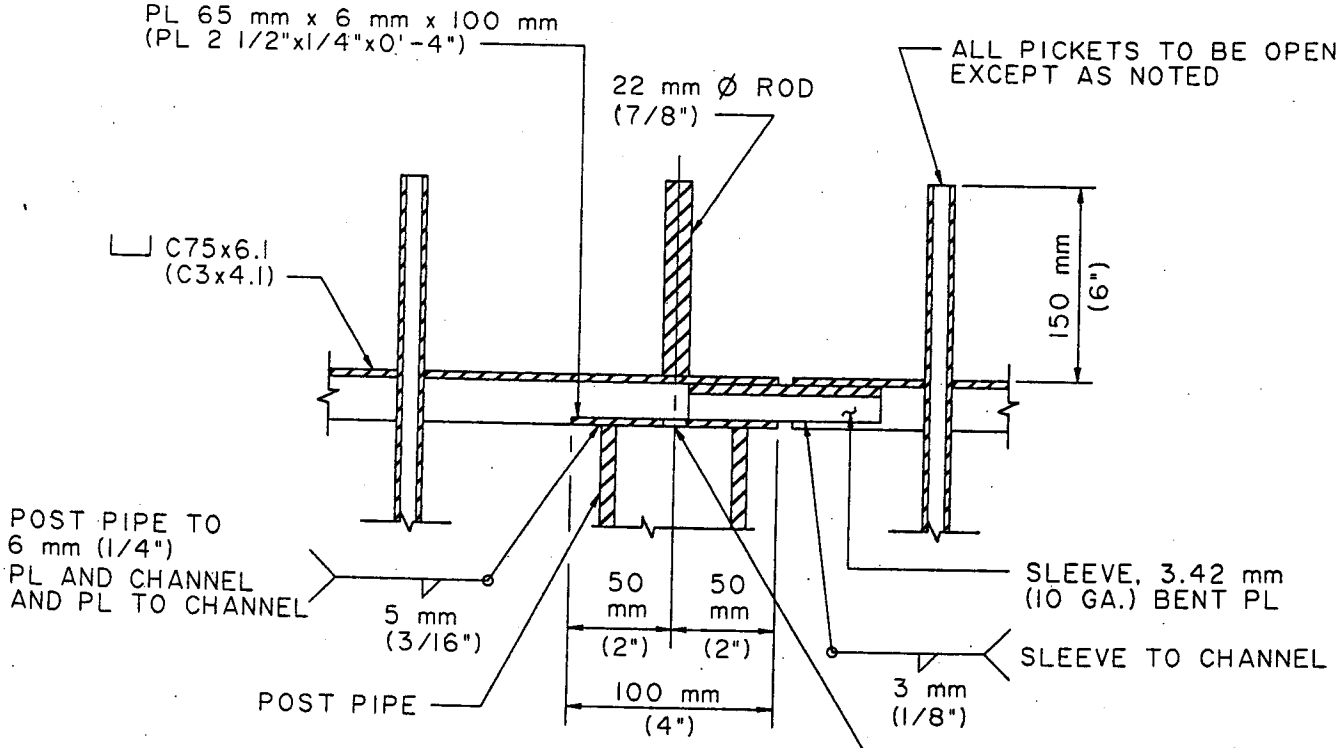
NOTE - UNLESS OTHERWISE INDICATED:

1. SPACE POSTS TO CLEAR EXPANSION JTS. BY 230 mm (9") MIN. TO ℄ 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.

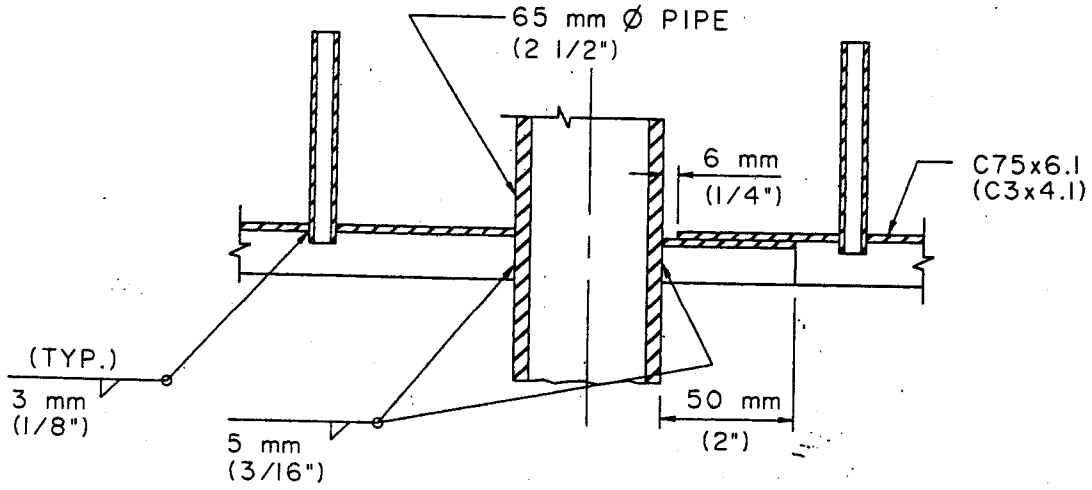
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

PICKET RAILING

STANDARD PLAN
METRIC
6102-1
SHEET 2 OF 4



SECTION E-E

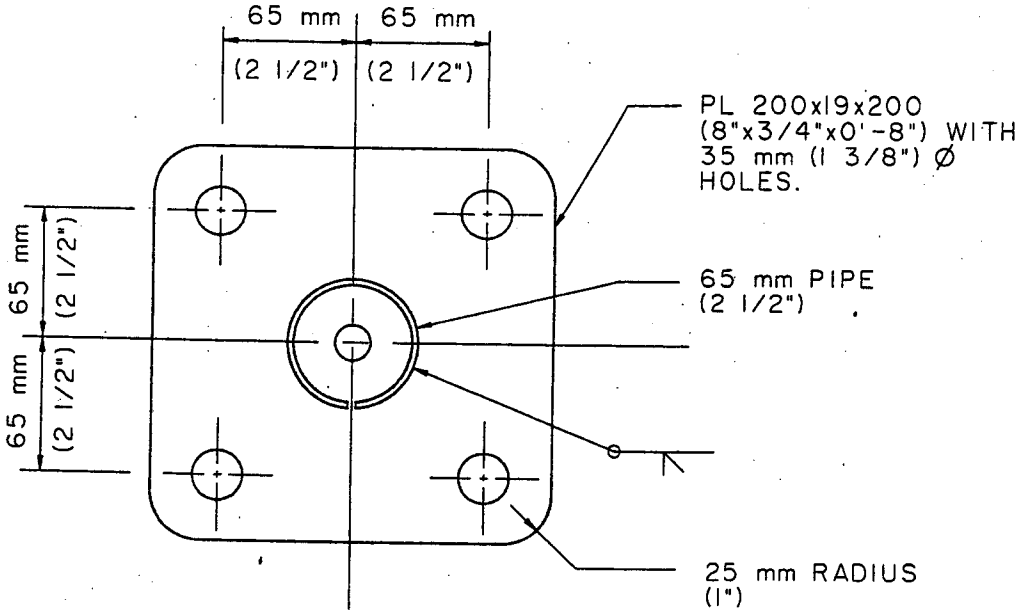


SECTION F-F

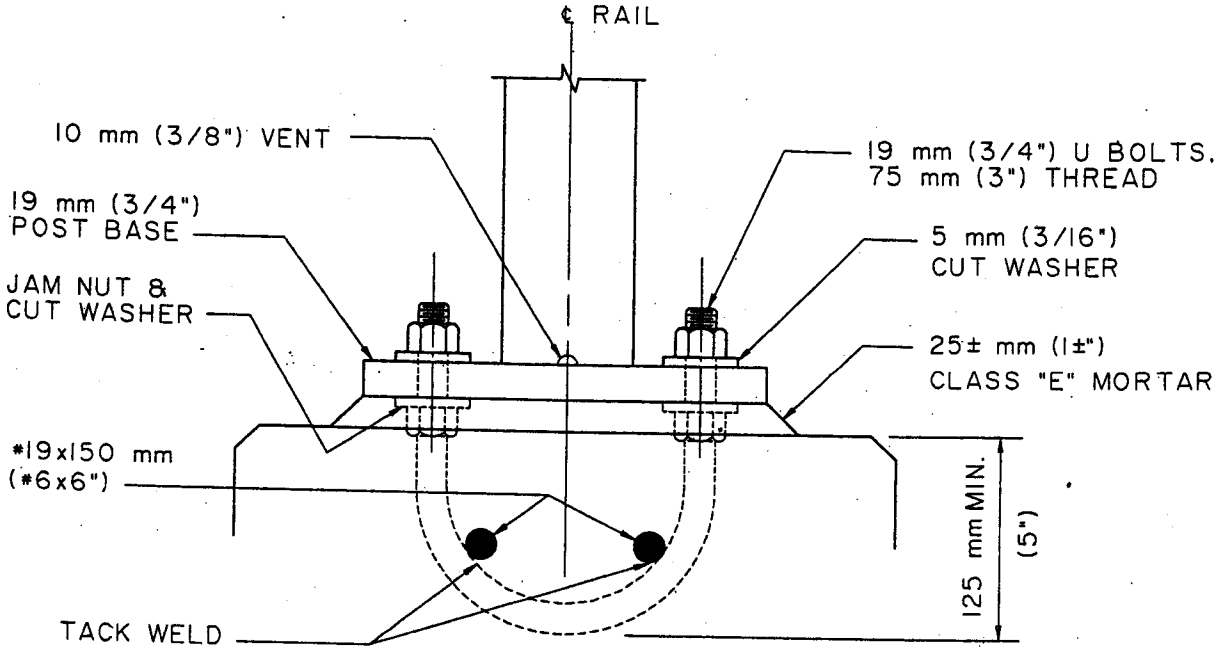
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

PICKET RAILING

STANDARD PLAN
METRIC
6102-1
SHEET 3 OF 4



POST BASE



ANCHORAGE DETAIL

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

PICKET RAILING

STANDARD PLAN
METRIC
6102-1
SHEET 4 OF 4

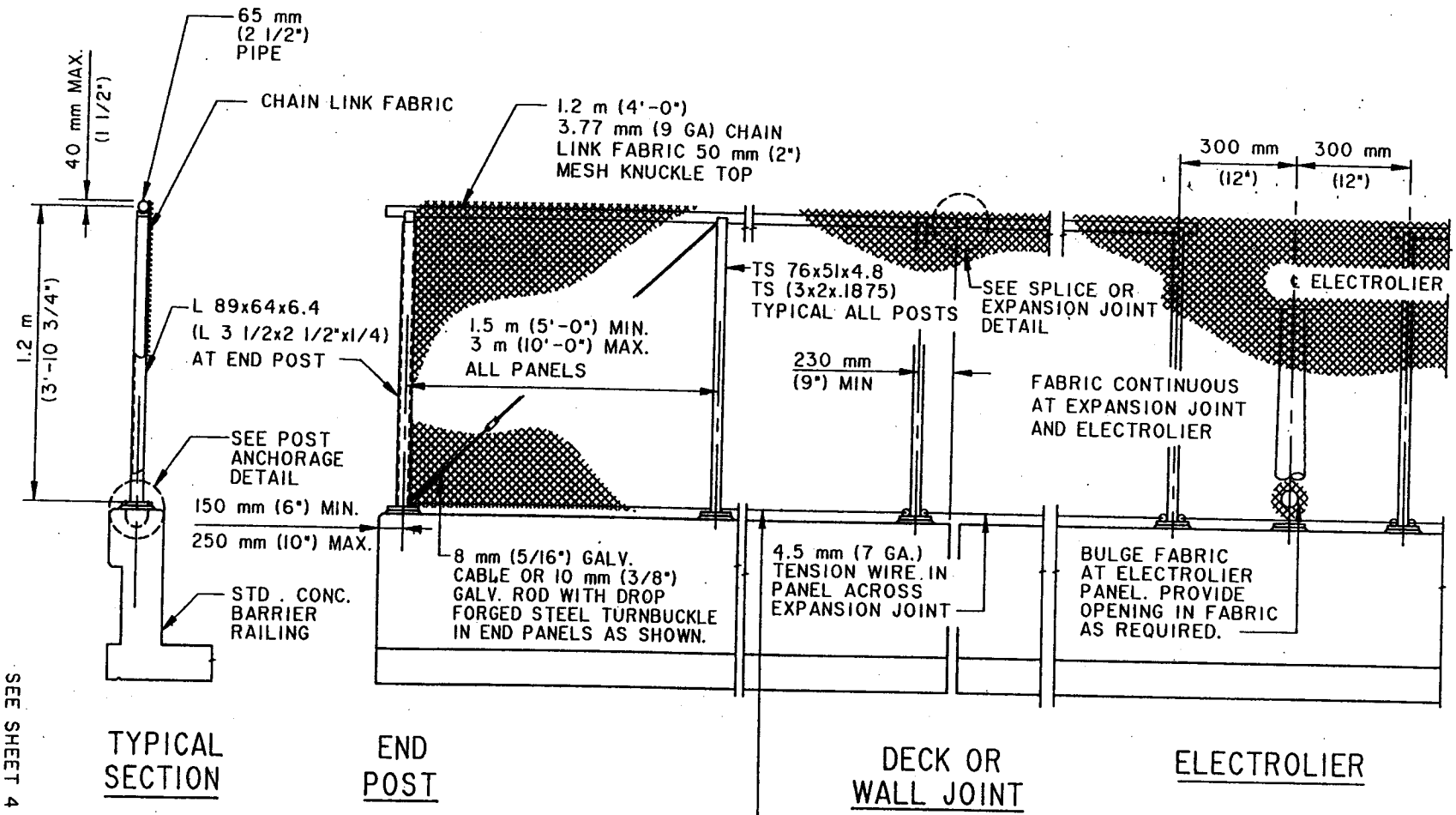
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

CHAIN LINK RAILING

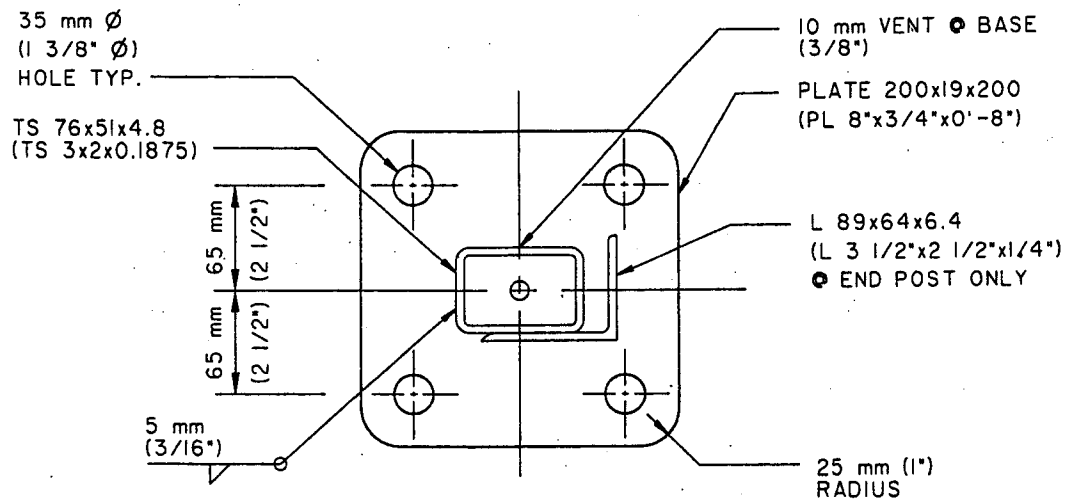
APPROVED Thomas G. Gilmore
DIRECTOR OF PUBLIC WORKS
5/31/1992
DATE

1999
REVISIONS

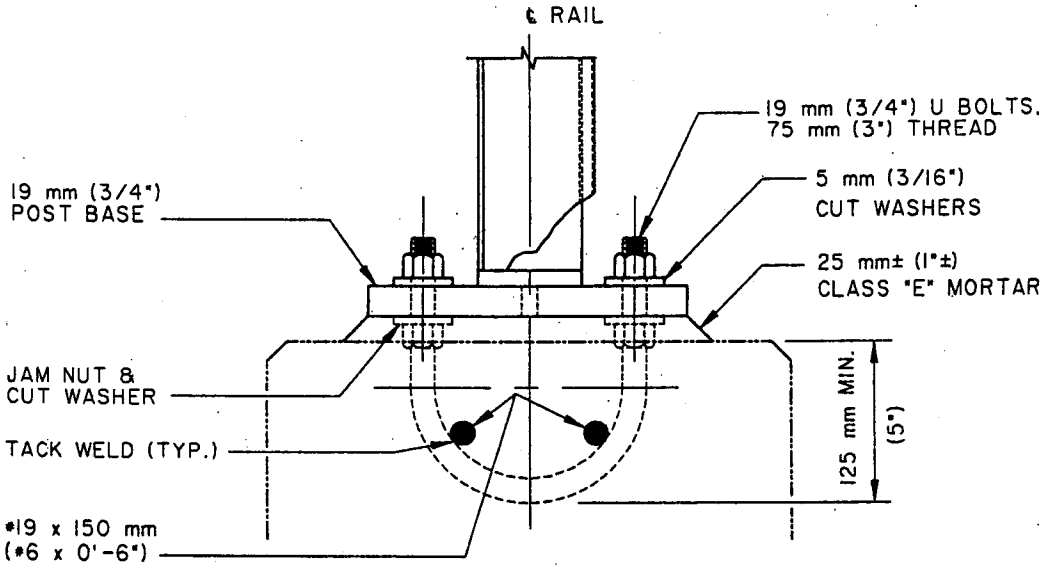
STANDARD PLAN
METRIC
6103-1
SHEET 1 OF 4



SEE SHEET 4 OF 4 FOR NOTES



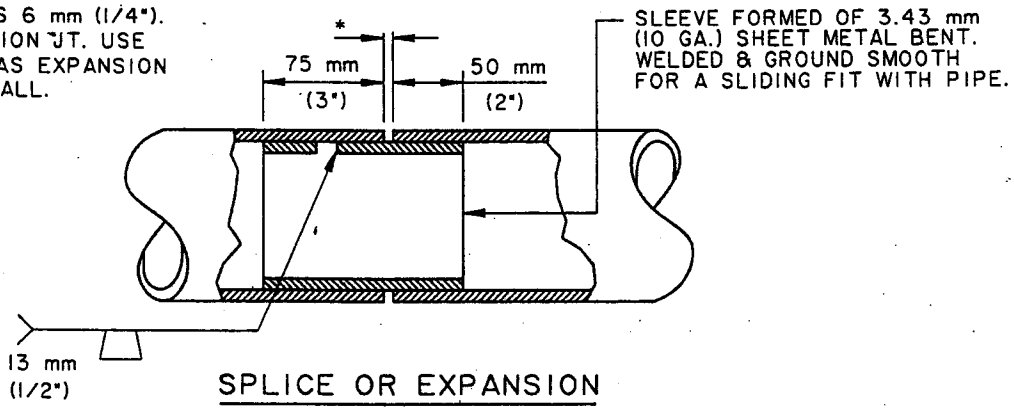
POST BASE



ANCHORAGE DETAIL

(SEE NOTE 9)

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



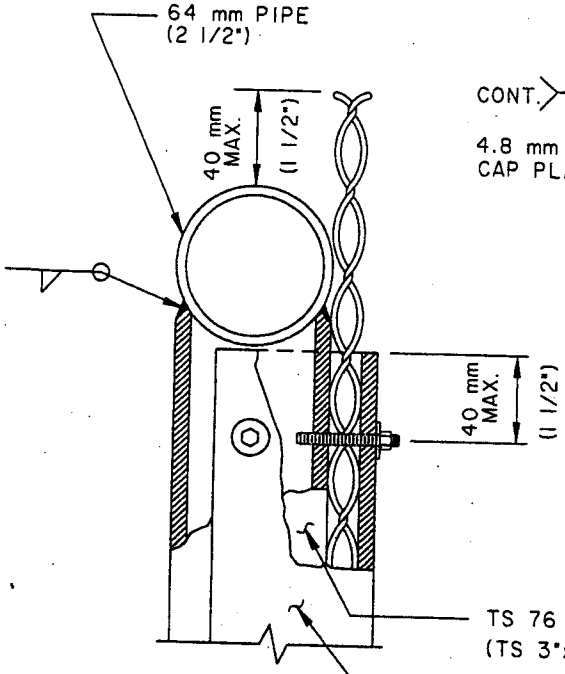
SPLICE OR EXPANSION JOINT DETAIL

SEE SHEET 4 OF 4 FOR NOTES

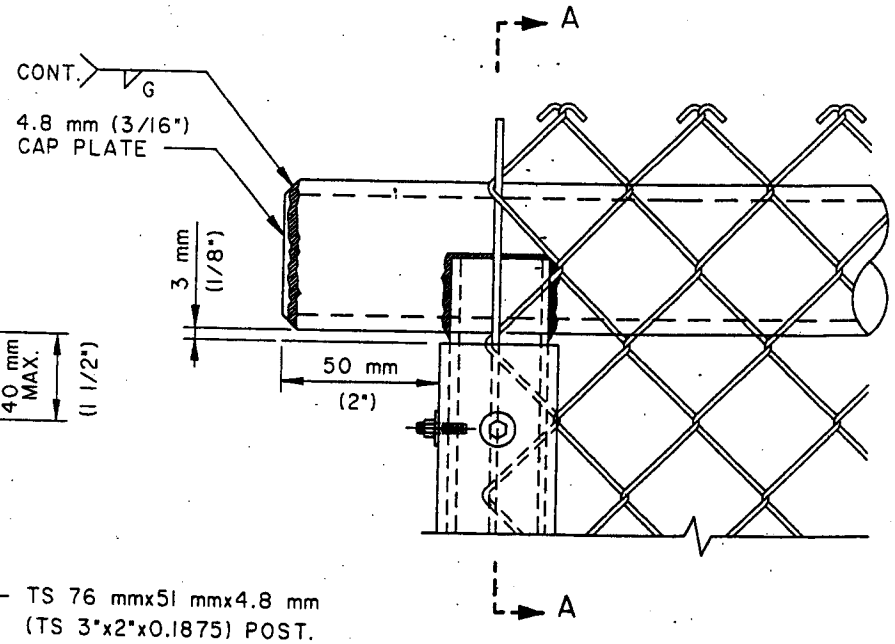
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

CHAIN LINK RAILING

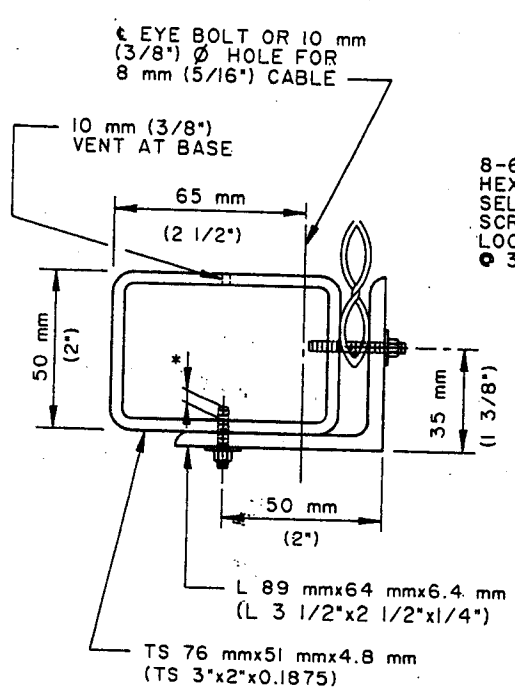
STANDARD PLAN
METRIC
6103-1



SECTION A-A

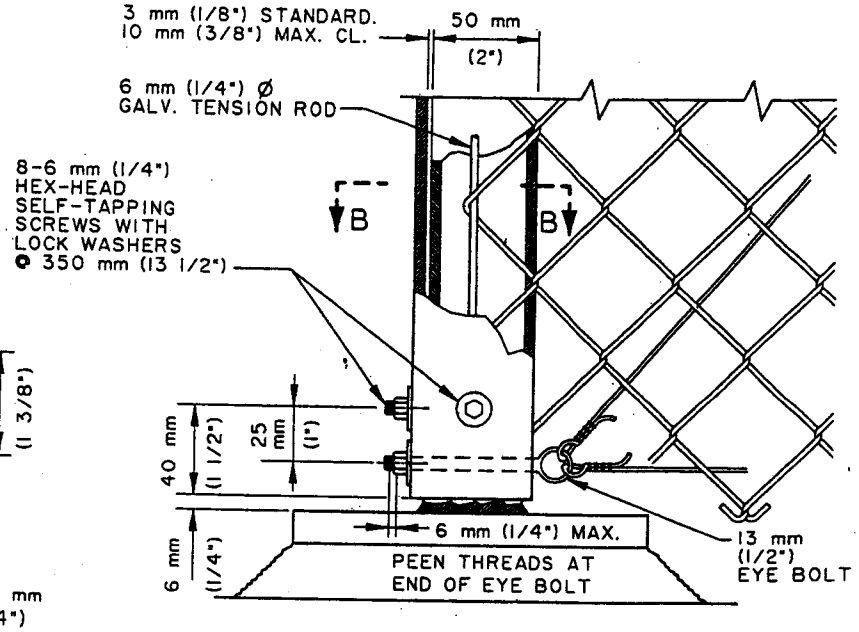


END POST ELEVATION
(TOP)



* 6 mm (1/4") MIN. TYP.

SECTION B-B



END POST ELEVATION
(BASE)

SEE SHEET 4 OF 4 FOR NOTES

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

CHAIN LINK RAILING

STANDARD PLAN
METRIC
6103-1
SHEET 3 OF 4

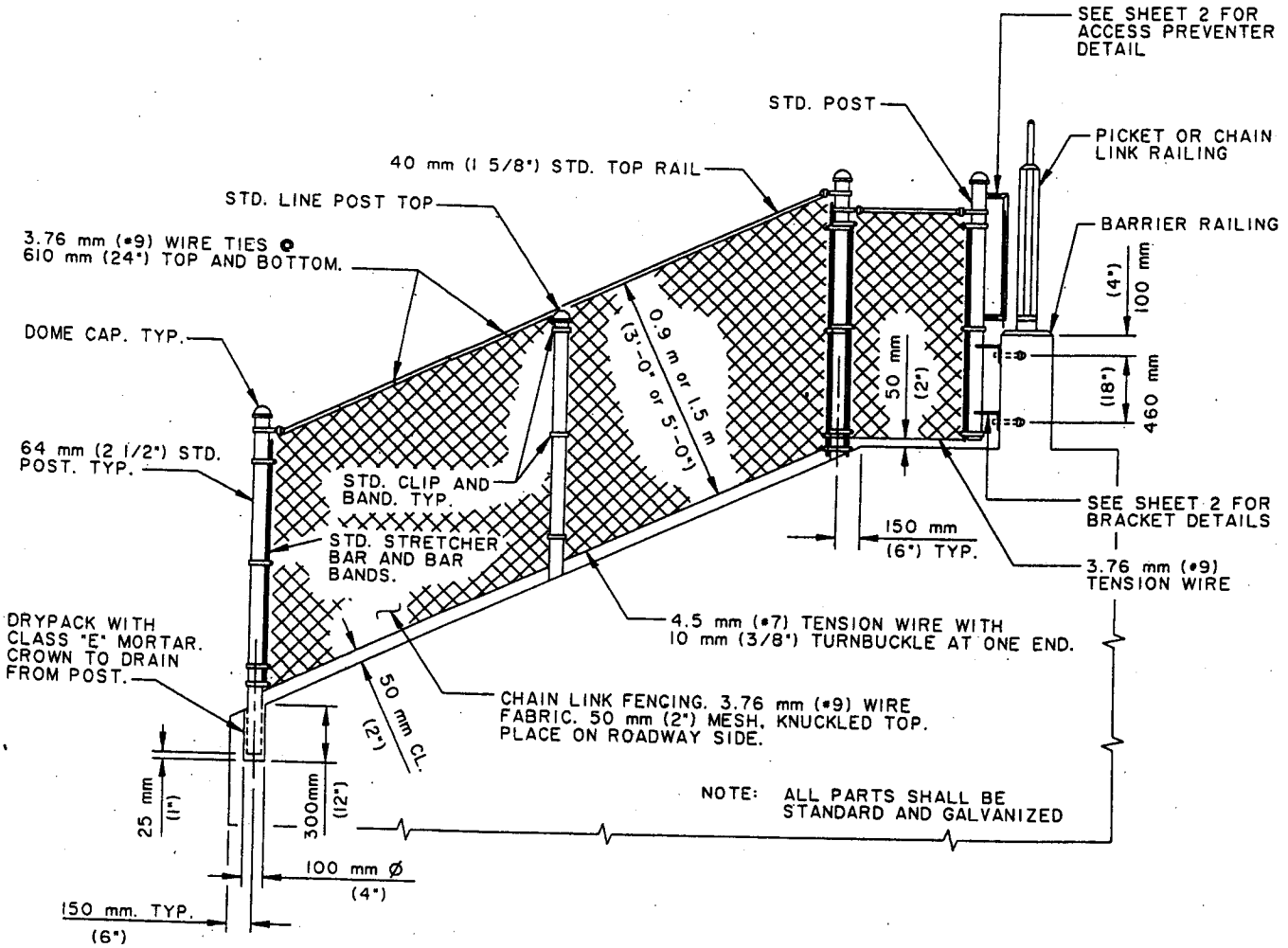
NOTES:

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 PERMITED 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.

STDPLNS.DPW.6104-1METRIC

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

BRIDGE FENCING DETAILS

STANDARD PLAN METRIC

6104-1

SHEET 1 OF 2

APPROVED Thomas A. Tidemanson 5/31/1992

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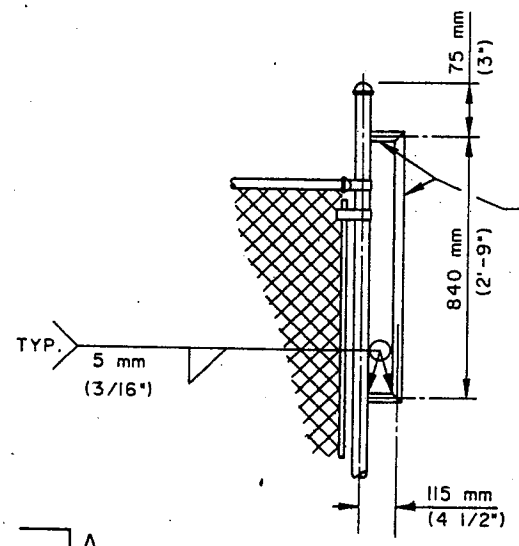
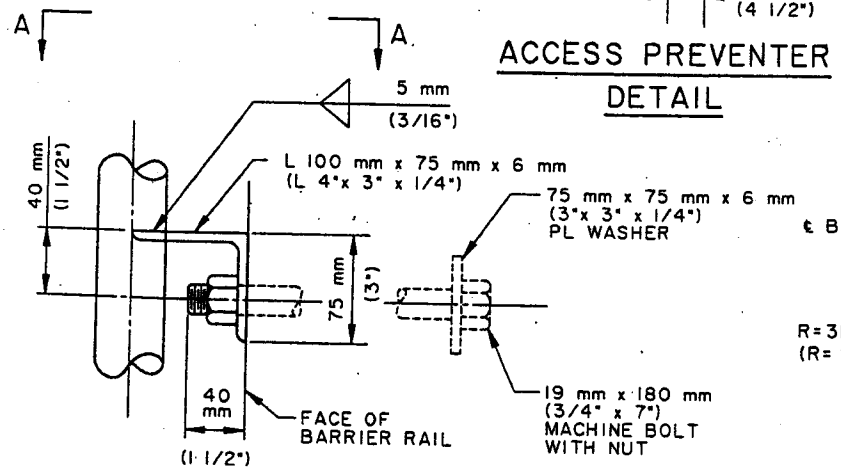
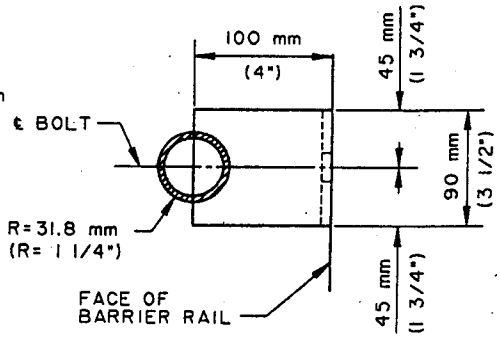


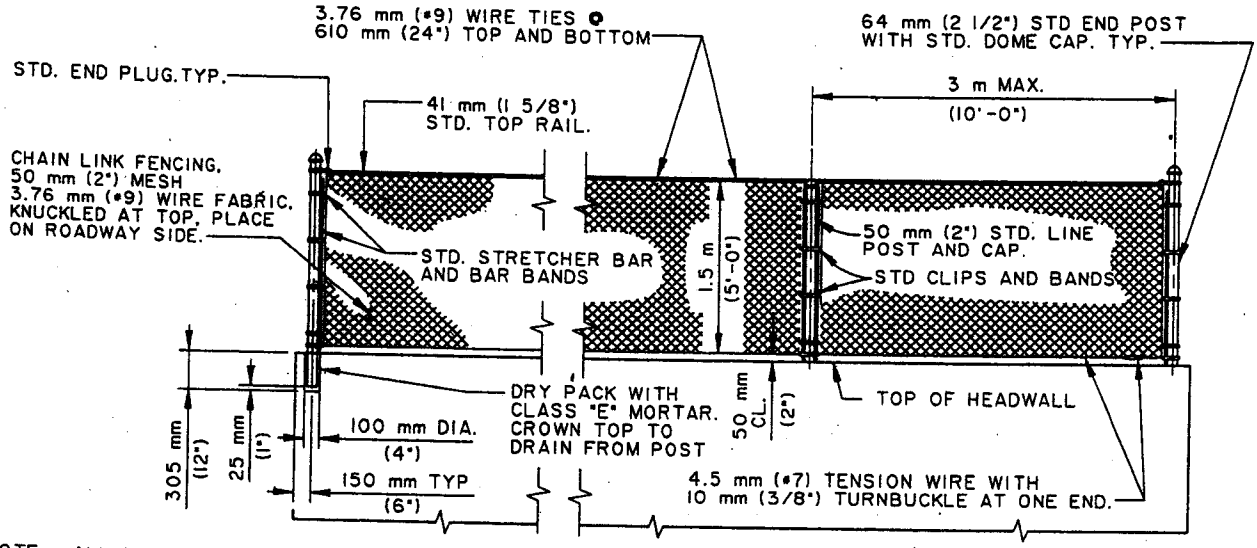
ACCESS PREVENTER DETAIL



FENCE POST BRACKET DETAIL



SECTION A-A



NOTE: ALL PARTS SHALL BE STANDARD AND GALVANIZED

HEADWALL FENCING DETAIL

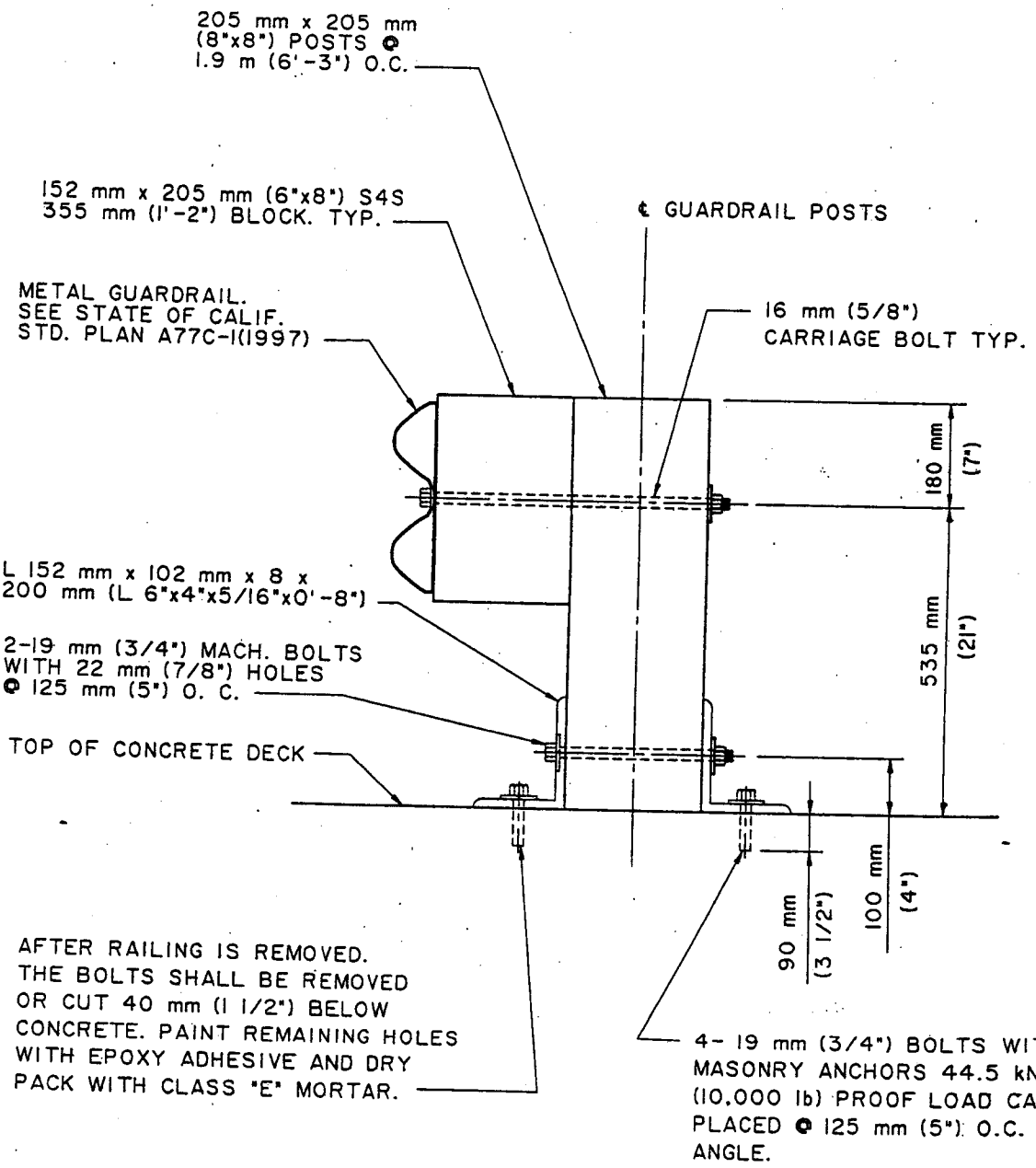
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

BRIDGE FENCING DETAILS

STANDARD PLAN
METRIC

6104-1

SHEET 2 OF 2



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. Tidemanson 5/31/1992
DIRECTOR OF PUBLIC WORKS DATE

1999
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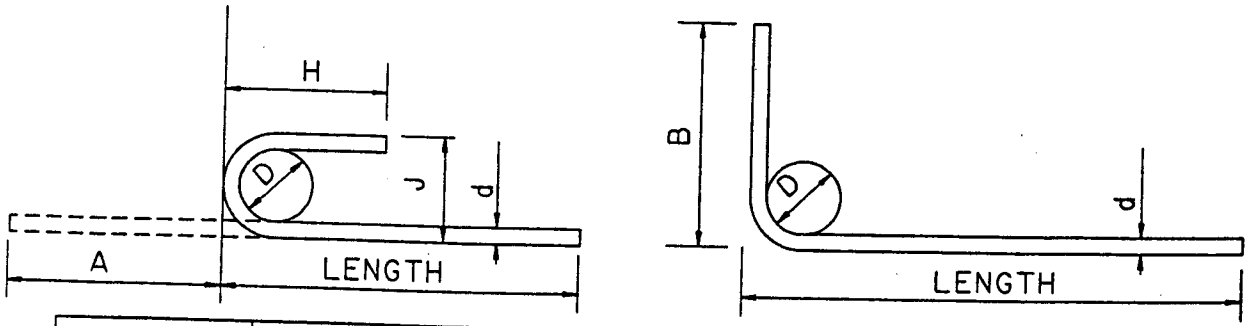
SHEET 1 OF 1



BAR SIZE	D *	A	J	H	B
#13 (#4)	75 mm (3")	150 mm (6")	100 mm (4")	115 mm (4 1/2")	200 mm (8")
#16 (#5)	95 mm (3 3/4")	180 mm (7")	130 mm (5")	130 mm (5")	250 mm (10")
#19 (#6)	115 mm (4 1/2")	200 mm (8")	150 mm (6")	150 mm (6")	305 mm (12")
#22 (#7)	135 mm (5 1/4")	250 mm (10")	180 mm (7")	180 mm (7")	355 mm (14")
#25 (#8)	150 mm (6")	280 mm (11")	200 mm (8")	200 mm (8")	410 mm (16")
#29 (#9)	230 mm (9")	380 mm (15")	285 mm (11 1/4")	260 mm (10 1/8")	485 mm (19")
#32 (#10)	260 mm (10 1/4")	430 mm (17")	325 mm (12 3/4")	295 mm (11 1/2")	560 mm (22")
#36 (#11)	285 mm (11 1/4")	485 mm (19")	360 mm (14 1/4")	325 mm (12 3/4")	610 mm (24")
#43 (#14)	430 mm (17")	660 mm (26")	520 mm (20 1/2")	415 mm (16 3/8")	790 mm (31")
#57 (#18)	580 mm (22 3/4")	890 mm (35")	685 mm (27")	575 mm (22 5/8")	1040 mm (41")

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

BAR HOOK DETAIL

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

STANDARD PLAN METRIC

6106-1

APPROVED Thomas A. Tidemanson 5/31/1992

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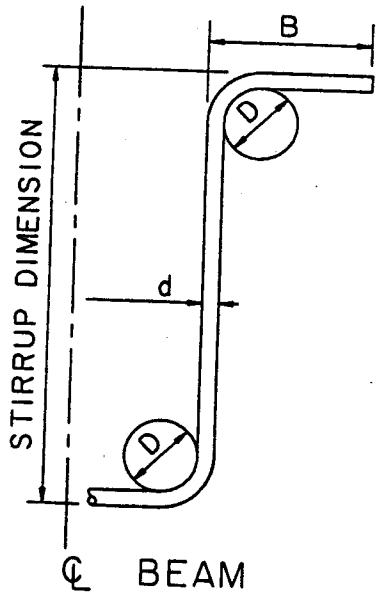
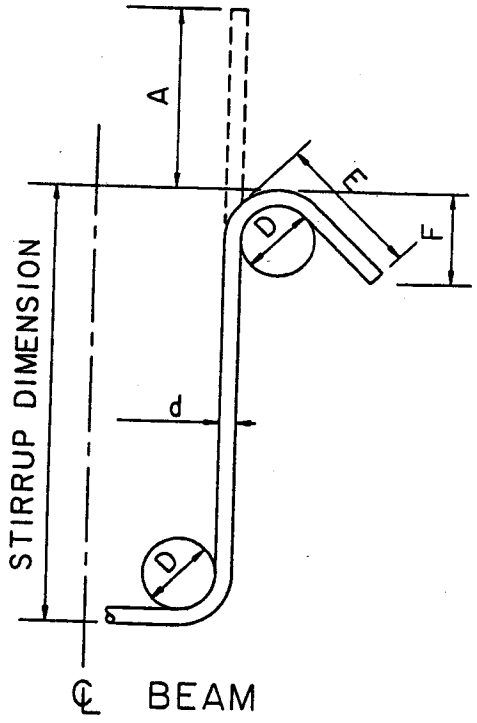
SHEET 1 OF 2



90° HOOK



135° HOOK

BAR SIZE	D	90° HOOK	135° HOOK		
		B	A	E	F
#13 (#4)	50 mm (2")	115 mm (4 1/2")	115 mm (4 1/2")	115 mm (4 1/2")	75 mm (3")
#16 (#5)	65 mm (2 1/2")	150 mm (6")	140 mm (5 1/2")	145 mm (5 5/8")	85 mm (3 1/4")

NOTE: 135° COLUMN TIE HOOKS MAY NOT BE BENT TO LESS THAN DIAMETER OF COLUMN VERTICAL BAR ENCLOSED IN HOOK.

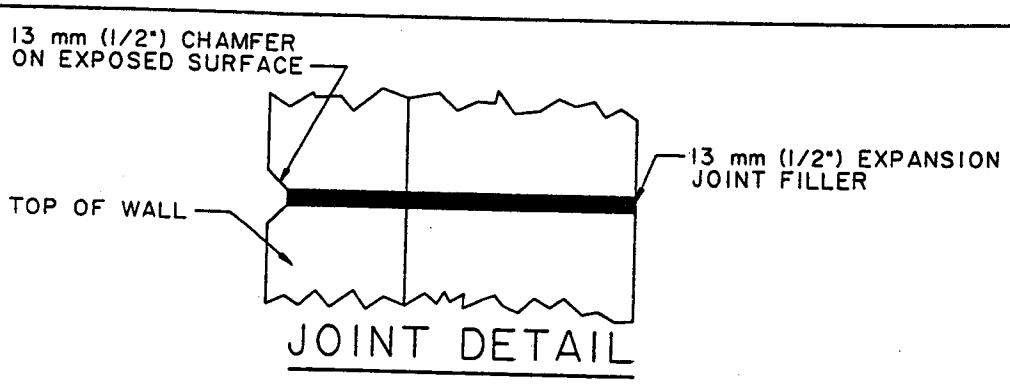
STIRRUP HOOKS
(TIE BENDS SIMILAR)

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

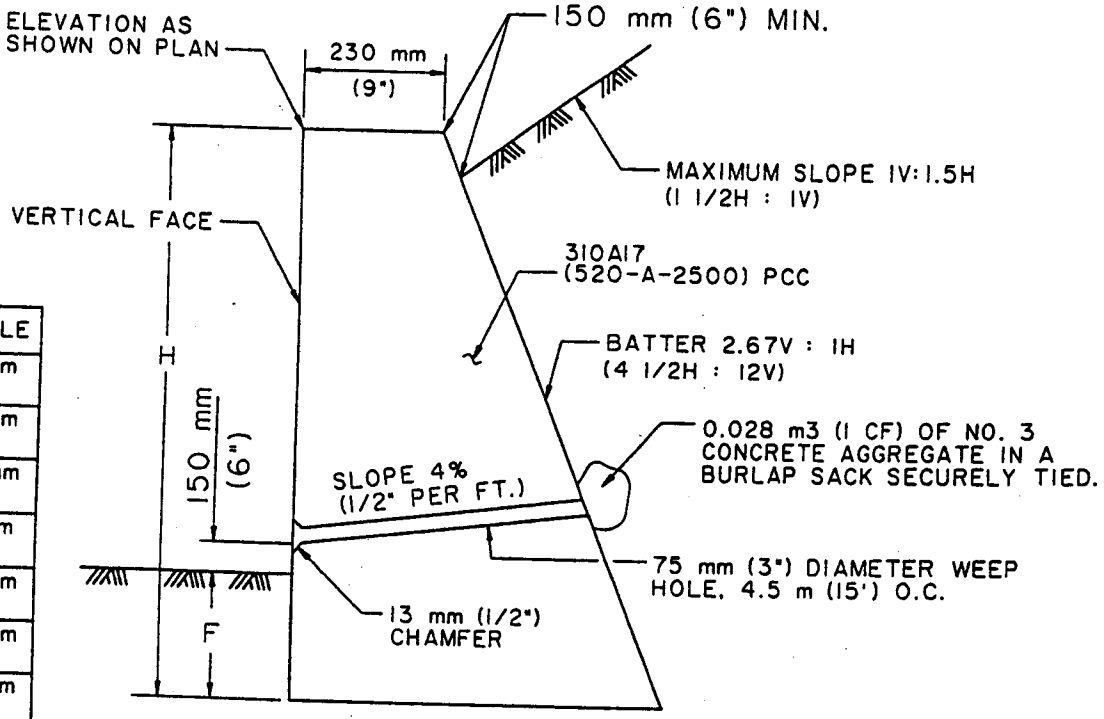
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

REINFORCEMENT DETAILS

STANDARD PLAN METRIC
6106-1
SHEET 2 OF 2



JOINT DETAIL



SECTION

DIMENSION TABLE	
H - m (FT)	F - mm (IN)
1.00 m (3.5)	230 mm (9)
1.20 m (4.0')	250 mm (10)
1.30 m (4.5)	280 mm (11)
1.50 m (5.0)	300 mm (12)
1.70 m (5.5)	330 mm (13)
1.80 m (6.0)	350 mm (14)
2.00 m (6.5)	380 mm (15)
2.10 m (7.0)	400 mm (16)
2.30 m (7.5)	430 mm (17)
2.40 m (8.0)	460 mm (18)

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

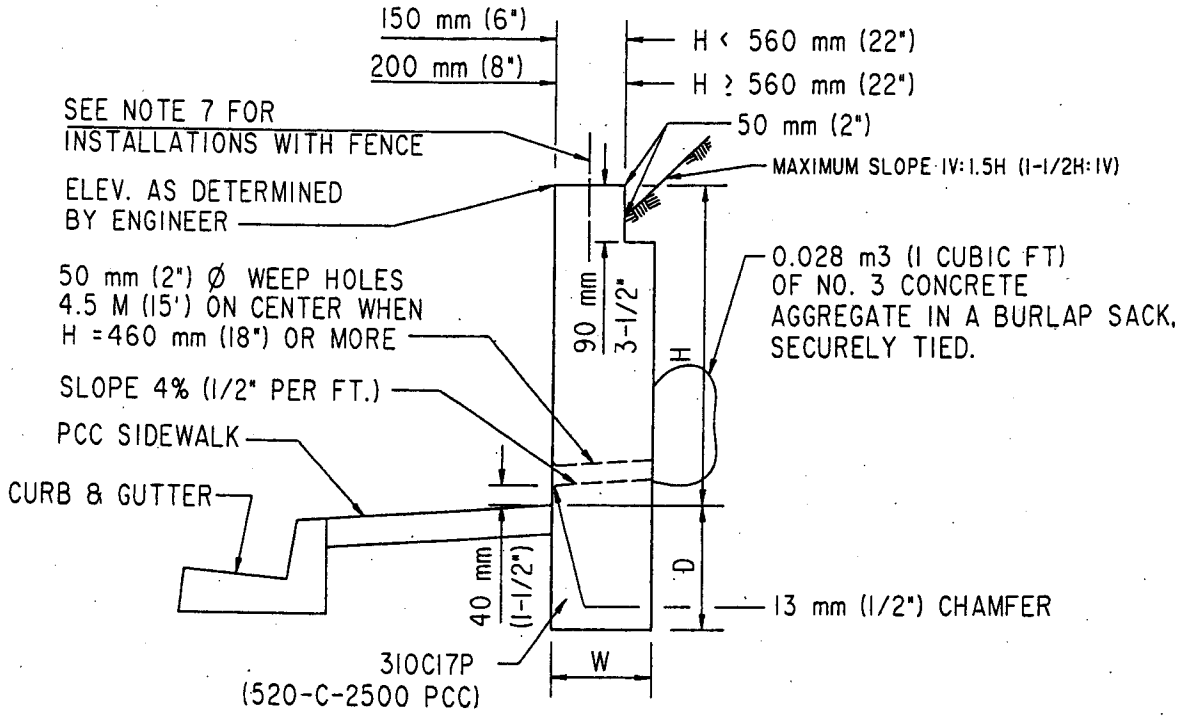
STANDARD PLAN
METRIC

6201-1

SHEET 1 OF 1

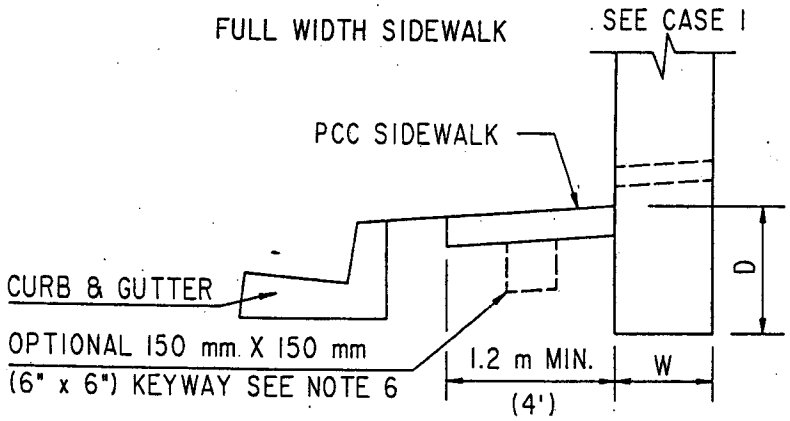
APPROVED Thomas A. Gilmansen 5/31/1992
DIRECTOR OF PUBLIC WORKS DATE

1999
REVISIONS



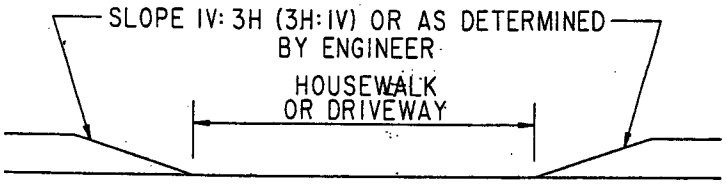
CASE I

FULL WIDTH SIDEWALK



CASE II

PARTIAL WIDTH SIDEWALK



ELEVATION

WALL TRANSITION AT DRIVEWAY OR HOUSEWALK

SEE SHEET 3 FOR NOTES

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

CONCRETE SLOUGH WALL

STANDARD PLAN METRIC

6203-1

SHEET 1 OF 3

APPROVED Thomas A Tidemanson 5/31/1992

DIRECTOR OF PUBLIC WORKS — DATE

1999 — REVISIONS

STDPLNS.DPW.6203-1METRIC

H= mm (IN.)	D= mm (IN.)	W= mm (IN.)
150 (6)	150 (6)	150 (6)
180 (7)	150 (6)	150 (6)
200 (8)	150 (6)	150 (6)
230 (9)	150 (6)	150 (6)
250 (10)	150 (6)	150 (6)
280 (11)	150 (6)	150 (6)
300 (12)	150 (6)	150 (6)
330 (13)	150 (6)	150 (6)
350 (14)	180 (7)	150 (6)
380 (15)	180 (7)	150 (6)
400 (16)	200 (8)	200 (8)
430 (17)	200 (8)	200 (8)
460 (18)	230 (9)	200 (8)
480 (19)	230 (9)	200 (8)
510 (20)	250 (10)	200 (8)
530 (21)	250 (10)	200 (8)
560 (22)	280 (11)	250 (10)
580 (23)	280 (11)	250 (10)
610 (24)	300 (12)	250 (10)
660 (26)	330 (13)	250 (10)
710 (28)	350 (14)	250 (10)
760 (30)	380 (15)	250 (10)
810 (32)	400 (16)	250 (10)
860 (34)	430 (17)	250 (10)
910 (36)	460 (18)	250 (10)

SEE SHEET 3
FOR NOTES

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

CONCRETE SLOUGH WALL

STANDARD PLAN
METRIC
6203-1

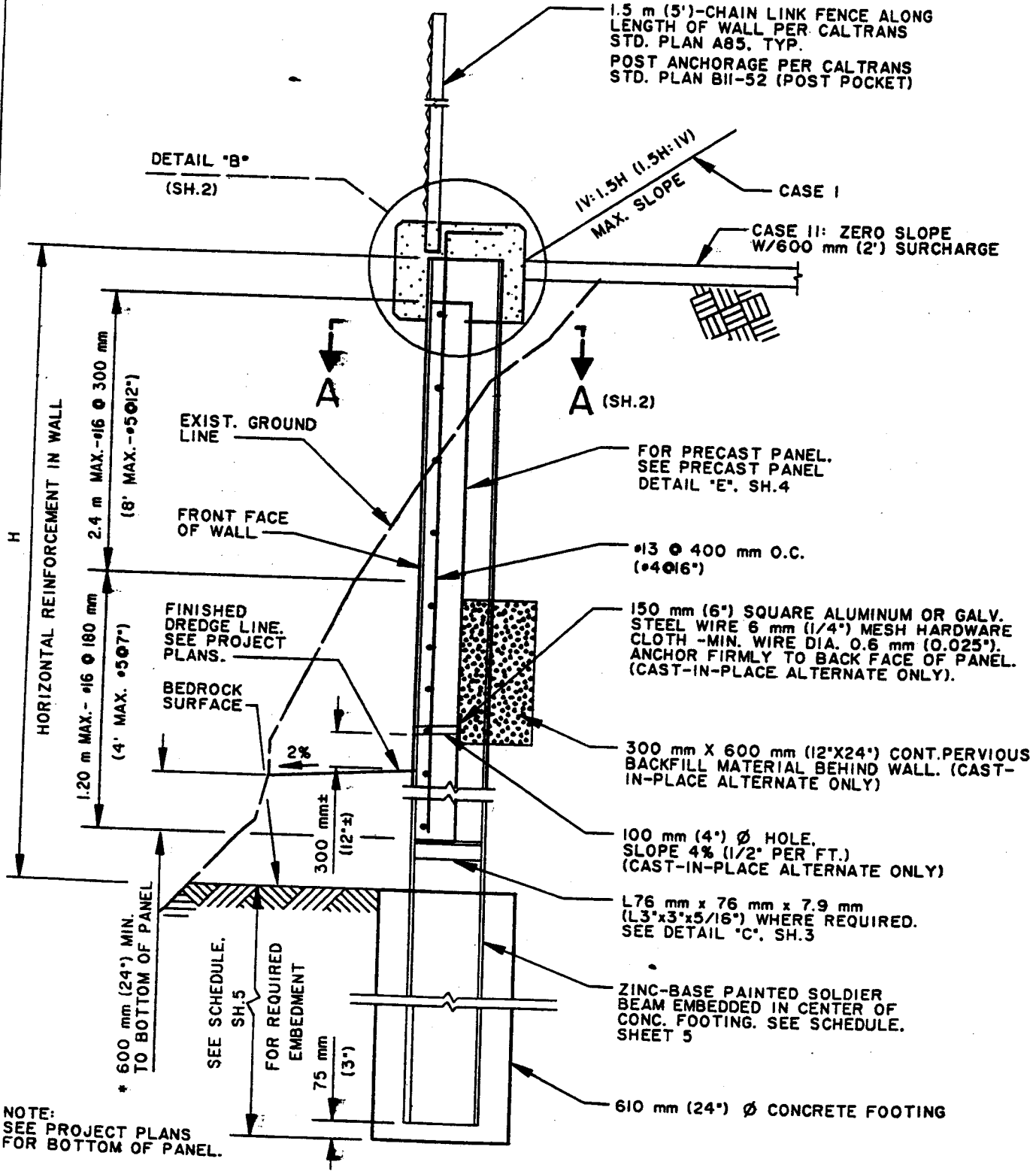
NOTES:

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.

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

CONCRETE SLOUGH WALL

STANDARD PLAN
METRIC
6203-1
SHEET 3 OF 3



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

STANDARD PLAN METRIC

6204-1

APPROVED

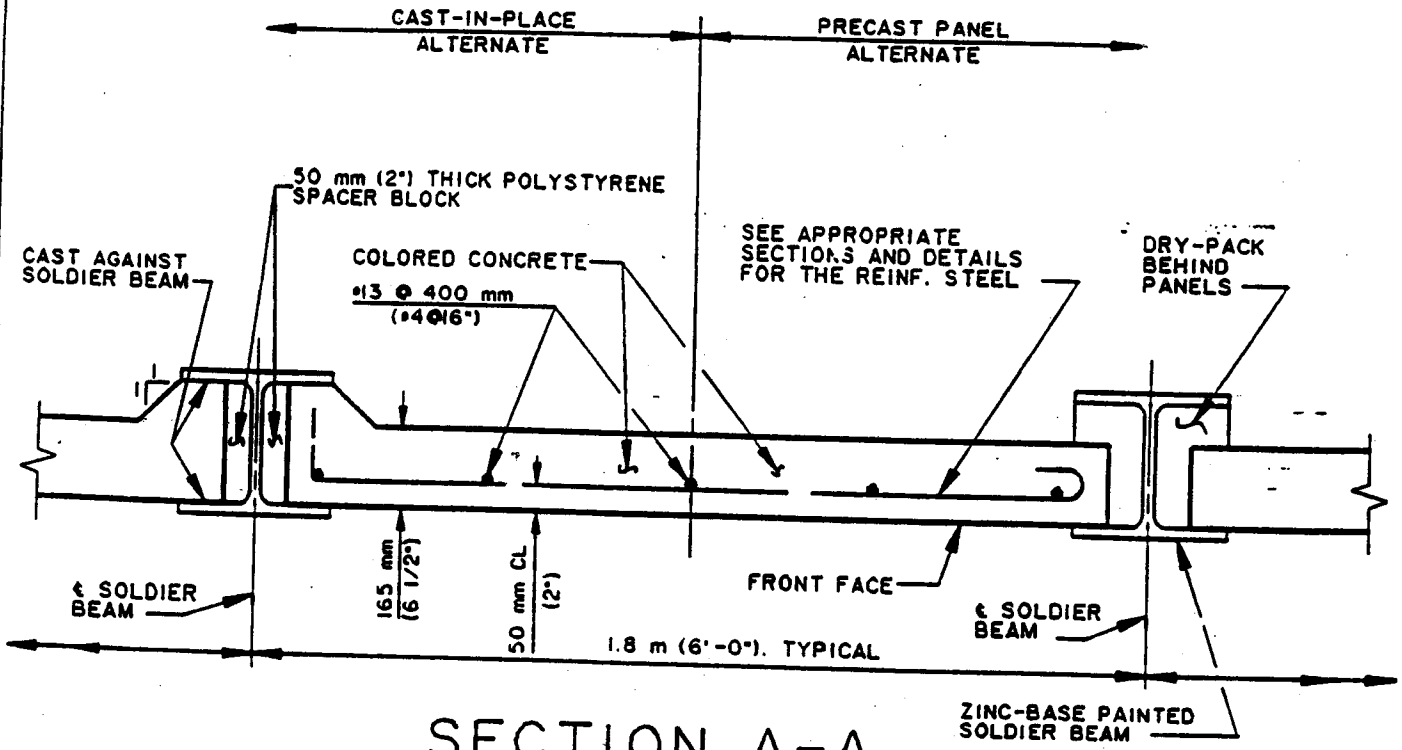
12/21/1994

DIRECTOR OF PUBLIC WORKS — DATE

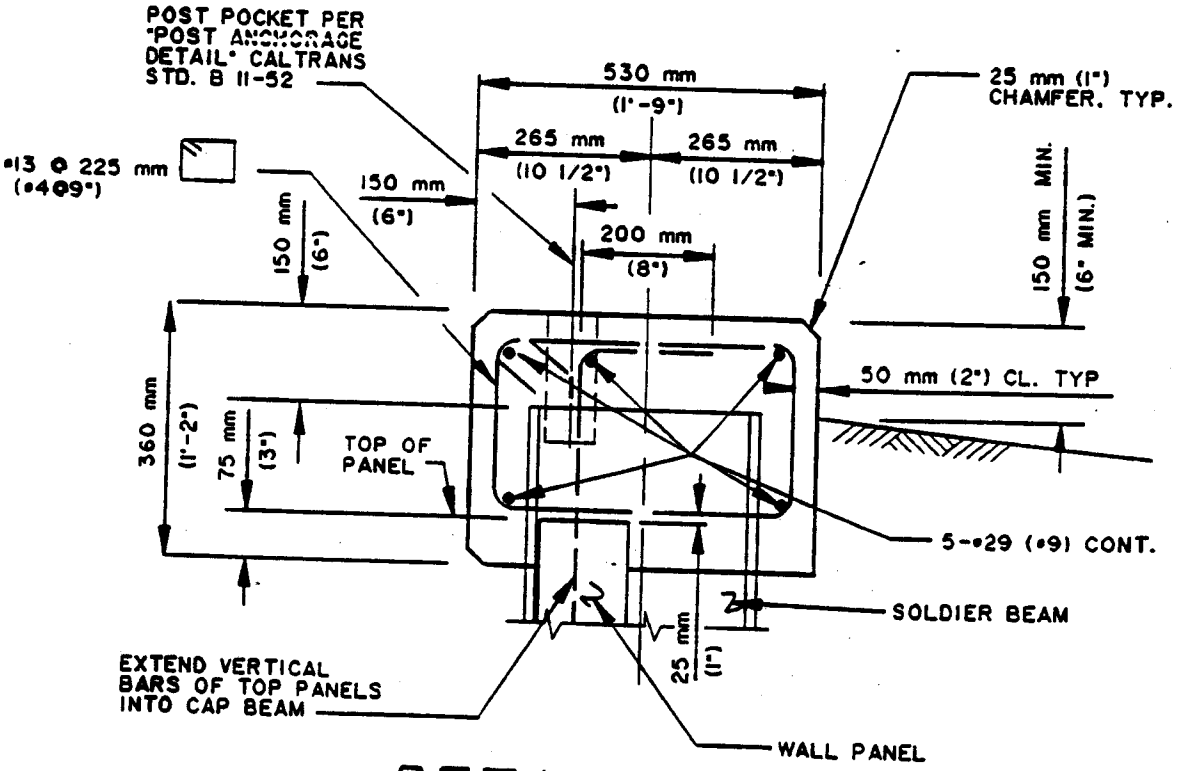
1999

REVISIONS

SHEET 1 OF 5



SECTION A-A



DETAIL B

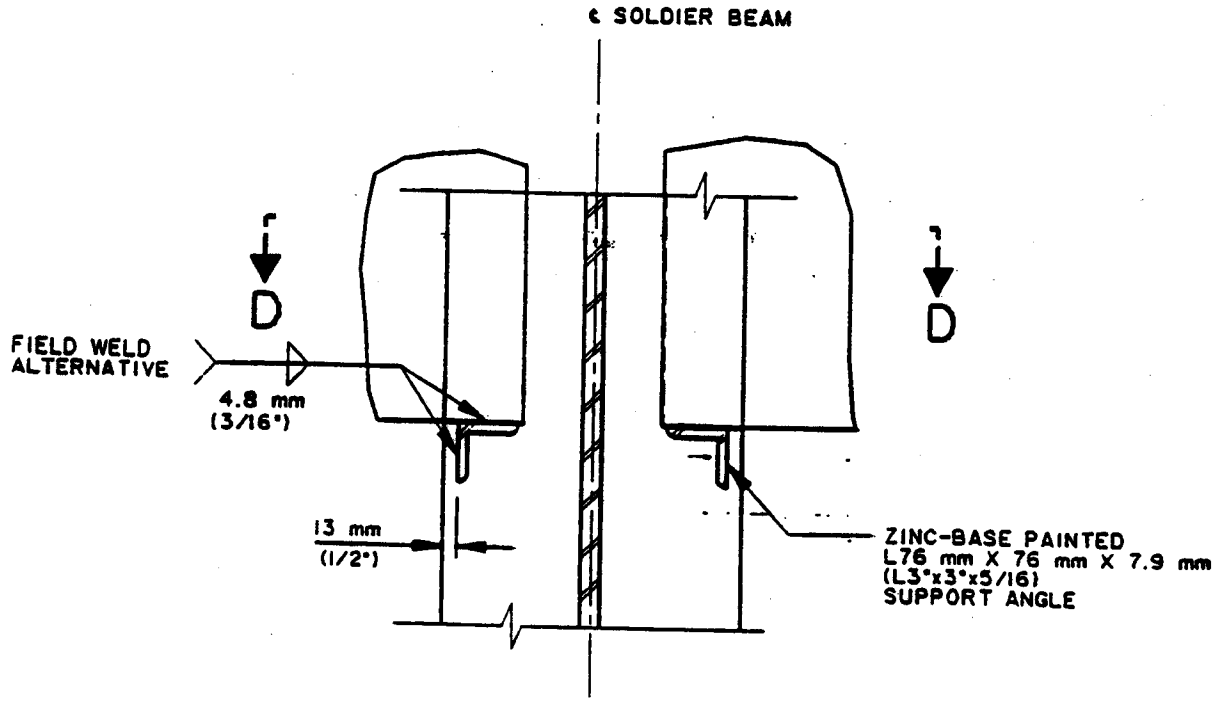
LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

CANTILEVER SOLDIER BEAM RETAINING WALL WITH REINFORCED CONCRETE PANELS

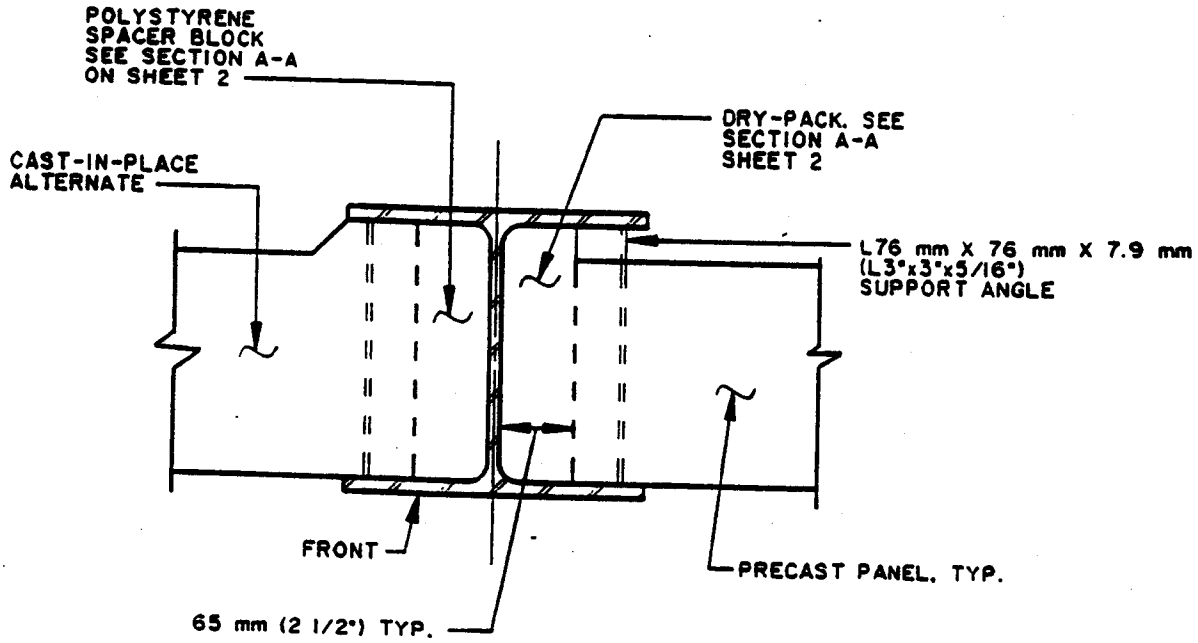
STANDARD PLAN METRIC

6204-1

SHEET 2 OF 5



DETAIL C



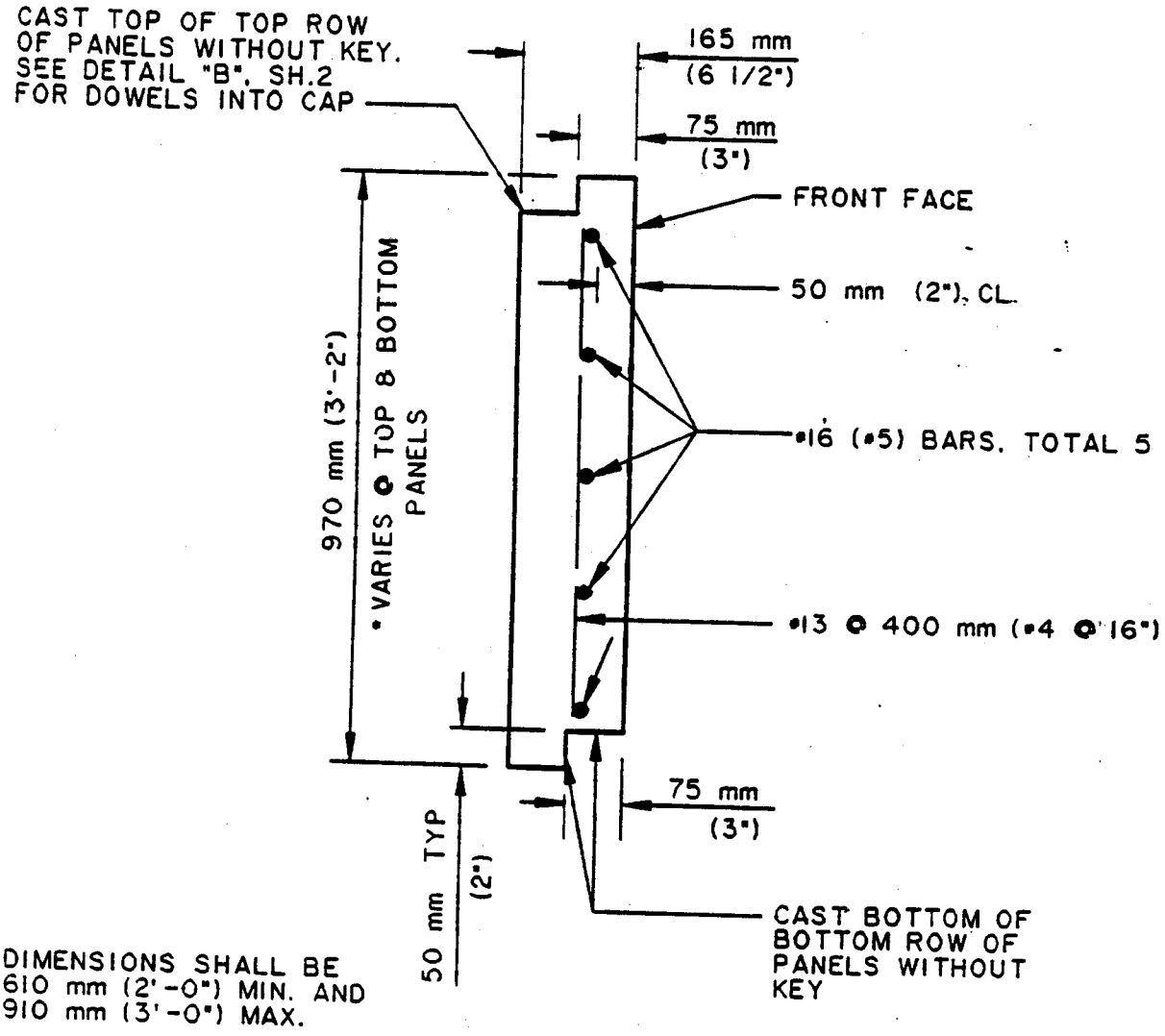
SECTION D-D

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

CANTILEVER SOLDIER BEAM RETAINING WALL WITH REINFORCED CONCRETE PANELS

STANDARD PLAN METRIC

6204-1



PRECAST PANEL DETAIL E

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

DESIGN HEIGHT H = m (ft) *	STEEL SCHEDULE		REQUIRED EMBEDMENT ** IN BEDROCK-	
	CASE I	CASE II	CASE I- m (ft)	CASE II- m (ft)
1.2 (4')	HP305x78.9 (HP12x53)	HP305x78.9 (HP12x53)	2.4 (8')	2.1 (7')
1.8 (6')	HP305x78.9 (HP12x53)	HP305x78.9 (HP12x53)	3.6 (12')	3.0 (10')
2.4 (8')	HP330x89.3 (HP13x60)	HP305x78.9 (HP12x53)	4.8 (16')	4.0 (13')
3.0 (10')	HP356x175.0 (HP14x117)	HP356x108.6 (HP14X73)	6.4 (21')	4.8 (16')
3.6 (12')	HP356x196.4 (W14x132)	HP356x151.8 (HP14X102)	7.6 (25')	5.5 (18')

* 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

LOS ANGELES COUNTY WATERWORKS DISTRICTS
DEPARTMENT OF PUBLIC WORKS

INDEX TO STANDARD PLANS

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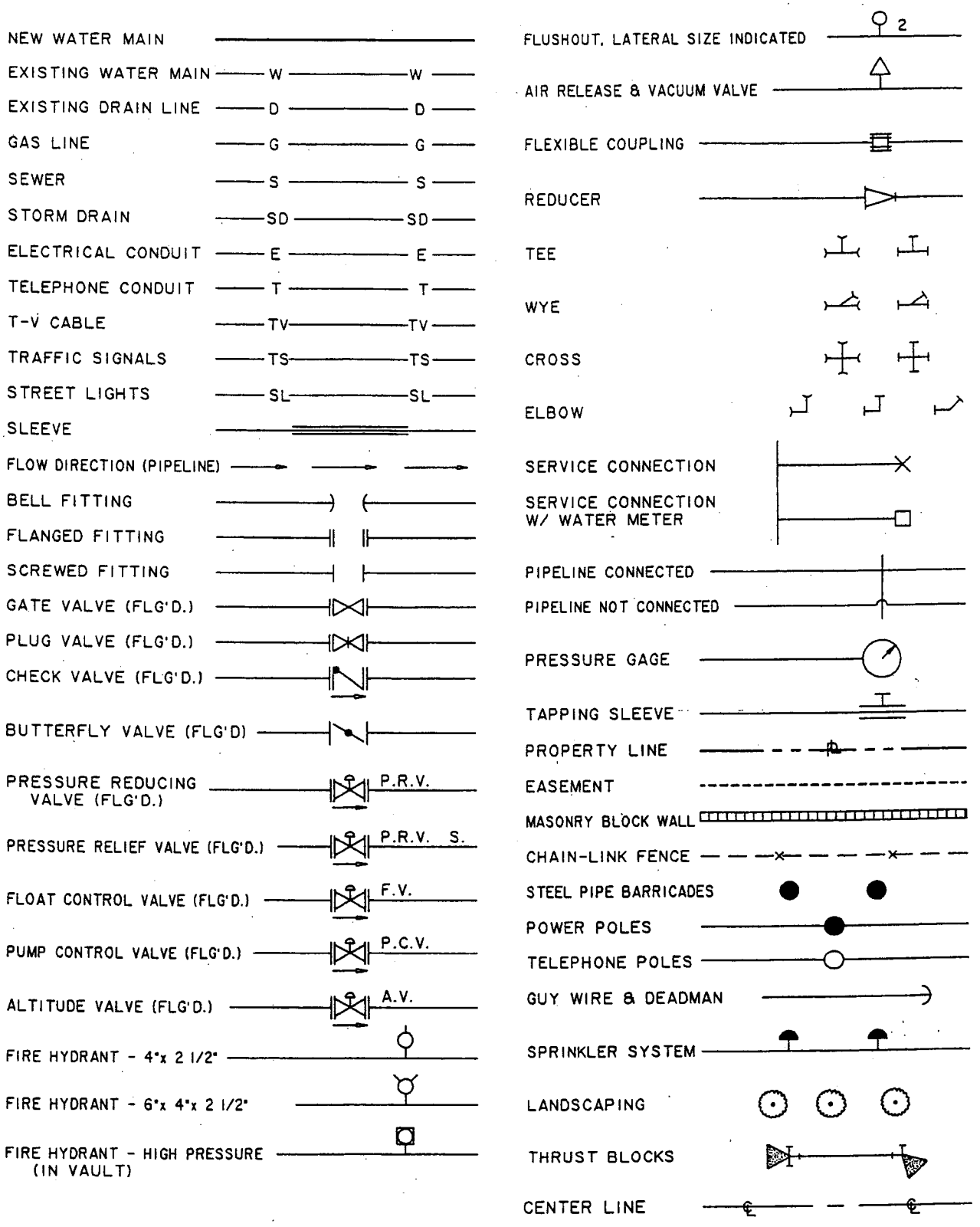
LOS ANGELES COUNTY WATERWORKS DISTRICTS
DEPARTMENT OF PUBLIC WORKS

INDEX TO STANDARD PLANS

LEGEND



LOS ANGELES COUNTY WATERWORKS DISTRICTS

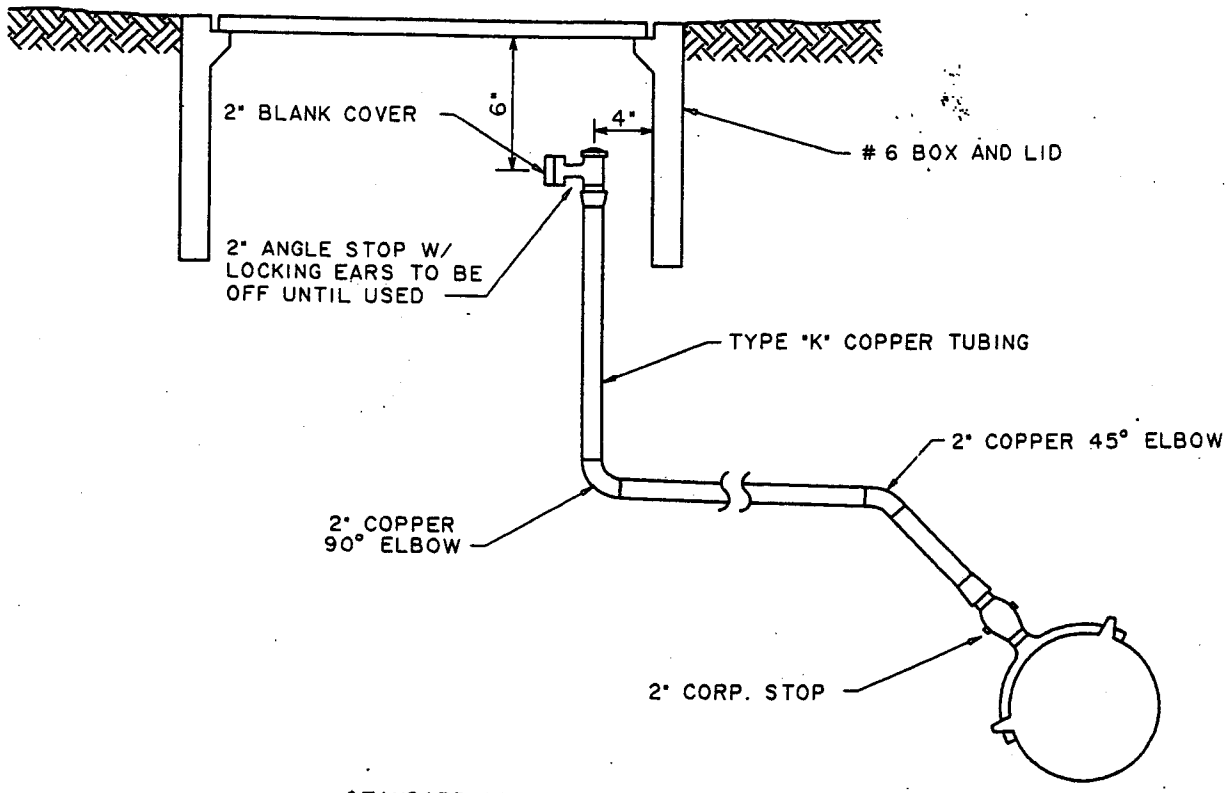
DEPARTMENT OF PUBLIC WORKS

APPROVED Dean D. Efstathiou
ASSISTANT DEPUTY DIRECTOR

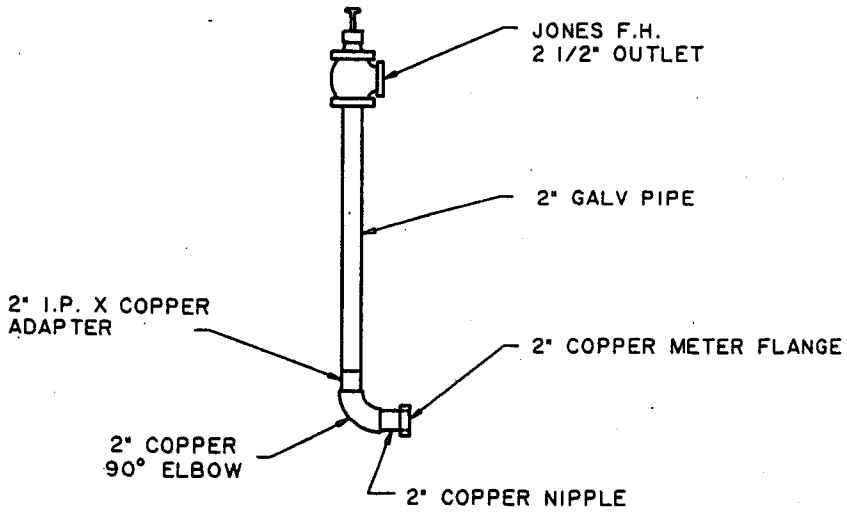
AUGUST 1993
DATE

STANDARD PLAN
W-3
SHEET 1 OF 1

FLUSHOUT 2" BURIED



STANDARD SERVICE CONNECTION - 2" COPPER



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

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

STANDARD PLAN

W-4

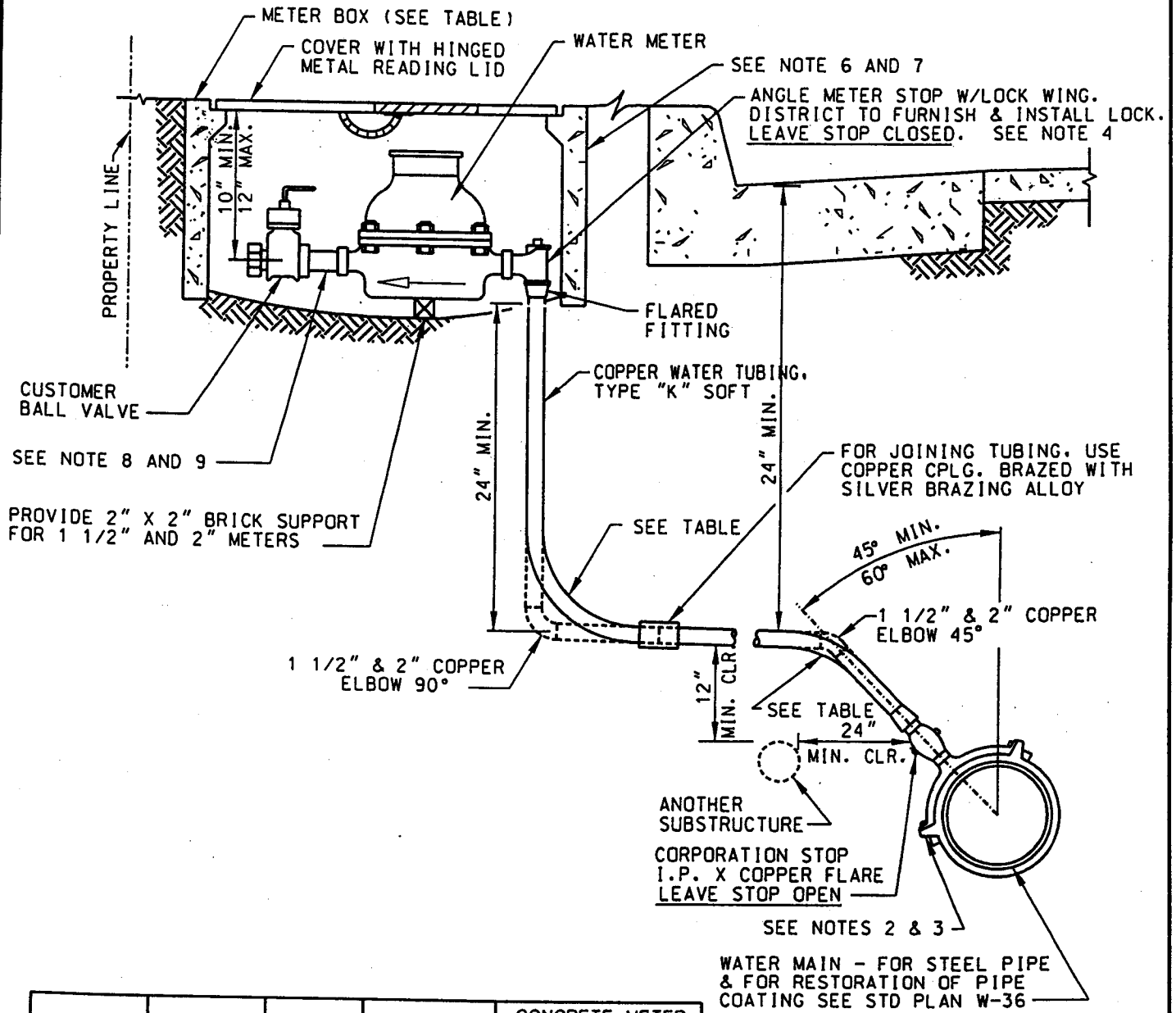
APPROVED Dean D Efstathiou
ASSISTANT DEPUTY DIRECTOR

AUGUST 1993
DATE

SHEET 1 OF 1

WATER SERVICE CONNECTION AND METER

(2" AND SMALLER, 149 PSI MAX. W.W.P.)



METER VALVE SIZE	MAIN BALL VALVE SIZE	MIN. SIZE TUBING	MIN. RADIUS TUBING BEND	CONCRETE METER BOX NOMINAL INSIDE DIMENSION
3/4" X 1"	1"	1"	18"	13"W X 24"L X 12"D
1"	1"	1"	18"	13"W X 24"L X 12"D
1 1/2"	1 1/2"	1 1/2"	COPPER ELBOW	17"W X 30"L X 12"D
2"	2"	2"	COPPER ELBOW	17"W X 30"L X 12"D

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

APPROVED Dean E. Hollis
ASSISTANT DEPUTY DIRECTOR

OCTOBER 1999
DATE

STANDARD PLAN
W-5
SHEET 1 OF 2

WATER SERVICE CONNECTION AND METER

(2" AND SMALLER, 149 PSI MAX. W.W.P.)

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 $1\frac{1}{2}$-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.

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

STANDARD PLAN

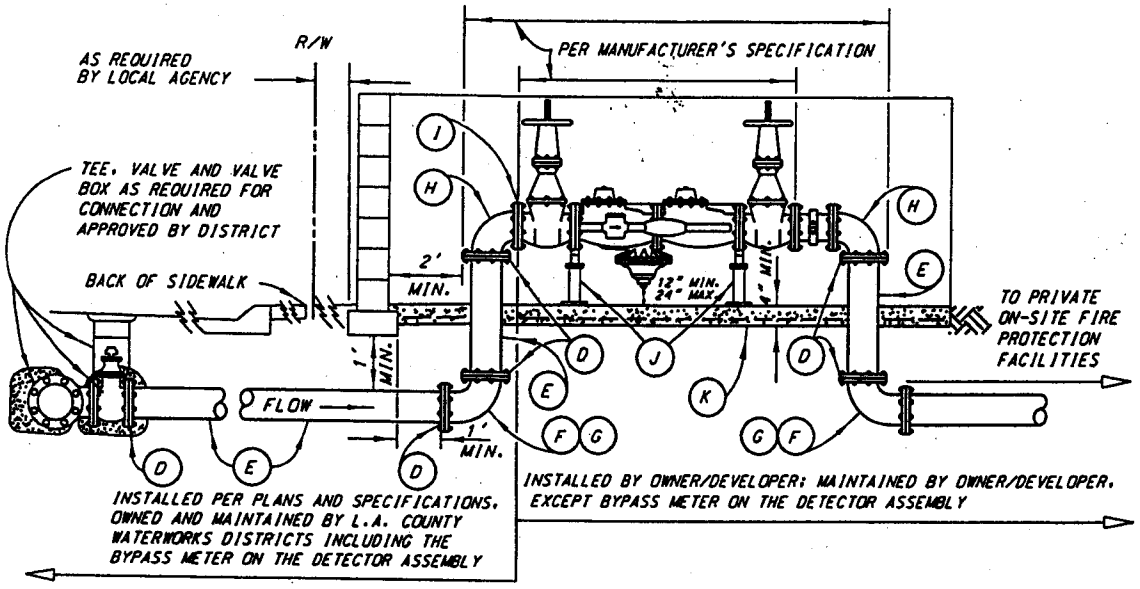
W-5

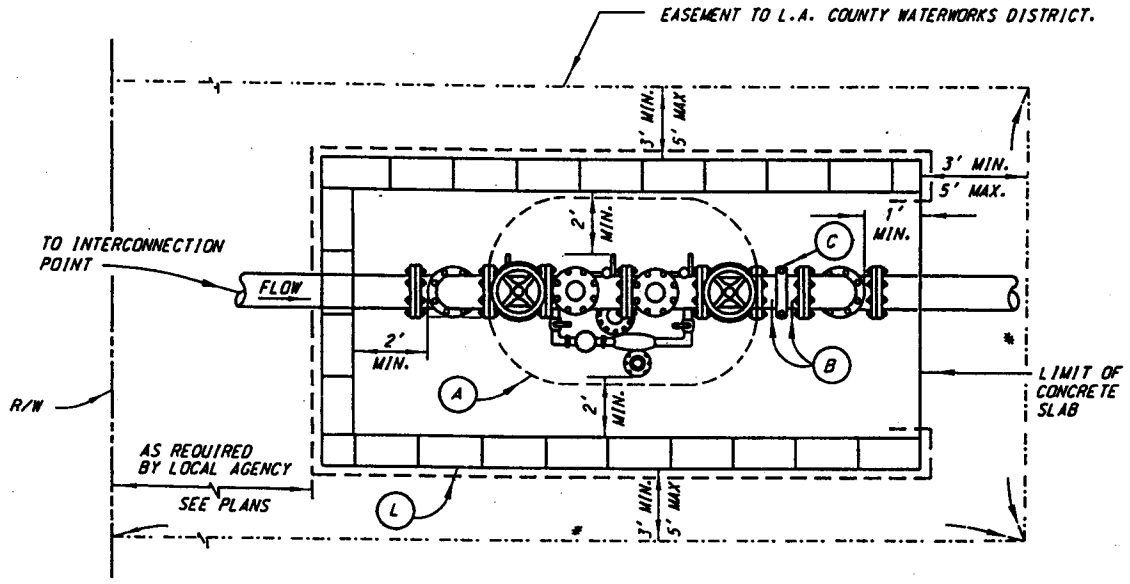
APPROVED Dean E. Hoffs
ASSISTANT/DEPUTY DIRECTOR

OCTOBER 1999
DATE

SHEET 2 OF 2

BACKFLOW PREVENTION DETECTOR ASSEMBLY





PLAN VIEW
NTS

* THIS DIMENSION PER APPROVED PLANS.

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

APPROVED Dean O. Efstathiou
ASSISTANT DEPUTY DIRECTOR

SEPTEMBER 1999
DATE

STANDARD PLAN
W-6
SHEET 1 OF 2

BACKFLOW PREVENTION DETECTOR ASSEMBLY

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

(C) VICTAULIC 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 520-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. IF AN ENCLOSURE/SCREEN IS TO BE CONSTRUCTED AROUND THE BACKFLOW PREVENTION ASSEMBLY, THEN 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. 1069 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.

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

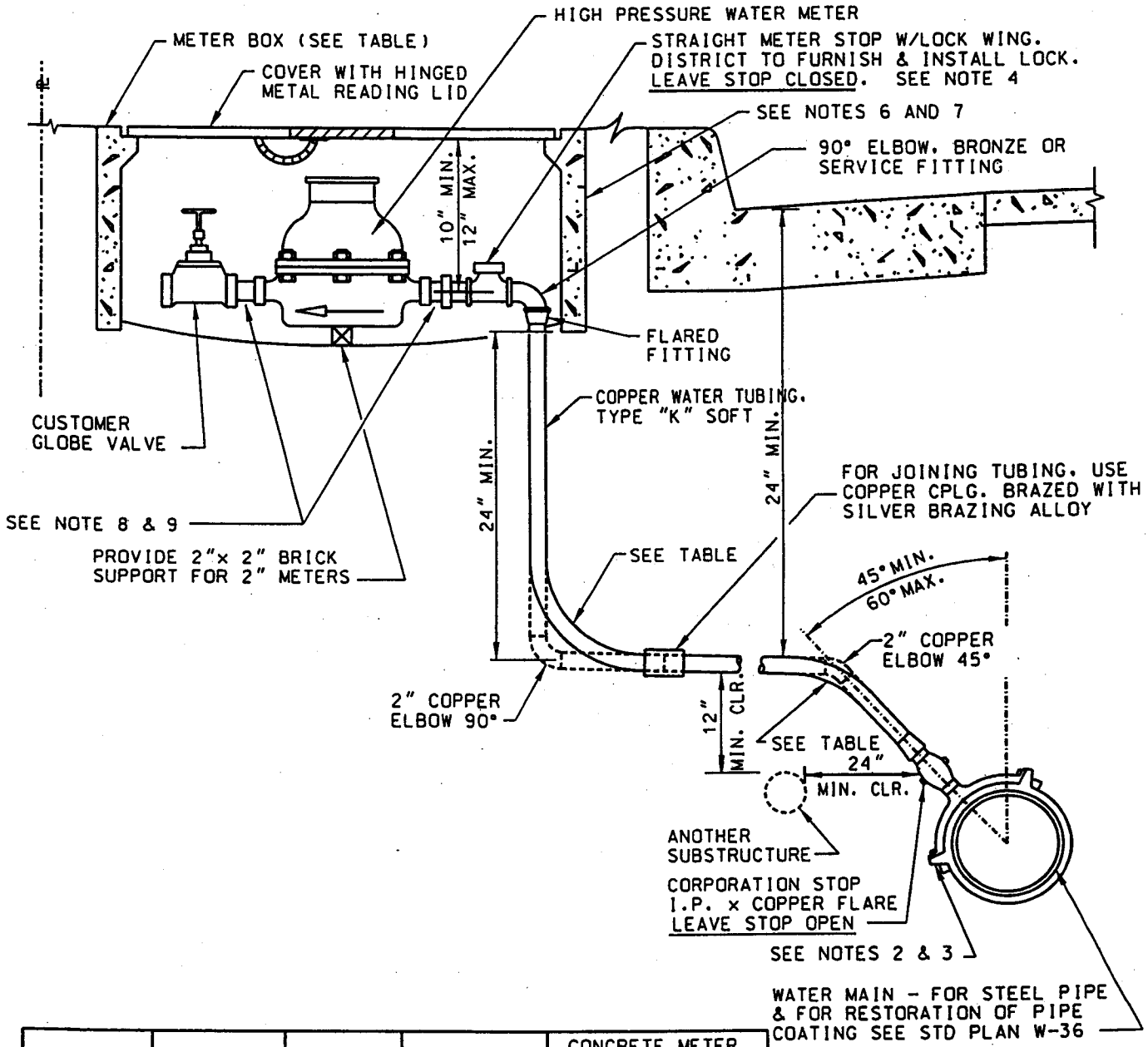
STANDARD PLAN
W-6
SHEET 2 OF 2

APPROVED Dean D. Efstathiou
ASSISTANT DEPUTY DIRECTOR

SEPTEMBER 1999
DATE

WATER SERVICE CONNECTION AND METER

(2" AND SMALLER, 150 to 500 PSI MAX. W.W.P.)



METER VALVE SIZE	MAIN GLOBE VALVE SIZE	MIN. SIZE TUBING	MIN. RADIUS TUBING BEND	CONCRETE METER BOX NOMINAL INSIDE DIMENSION
3/4"	1"	1"	18"	13"W X 24"L X 12"D
1"	1"	1"	18"	13"W X 24"L X 12"D
1 1/2"	1 1/2"	1 1/2"	COPPER ELBOW	30"W X 48"L X 14"D WITH TWO-PIECE LID
2"	2"	2"	COPPER ELBOW	30"W X 48"L X 14"D WITH TWO-PIECE LID

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

APPROVED Dean Efstathiou
ASSISTANT DEPUTY DIRECTOR

OCTOBER 1999
DATE

STANDARD PLAN
W-7
SHEET 1 OF 2

WATER SERVICE CONNECTION AND METER
(2" AND SMALLER, 150 to 500 PSI MAX. W.W.P.)

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.

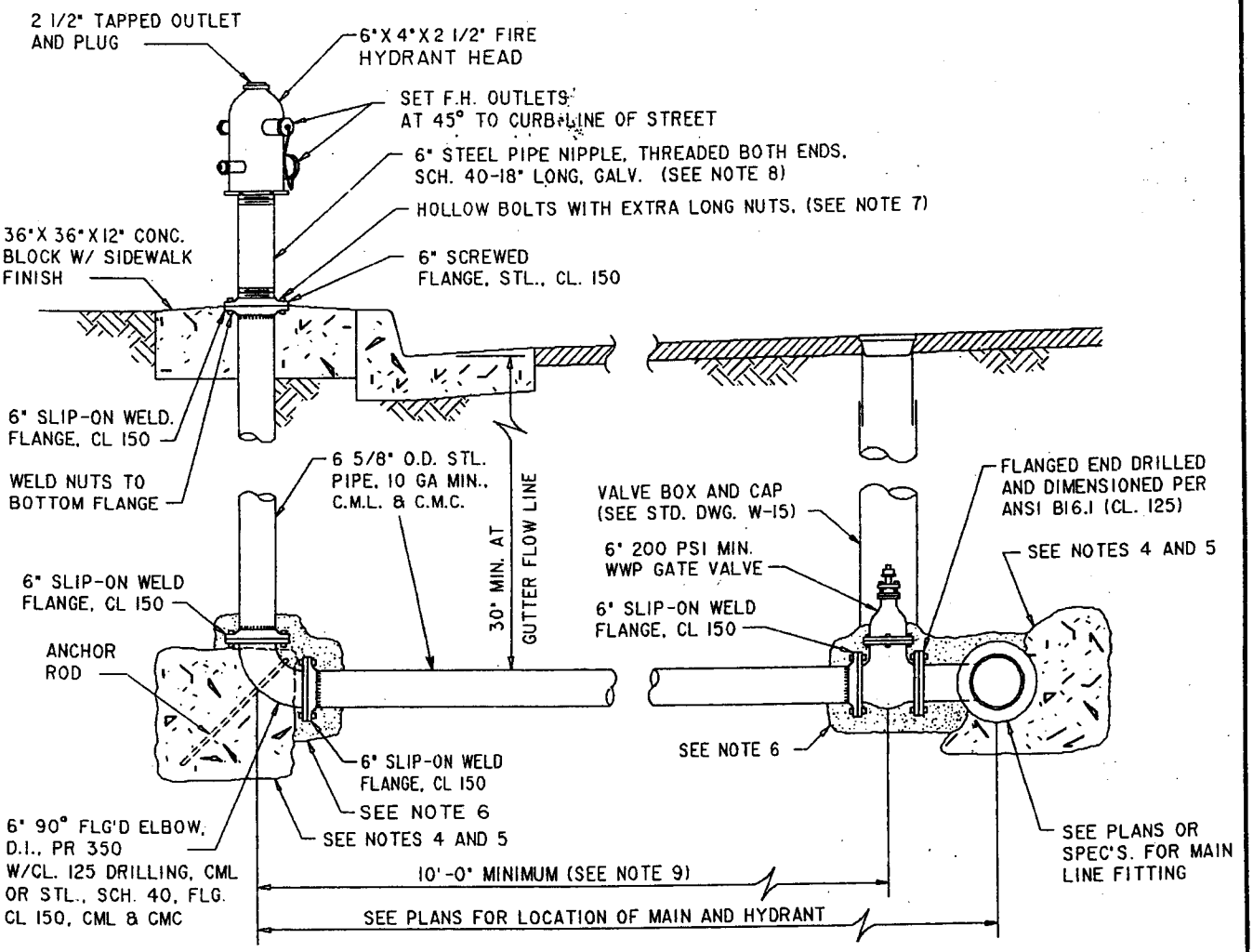
8. ALL 1-INCH AND SMALLER HIGH PRESSURE METERS SHALL BE SUPPLIED WITH ONE (1) BRONZE METER COUPLING, TAILPIECE, AND (2) UNTREATED RUBBER GASKETS. (NOTE: PAPER OR LEATHER GASKETS ARE NOT ACCEPTABLE.)

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.

LOS ANGELES COUNTY WATERWORKS DISTRICTS	
DEPARTMENT OF PUBLIC WORKS	STANDARD PLAN W-7
APPROVED Dean Efstathiou, ASSISTANT DEPUTY DIRECTOR — OCTOBER 1999 DATE	SHEET 2 OF 2

FIRE HYDRANT - COMPLETE

(200 PSI MAX. WWP. LATERAL AT RIGHT ANGLE TO MAIN)



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 #1069 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 HORIZONTAL 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

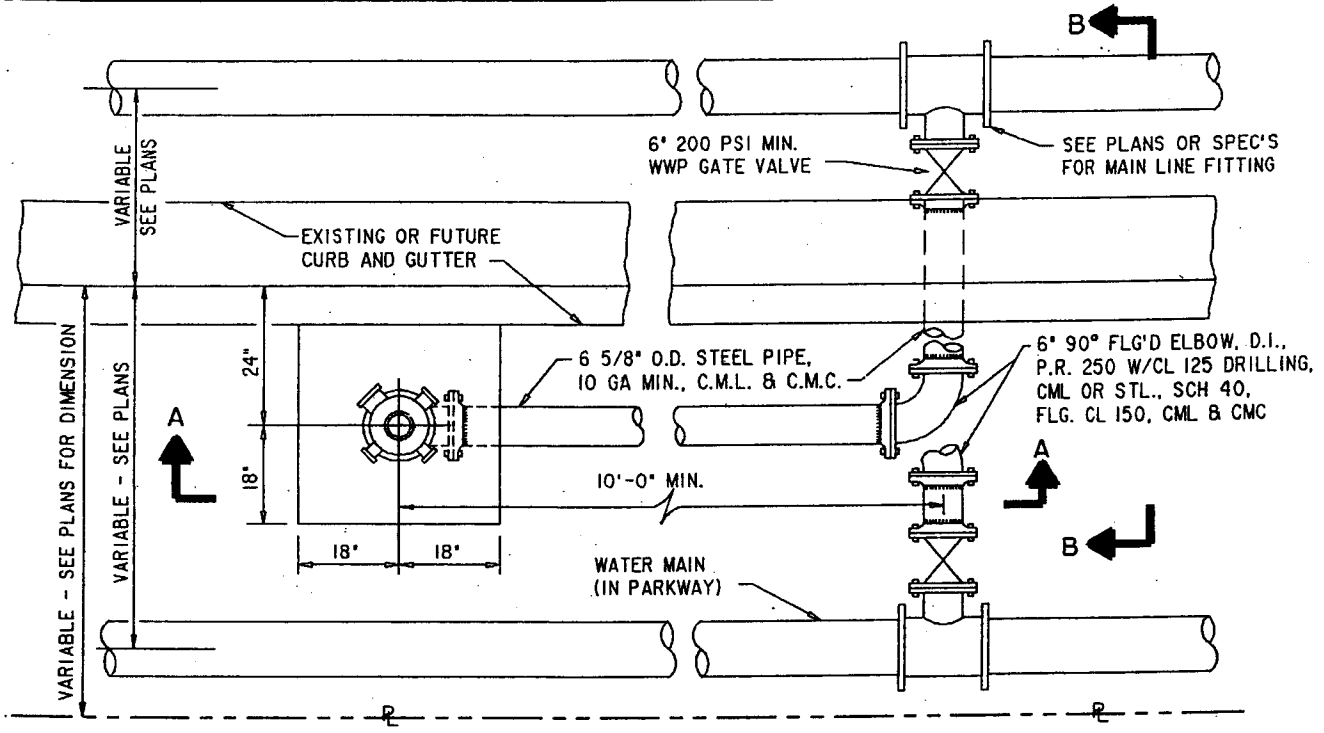
APPROVED Dean D. Efstathiou
ASSISTANT DEPUTY DIRECTOR

OCTOBER 1998
DATE

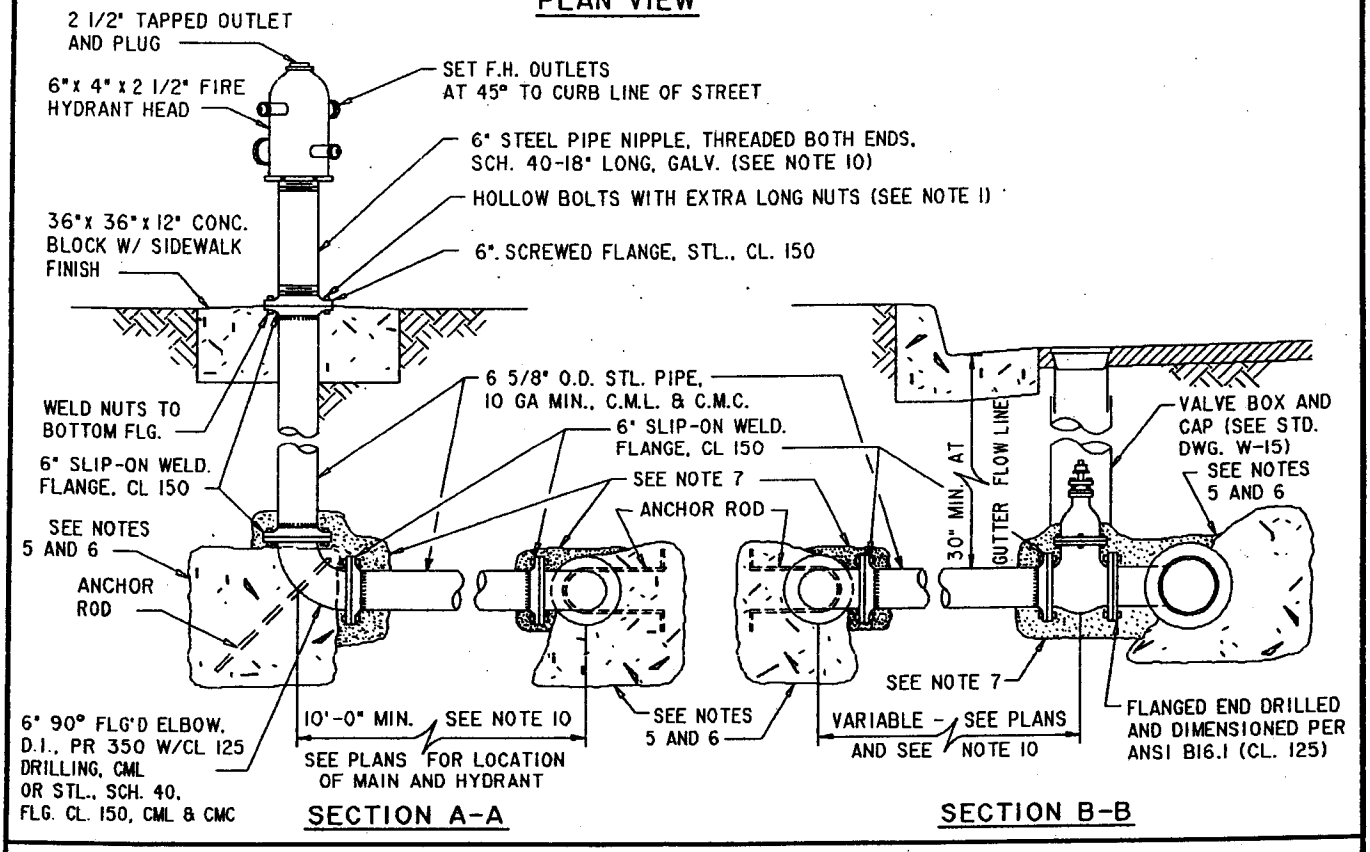
STANDARD PLAN
W-8
SHEET 1 OF 1

FIRE HYDRANT - COMPLETE

(200 PSI MAX WWP, PARALLEL TO MAIN)



PLAN VIEW



SECTION A-A

SECTION B-B

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

APPROVED Dean D. Efthathiou
ASSISTANT DEPUTY DIRECTOR

OCTOBER 1998
DATE

STANDARD PLAN

W-9

SHEET 1 OF 2

FIRE HYDRANT - COMPLETE (CONTINUED)

(200 PSI MAX WWP, PARALLEL TO MAIN)

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.
9. 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 #1069 AND 2 COATS OF RUST-OLEUM YELLOW #944.
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.

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

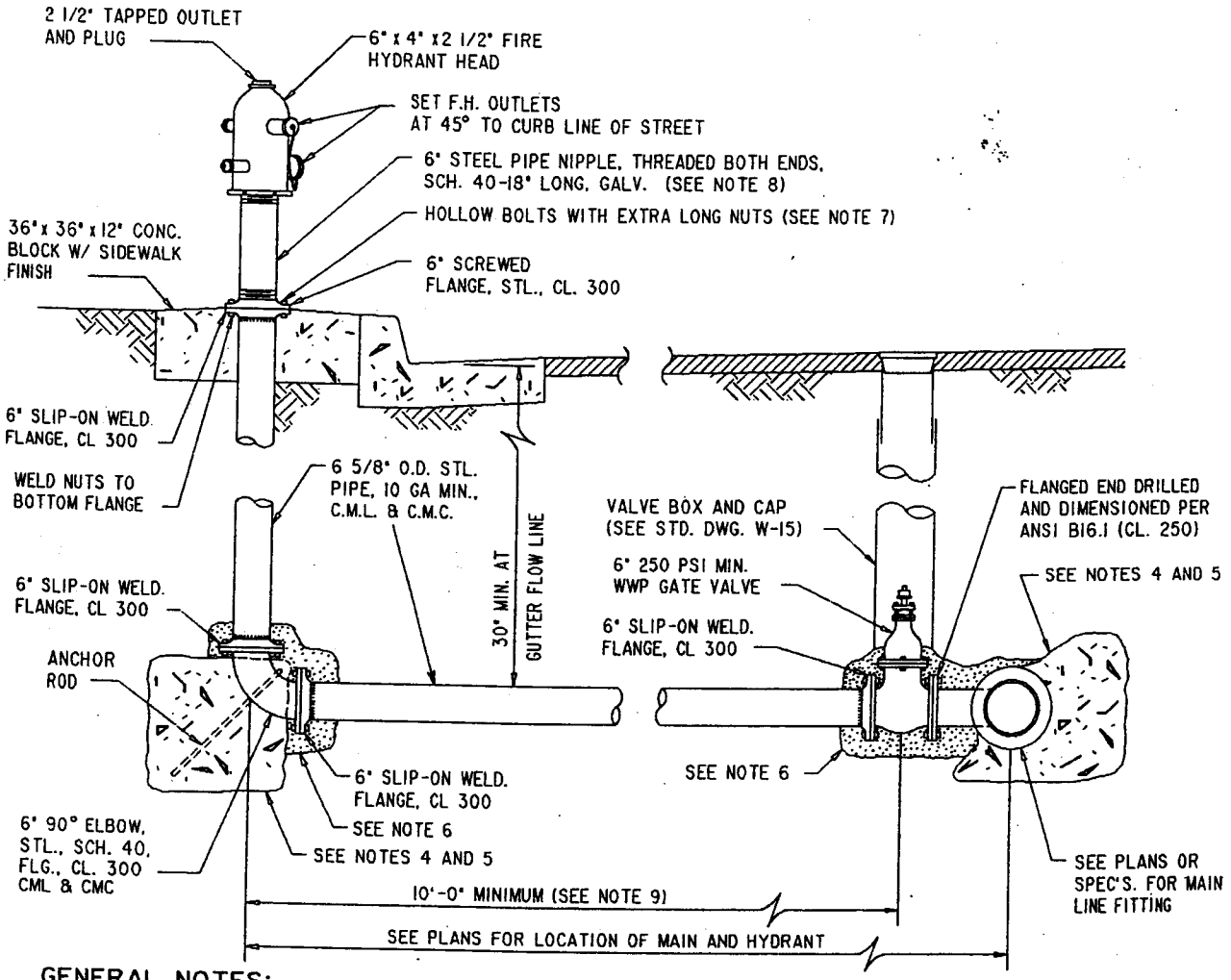
APPROVED Dean D. Efthathiou
ASSISTANT DEPUTY DIRECTOR

OCTOBER 1998
DATE

STANDARD PLAN
W-9
SHEET 2 OF 2

FIRE HYDRANT - COMPLETE

(250 PSI MAX. WWP, LATERAL AT RIGHT ANGLE TO MAIN)



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)
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11. OUTLETS SHALL BE CAPPED WITH APPROVED PLASTIC CAPS.

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

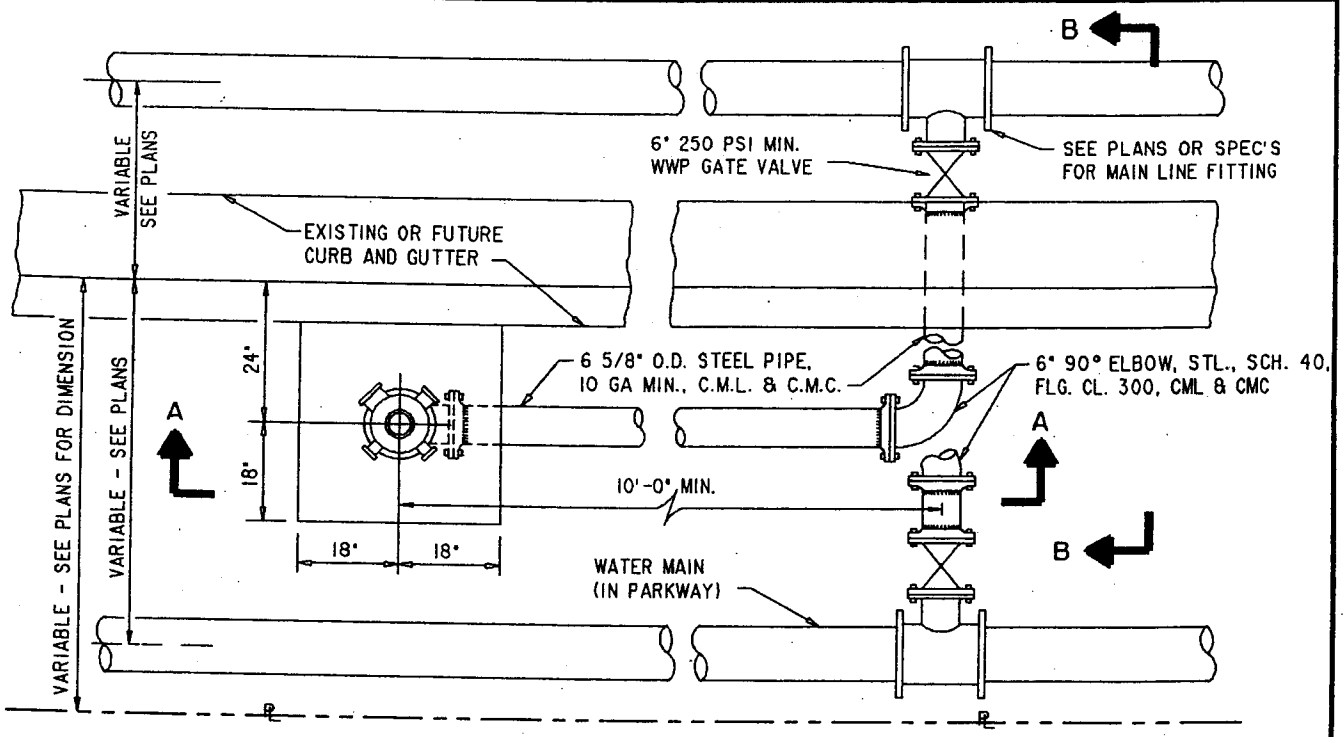
APPROVED Dean D. Efstathiou
ASSISTANT DEPUTY DIRECTOR

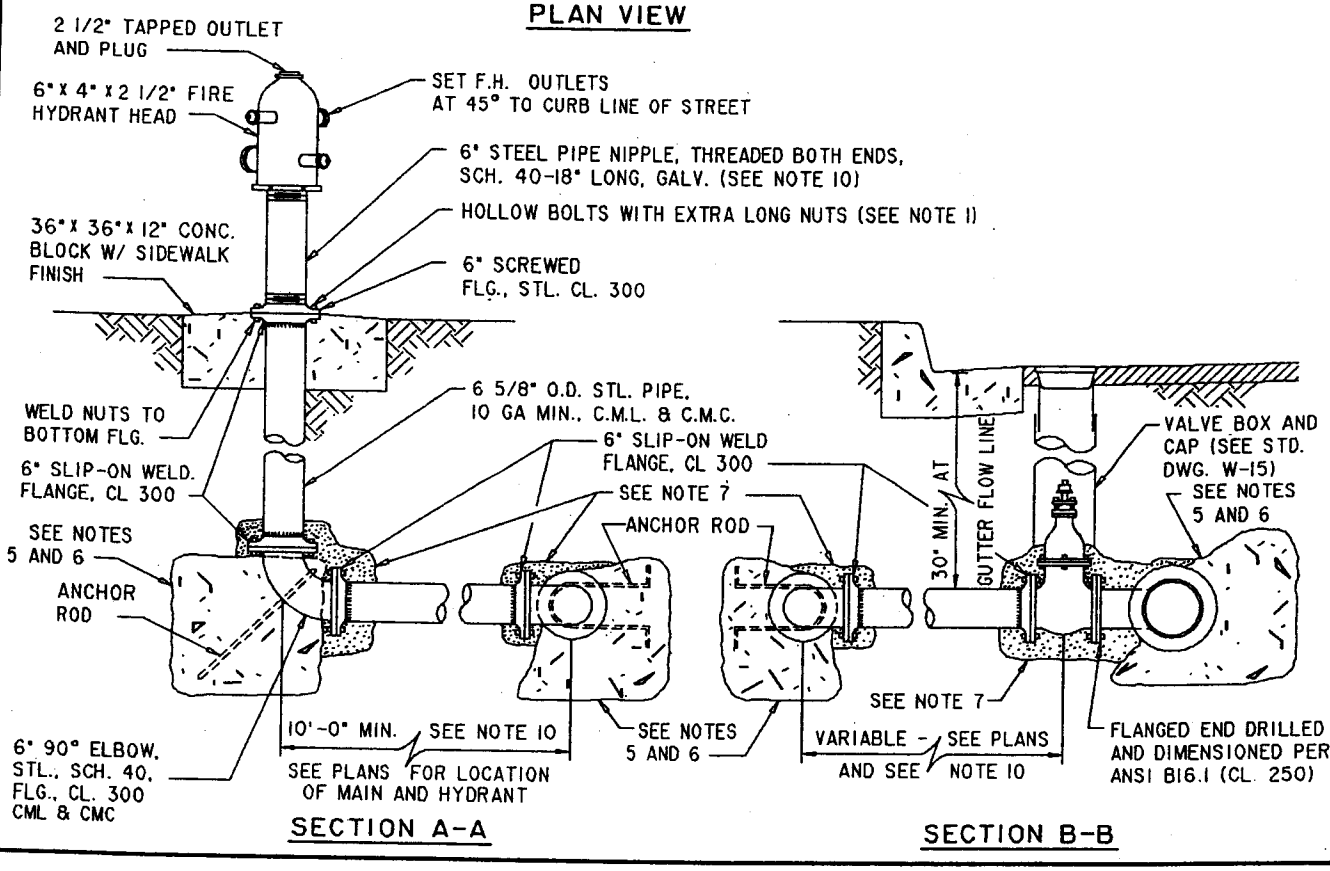
OCTOBER 1998
DATE

STANDARD PLAN
W-10
SHEET 1 OF 1

FIRE HYDRANT - COMPLETE

(250 PSI MAX WWP, PARALLEL TO MAIN)





LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

APPROVED Dean D. Efstathiou
ASSISTANT DEPUTY DIRECTOR

OCTOBER 1998
DATE

STANDARD PLAN
W-11
SHEET 1 OF 2

FIRE HYDRANT - COMPLETE (CONTINUED)
(250 PSI MAX WWP, PARALLEL TO MAIN)

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)
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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 (1 CEMENT: 3 SAND: 1 LIME) TO PROVIDE A 2-INCH THICK COATING.
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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 PLASTIC CAPS.

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

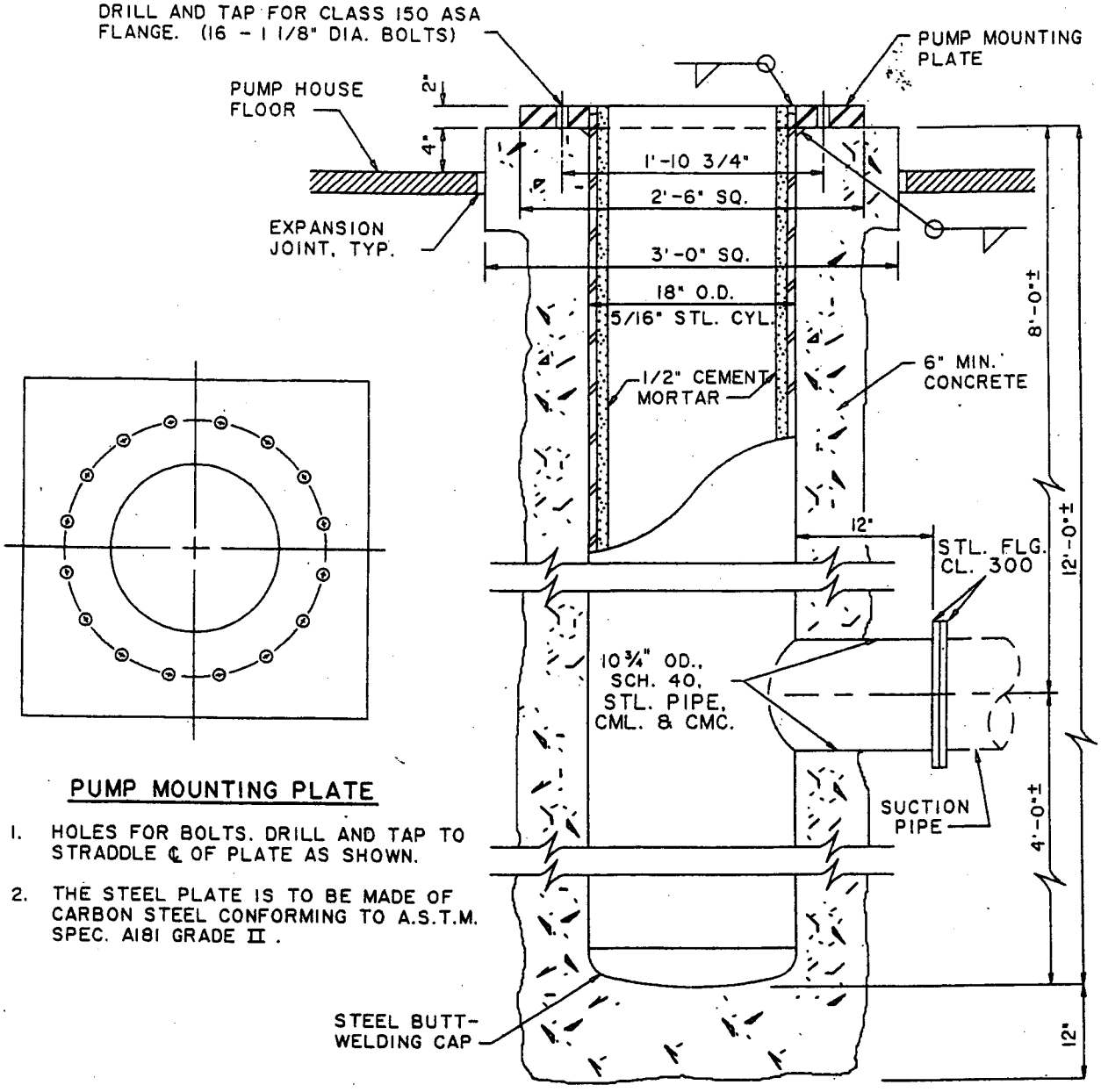
STANDARD PLAN

W-11

APPROVED Dean Efstathiou
ASSISTANT/DEPUTY DIRECTOR

OCTOBER 1998
DATE

BOOSTER PUMP SUCTION CAN



PUMP MOUNTING PLATE

1. HOLES FOR BOLTS. DRILL AND TAP TO STRADDLE ℄ 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 .

LOS ANGELES COUNTY WATERWORKS DISTRICTS

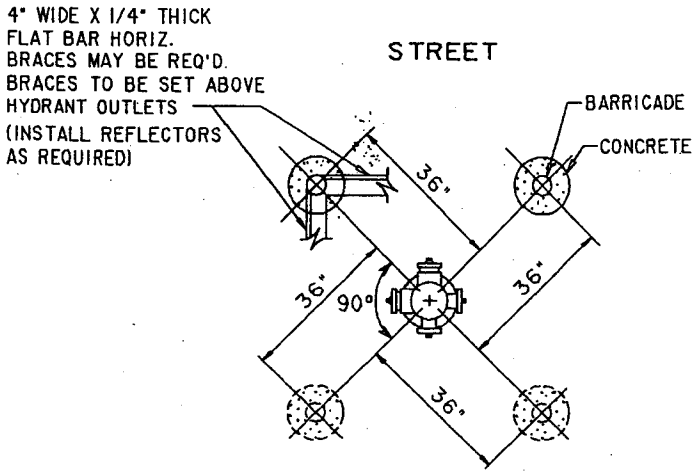
DEPARTMENT OF PUBLIC WORKS

STANDARD PLAN
W-13
SHEET 1 OF 1

APPROVED Dean D Efstathiou
ASSISTANT DEPUTY DIRECTOR

AUGUST 93
DATE

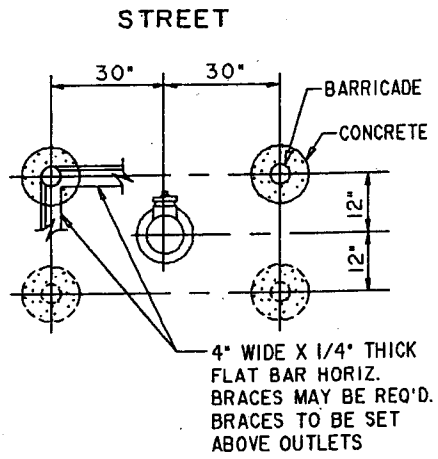
BARRICADES - FIRE HYDRANT & OTHER



PLAN

FIRE HYDRANT BARRICADES

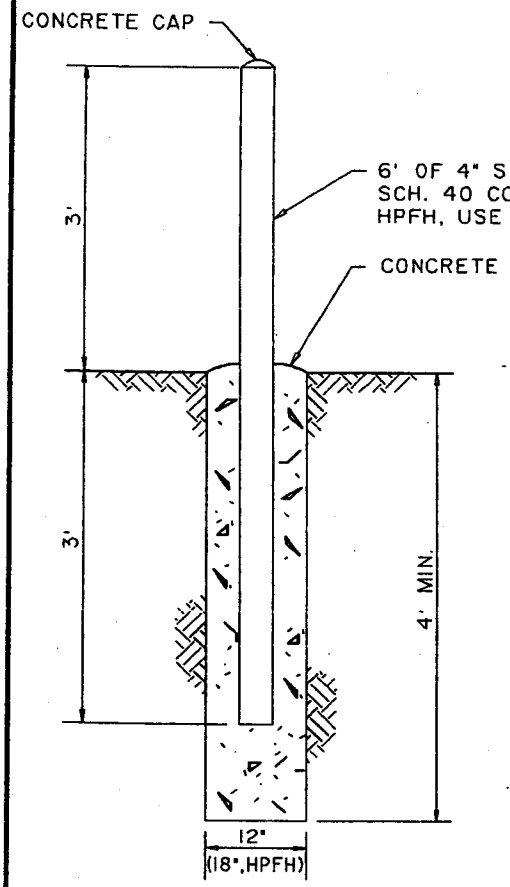
(SEE NOTE 6)



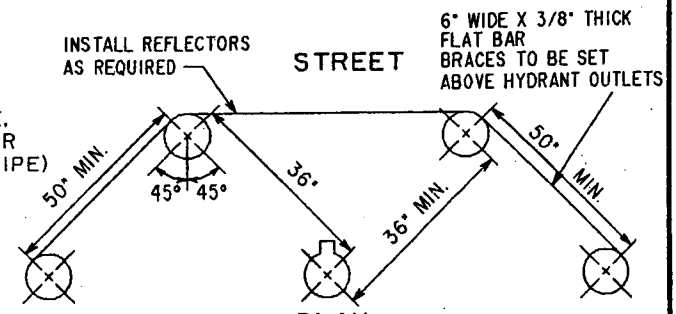
PLAN

OTHER BARRICADES

(SEE NOTE 7)



BARRICADE DETAILS



PLAN

HIGH PRESSURE FIRE HYDRANT (H.P.F.H.)

(SEE NOTE 6)

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 #1069.
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 #1282.

LOS ANGELES COUNTY WATERWORKS DISTRICTS

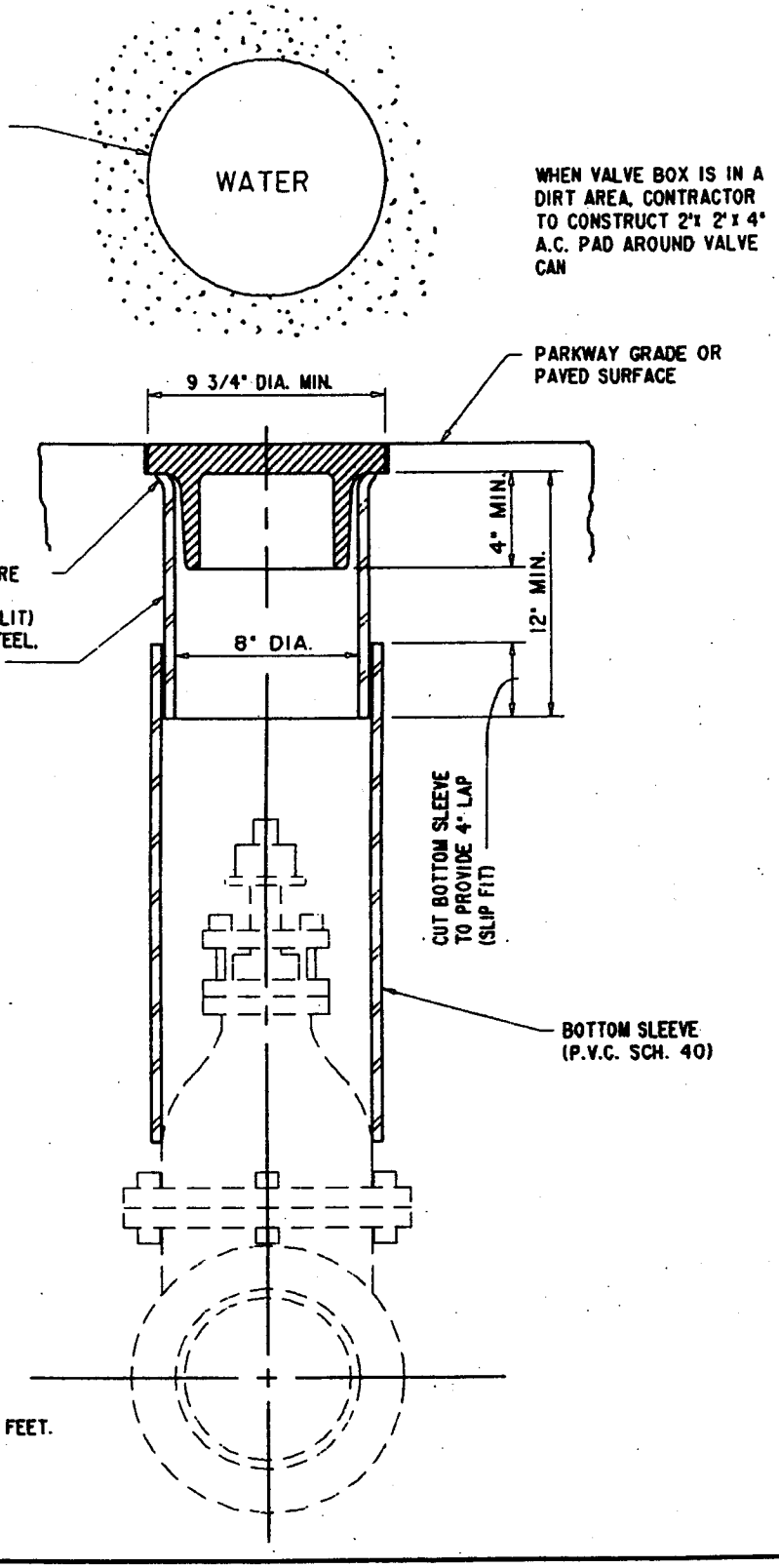
DEPARTMENT OF PUBLIC WORKS

APPROVED Dean Efstathiou
ASSISTANT DEPUTY DIRECTOR

OCTOBER 1998
DATE

STANDARD PLAN
W-14
SHEET 1 OF 1

ADJUSTABLE VALVE BOX



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

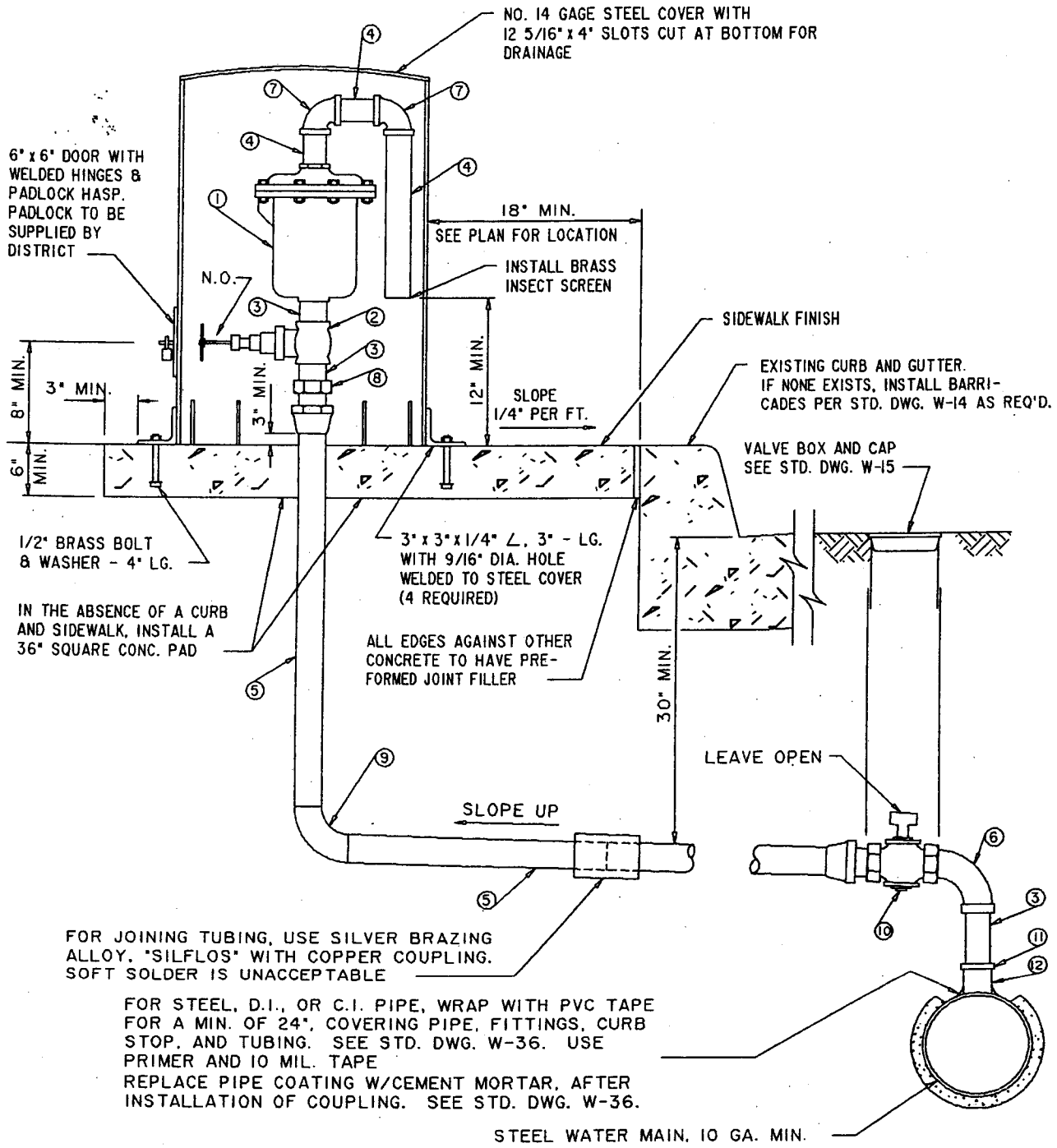
DEPARTMENT OF PUBLIC WORKS

APPROVED Dean D. Efstathiou
ASSISTANT DEPUTY DIRECTOR

JUNE 1997
DATE

STANDARD PLAN
W-15
SHEET 1 OF 1

AIR RELEASE AND VACUUM VALVE ASSEMBLY



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.

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

APPROVED Deas D. Efstathiou
ASSISTANT DEPUTY DIRECTOR

OCTOBER 1998
DATE

STANDARD PLAN
W-16
SHEET 1 OF 2

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

NO.	DESCRIPTION (FOR 2" VALVES)	ENGINEER'S EST. QUANTITY
(1)	2" AIR RELEASE AND VACUUM VALVE	1
(2)	2" BALL VALVE, SCREWED, BRONZE	1
(3)	2" BRONZE NIPPLE, SHORT	1' ±
(4)	2" STD. STEEL PIPE, NIPPLE, GALV.	2' ±
(5)	2" COPPER TUBING, TYPE "K" SOFT	24' ±
(6)	2" 90° STREET ELBOW, SCREWED, BRONZE	1
(7)	2" 90° ELBOW, SCREWED, GALV.	2
(8)	2" ADAPTER, BRONZE, COPPER FLARED x I.P., MALE	1
(9)	2" 90° ELBOW, COPPER	1
(10)	2" CURB STOP, BRONZE, COPPER FLARED x I.P., FEMALE, "HAYS" 5050 OR APPROVED EQUAL	1
(11)	2 1/2" x 2" INSULATING BUSHING	1
(12)	2 1/2" WELDED COUPLING	1

LOS ANGELES COUNTY WATERWORKS DISTRICTS

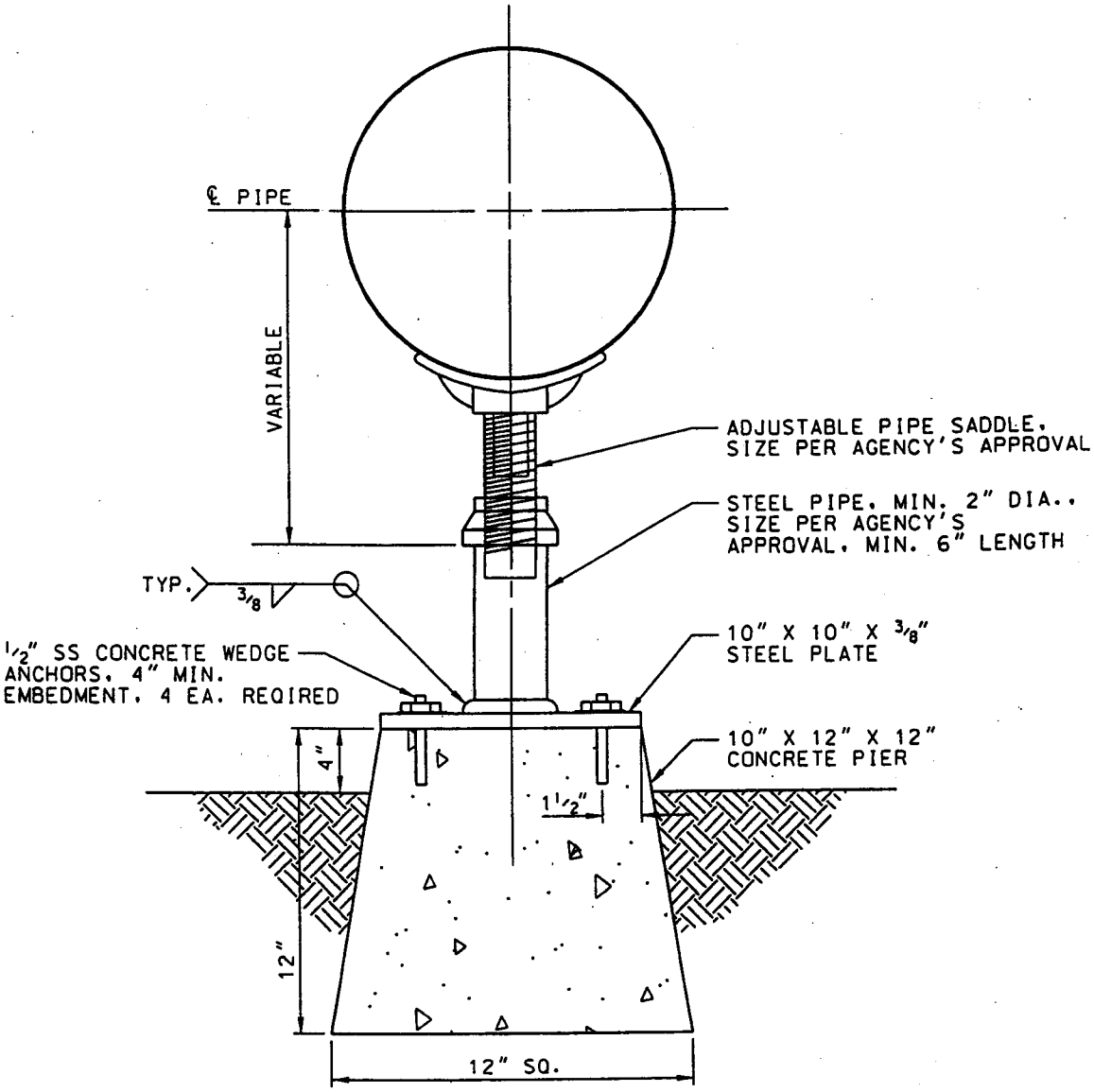
DEPARTMENT OF PUBLIC WORKS

APPROVED Dean D. Efthathiou
ASSISTANT DEPUTY DIRECTOR

OCTOBER 1998
DATE

STANDARD PLAN
W-16
SHEET 2 OF 2

ADJUSTABLE PIPE SUPPORT



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.

LOS ANGELES COUNTY WATERWORKS DISTRICTS

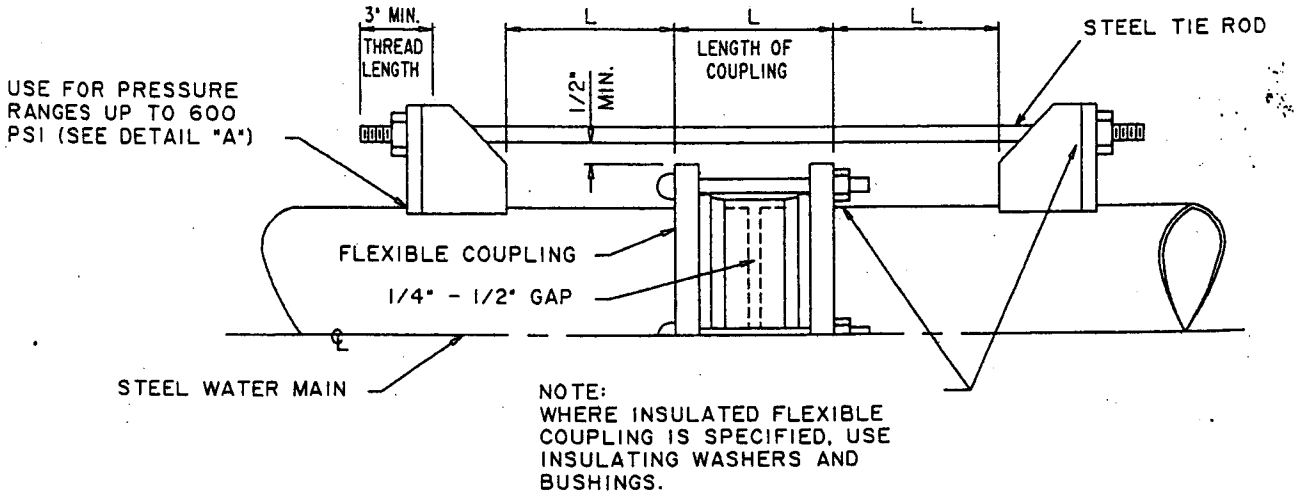
DEPARTMENT OF PUBLIC WORKS

STANDARD PLAN
W-17
SHEET 1 OF 1

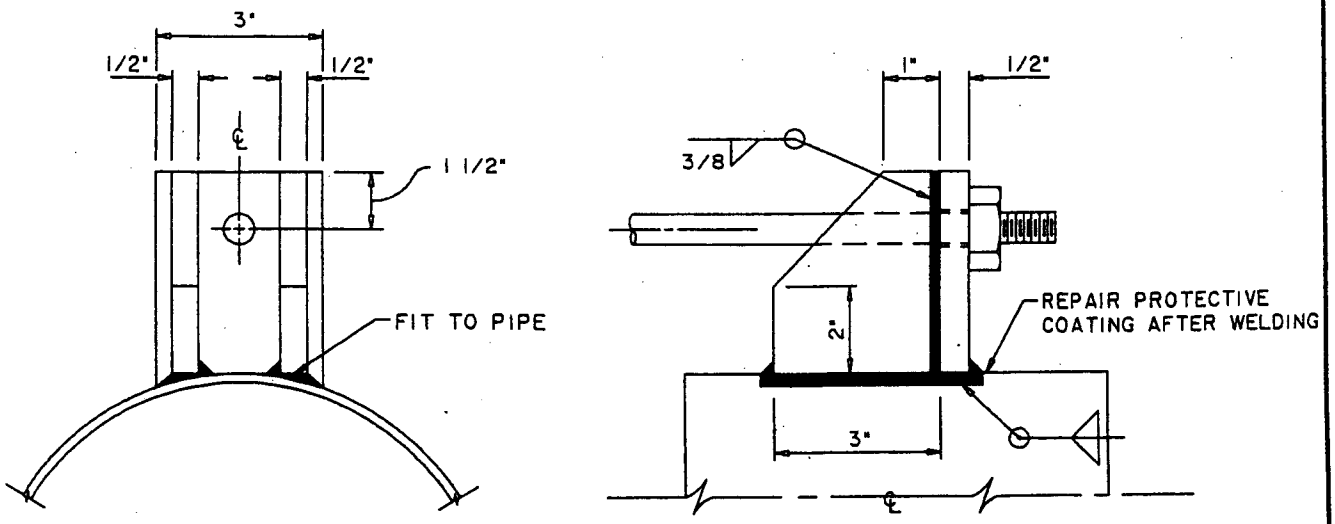
APPROVED Dean Efstathiou
ASSISTANT DEPUTY DIRECTOR

OCTOBER 1999
DATE

FLEXIBLE COUPLING TIES
(FOR ABOVE GROUND INSTALLATIONS OR IN VAULTS)



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

600 PSI MAX.			400 PSI MAX.			200 PSI MAX.		
PIPE SIZE	TIE RODS		PIPE SIZE	TIE RODS		PIPE SIZE	TIE RODS	
	NO.	DIA.		NO.	DIA.		NO.	DIA.
4"	2	3/4"	4"	2	5/8"	4"	2	1/2"
6"	3	7/8"	6"	2	7/8"	6"	2	5/8"
8"	4	1"	8"	3	1"	8"	2	7/8"
10"	6	1"	10"	4	1"	10"	2	1"
12"	6	1 1/4"	12"	6	1"	12"	3	1"

LOS ANGELES COUNTY WATERWORKS DISTRICTS

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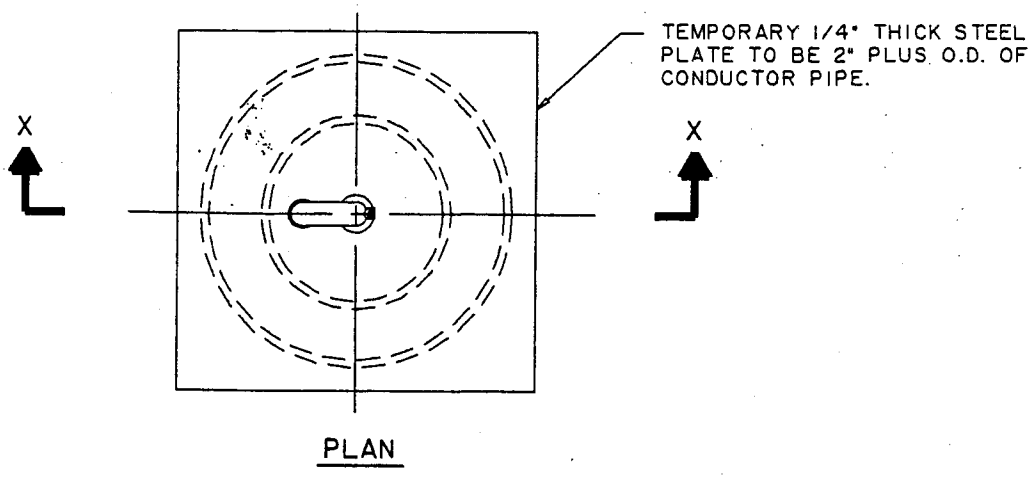
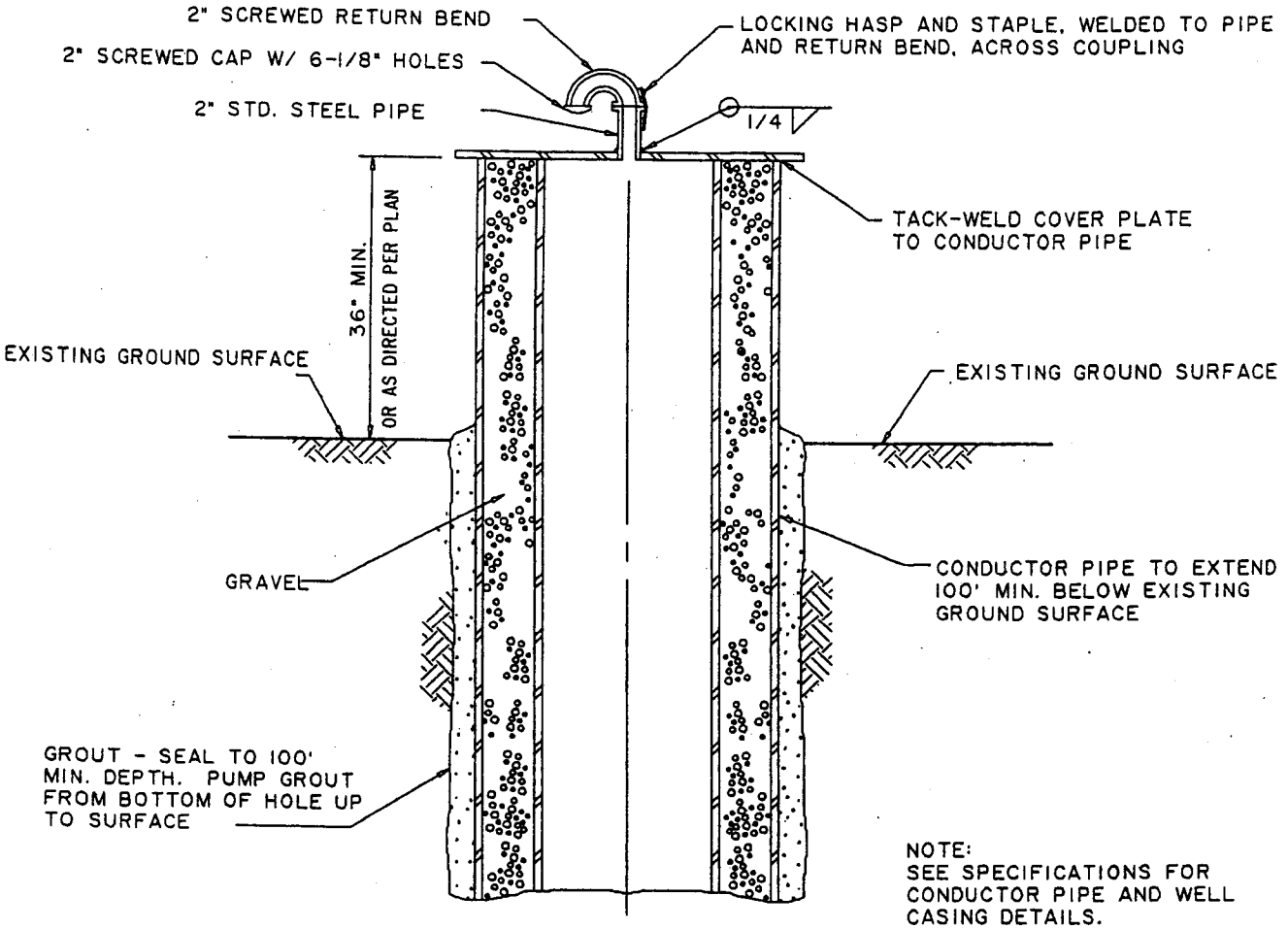
GRAVEL ENVELOPE WELL HEAD



PLAN



SECTION X-X

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

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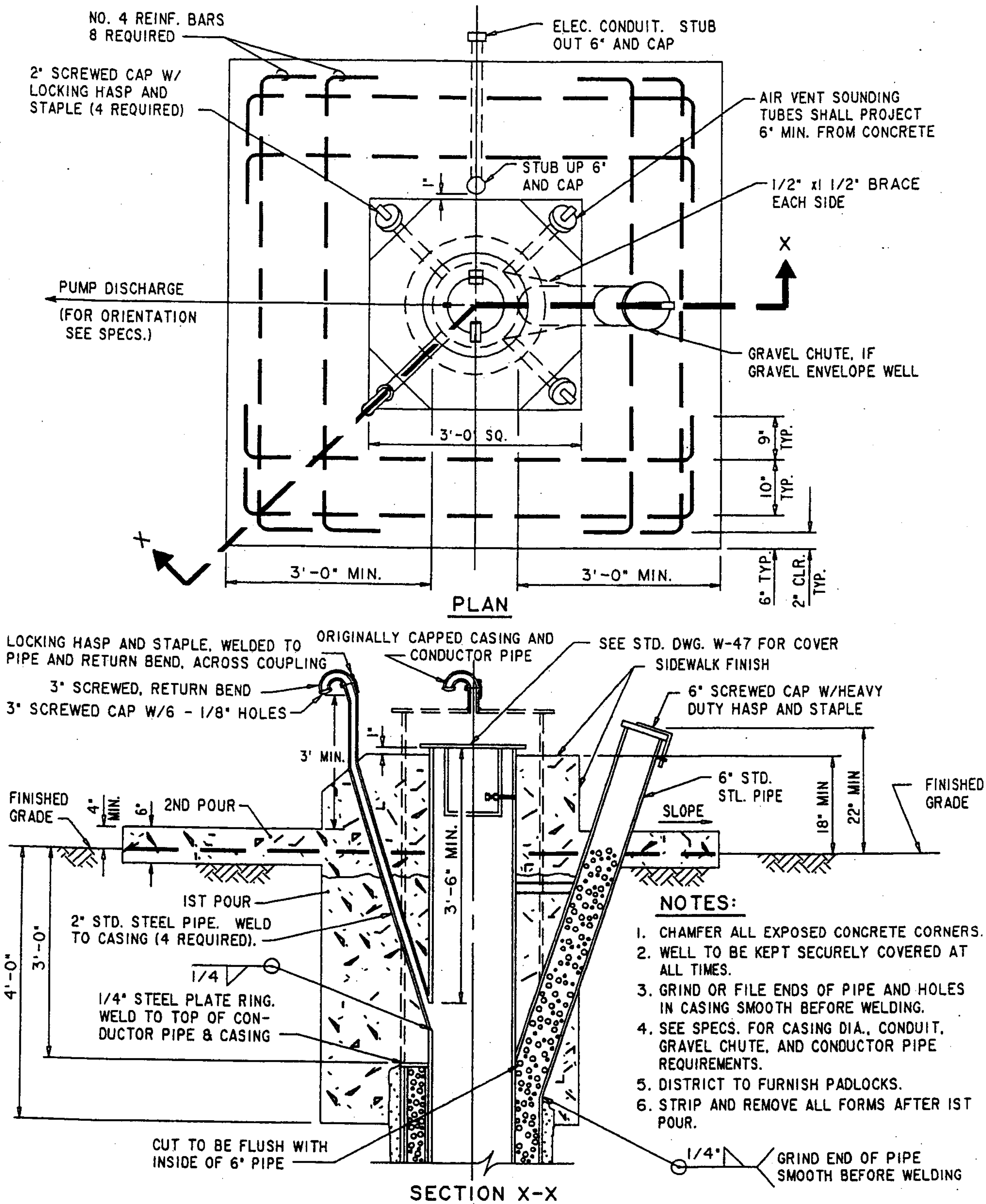
WELL SLAB AND PEDESTAL



NOTES:

1. CHAMFER ALL EXPOSED CONCRETE CORNERS.
2. WELL TO BE KEPT SECURELY COVERED AT ALL TIMES.
3. GRIND OR FILE ENDS OF PIPE AND HOLES IN CASING SMOOTH BEFORE WELDING.
4. SEE SPECS. FOR CASING DIA., CONDUIT, GRAVEL CHUTE, AND CONDUCTOR PIPE REQUIREMENTS.
5. DISTRICT TO FURNISH PADLOCKS.
6. STRIP AND REMOVE ALL FORMS AFTER 1ST POUR.

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SHEET 1 OF 1

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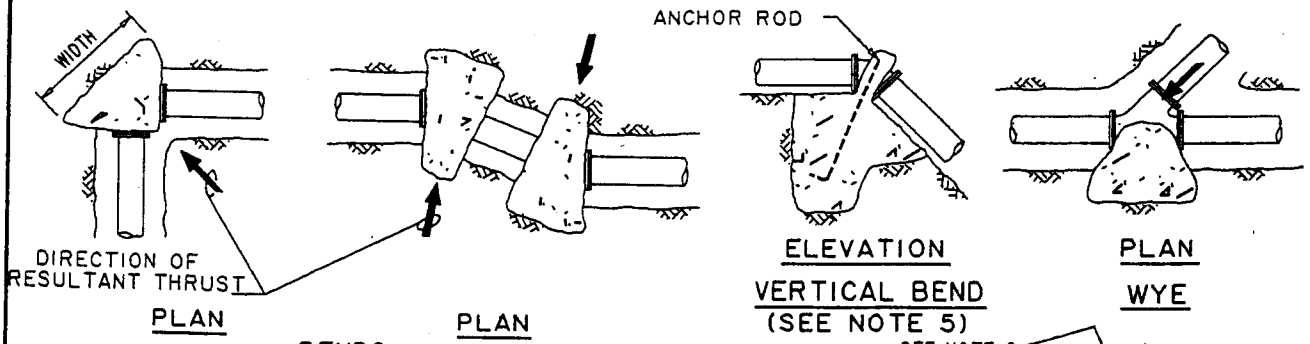
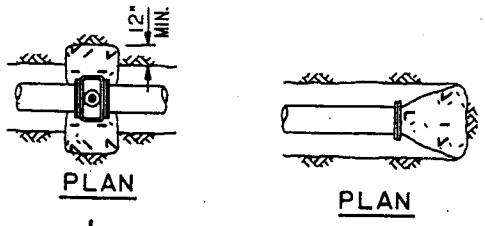
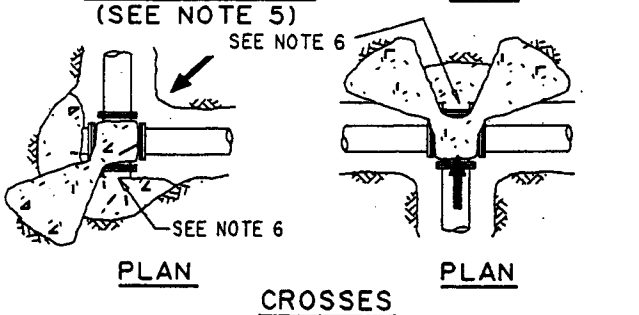
CONCRETE THRUST BLOCKS

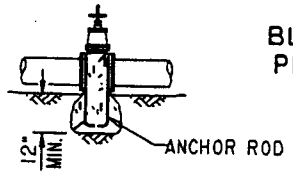


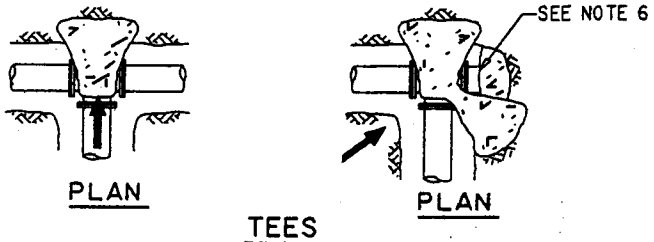
BENDS





CROSSES





TEES

TABLE I

MINIMUM BEARING AREAS IN SQ. FT. *				
MAIN SIZE	TEE **	90° BEND	45° BEND	22 1/2° BEND
6"	4	4	4	3
8"	5	7	4	3
10"	9	12	6	4
12"	12	16	9	6

* BASED ON 150 PSI W.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

*** SOIL TYPE	**** MAX. ALLOWABLE SOIL BEARING VALUES	FACTORS FOR INCREASING AREAS IN TABLE I
LOOSE SAND	500 PSF	4
SOFT SANDY CLAY	1000 PSF	2
ADOBE	1000 PSF	2
COMPACT FINE SAND	2000 PSF	1
COMPACT COARSE SAND	2000 PSF	1
MEDIUM STIFF CLAY	2000 PSF	1

*** 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.

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.

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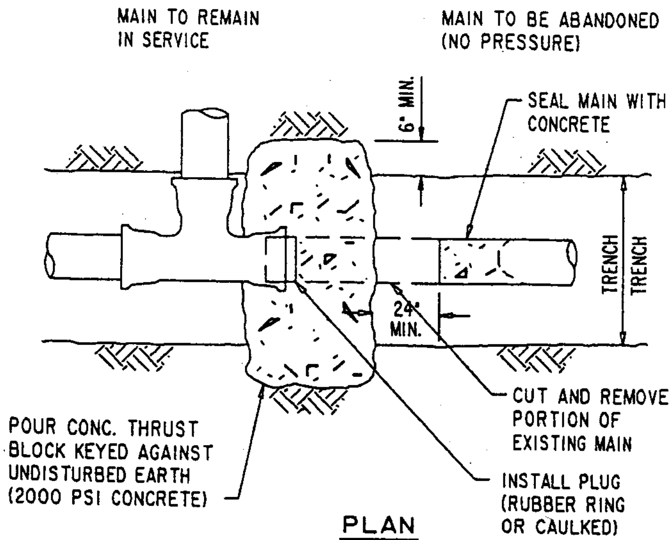
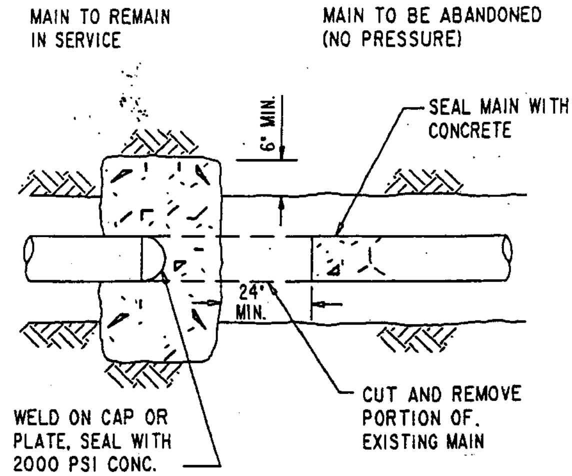
CUTTING AND PLUGGING WATER MAINS



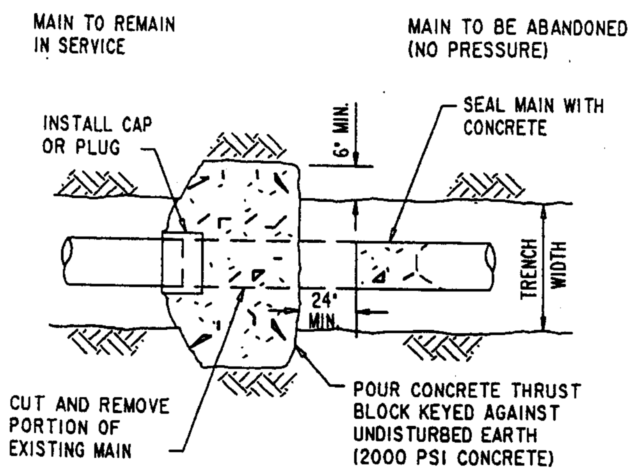
PLAN

EXISTING HUB END FITTING OR VALVE



PLAN

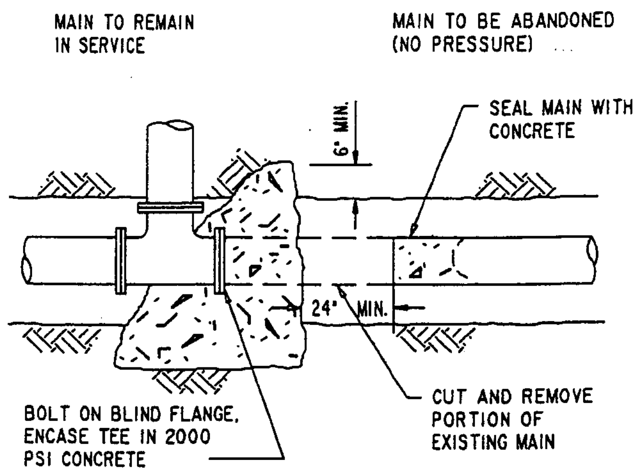
EXISTING STEEL MAIN



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

PLAN

EXISTING ASBESTOS-CEMENT OR CAST-IRON MAIN



PLAN

EXISTING FLANGED FITTING OR VALVE

NOTE: SEE SPECIFICATIONS FOR FLUSHOUT REQUIREMENTS.

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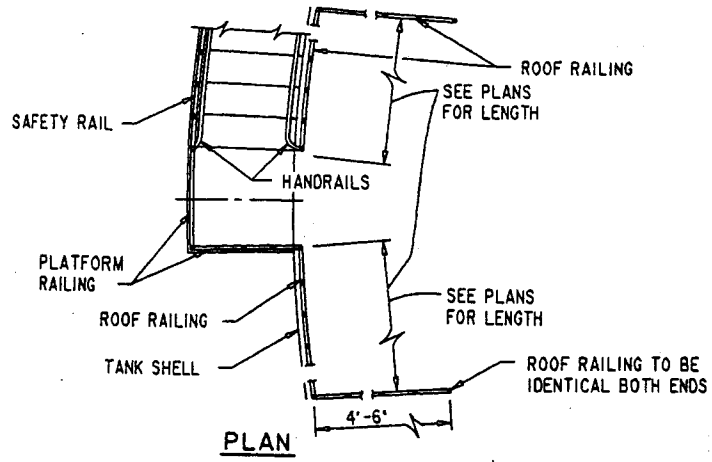
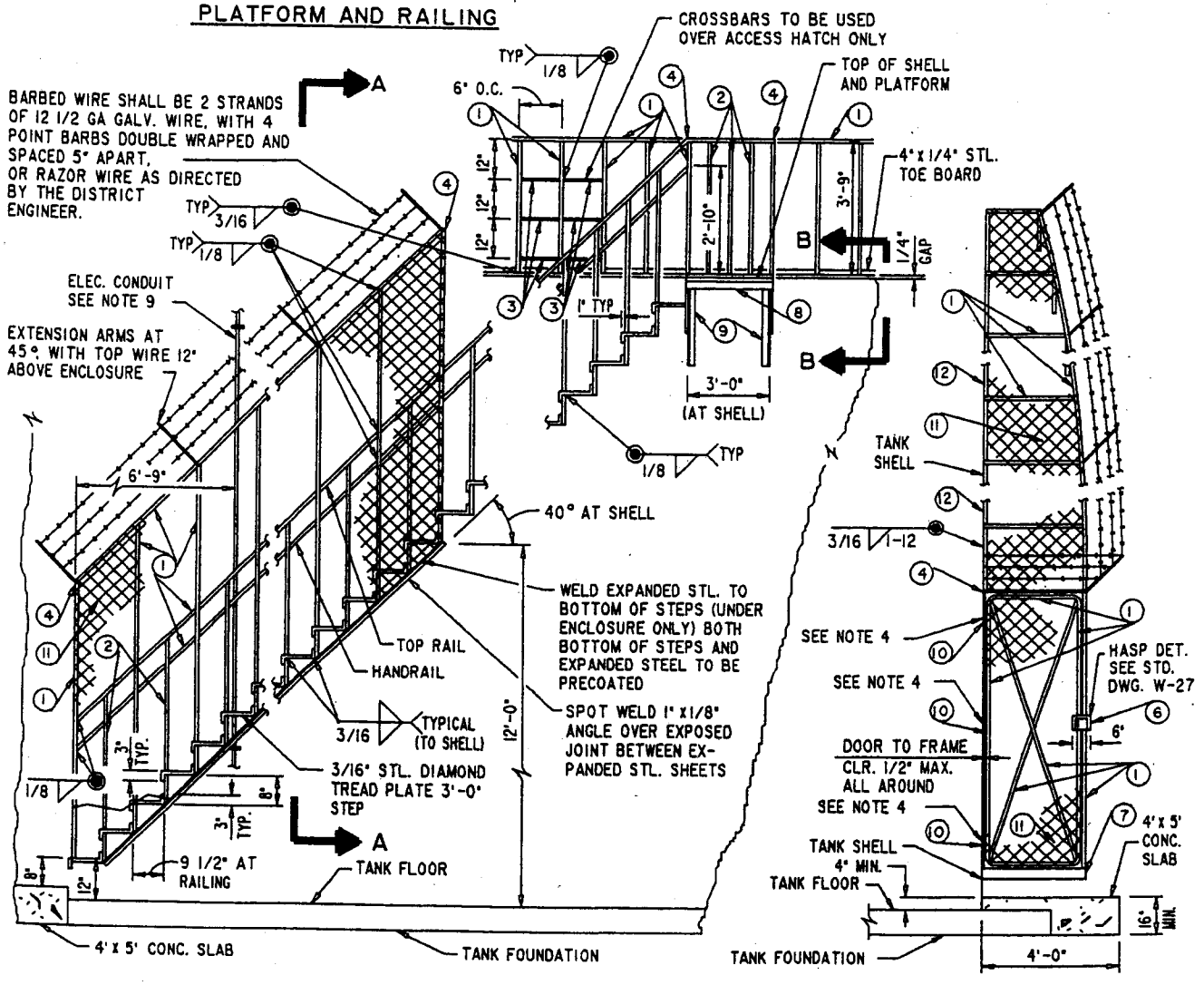
TANK - SPIRAL STAIRWAY



PLAN

PLATFORM AND RAILING



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STANDARD PLAN
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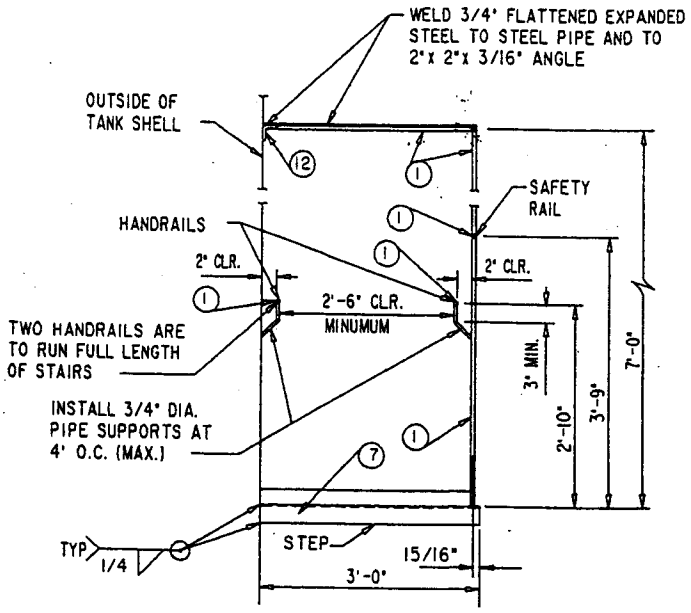
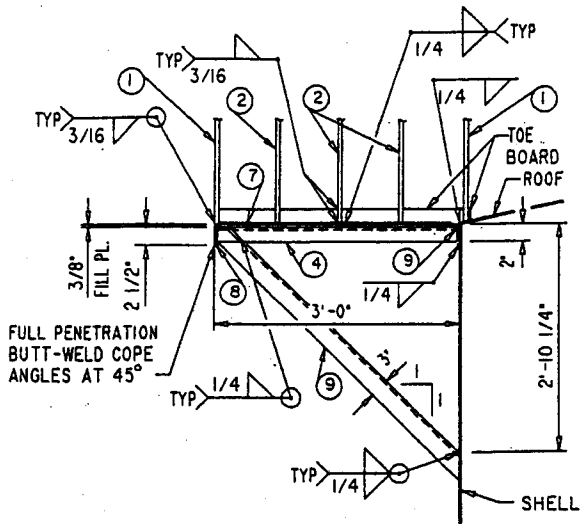
SHEET 1 OF 2



SECTION A - A



SECTION B - B

PLATFORM

MATERIAL LIST	
ITEM NO.	DESCRIPTION
1.	1 1/2" STEEL PIPE, SCHEDULE 40, BLACK
2.	1" STEEL PIPE, SCHEDULE 40, BLACK
3.	3/4" STEEL RODS (FOR INTERIOR LADDER EXTENSION)
4.	1 1/2" PIPE RAILING ELBOW, BLACK
5.	1" 90° PIPE RAILING ELBOW, BLACK
6.	3" HASP
7.	3/16" STEEL DIAMOND TREAD PLATE
8.	2 1/2" x 2" x 1/4" STEEL ANGLE
9.	3" x 2" x 3/8" STEEL ANGLE
10.	4" x 4" x 1/4" STEEL BUTT HINGE WITH NON-REMOVABLE BRASS PIN
11.	3/4" FLATTENED, EXPANDED STEEL NO. 10 GA.
12.	2" x 2" x 3/16" STEEL ANGLE.

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.

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STANDARD PLAN
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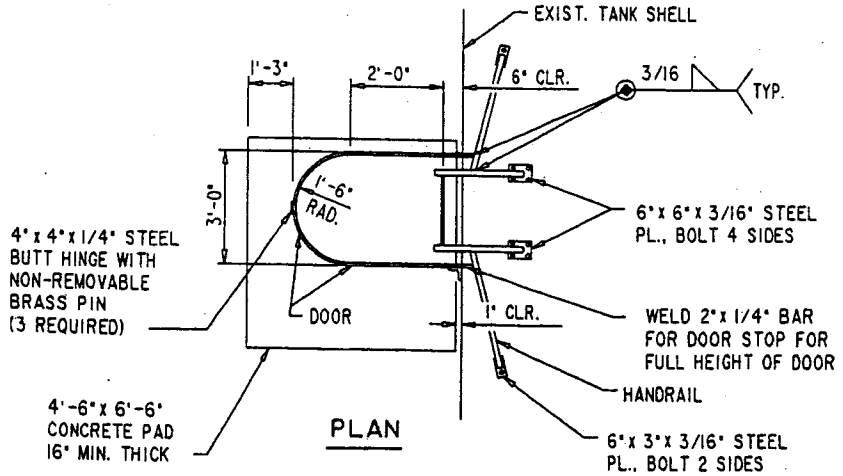
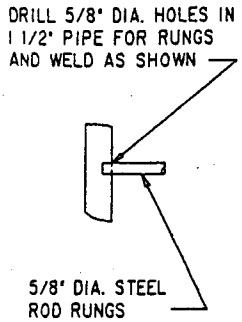
SHEET 2 OF 2

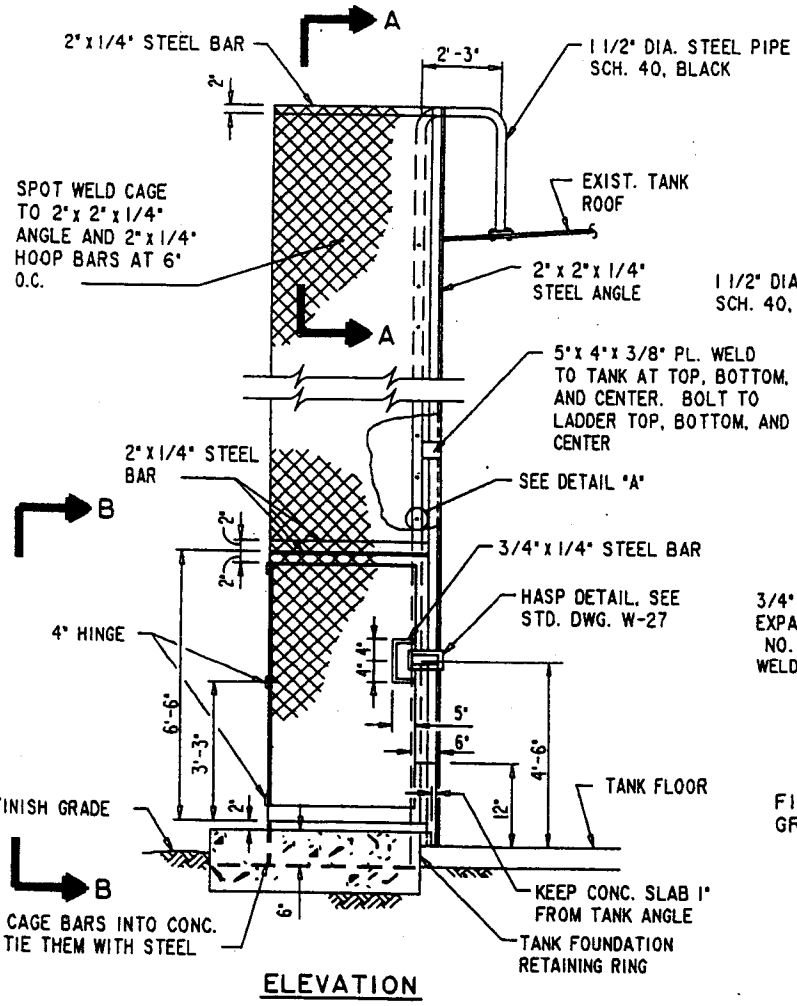
TANK - VERTICAL EXTERIOR LADDER



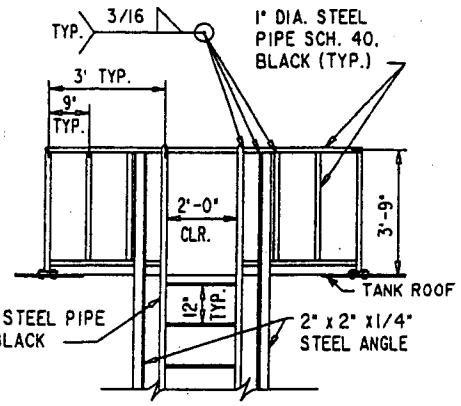
PLAN



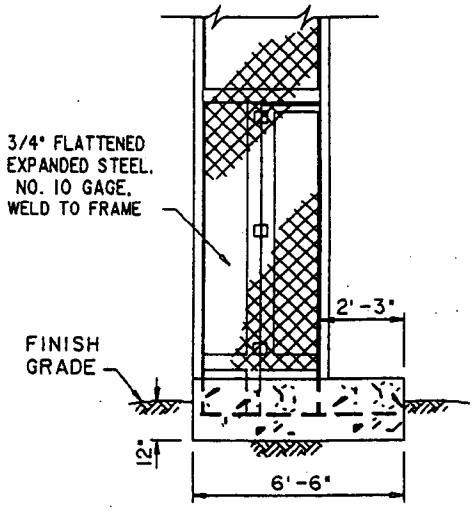
DETAIL "A"



ELEVATION



SECTION A - A



VIEW B - B

LOS ANGELES COUNTY WATERWORKS DISTRICTS

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STANDARD PLAN
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SHEET 1 OF 2

TANK - VERTICAL EXTERIOR LADDER (CONTINUED)

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"x1/8" 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.

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STANDARD PLAN
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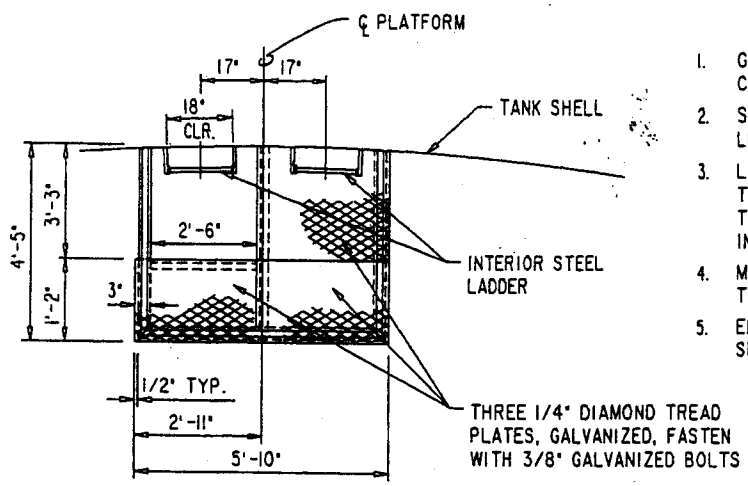
SHEET 2 OF 2

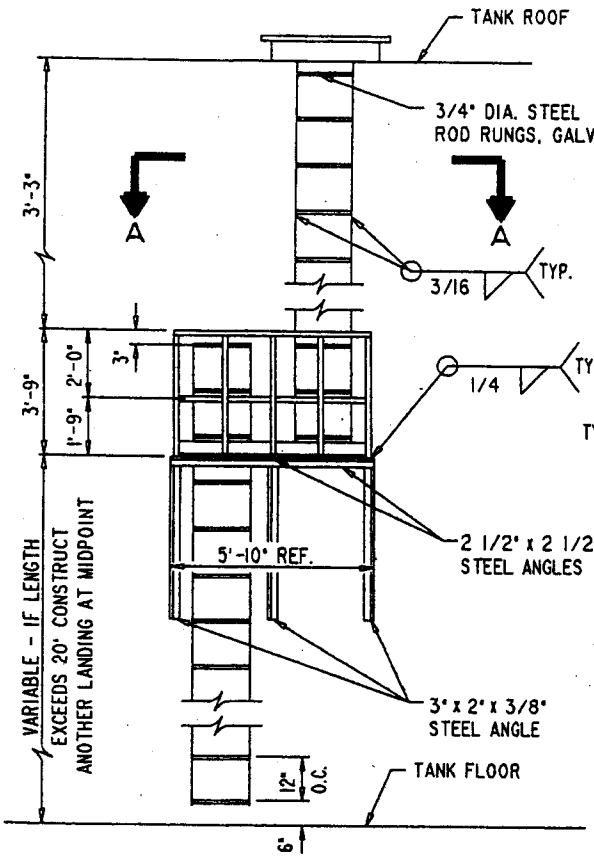
TANK - VERTICAL INTERIOR LADDER



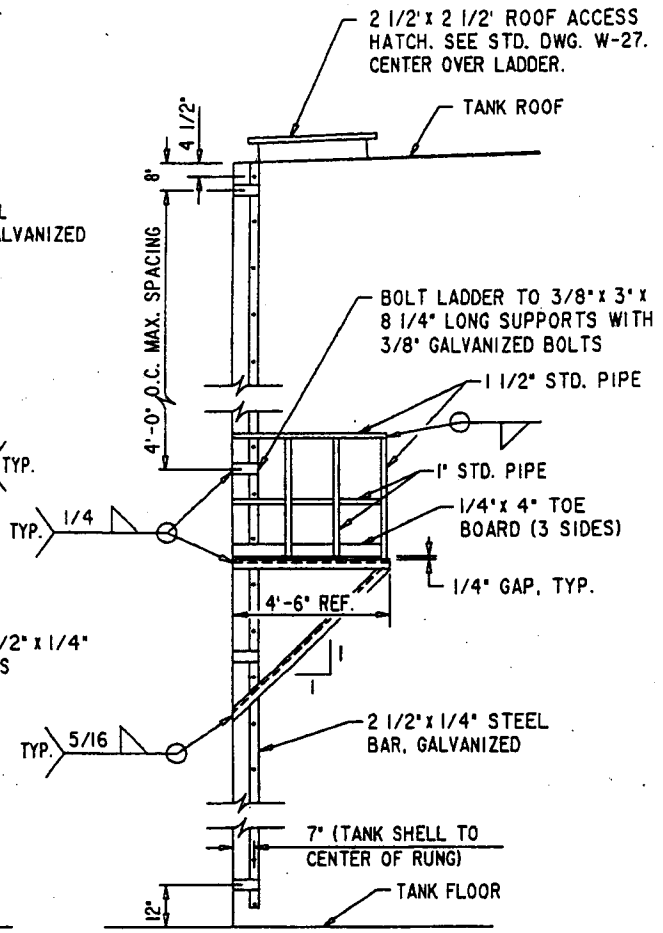
SECTION A-A

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.



FRONT VIEW



SIDE VIEW

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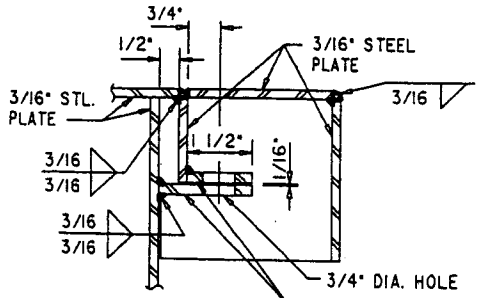
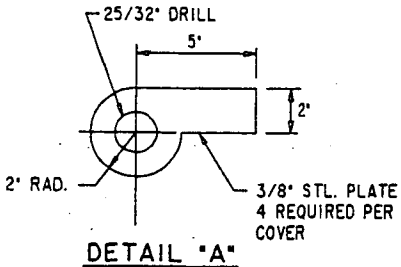
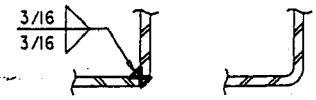
TANK - ROOF ACCESS HATCH DETAILS



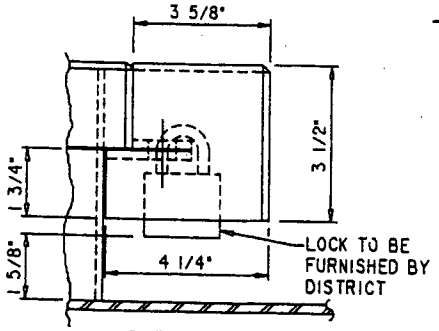
SECTION B-B
HASP DETAIL



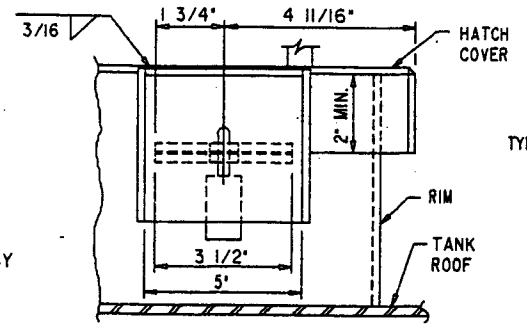
DETAIL "A"
HINGE PLATE DETAIL



TYPICAL JOINTS
(EITHER TYPE ACCEPTABLE)

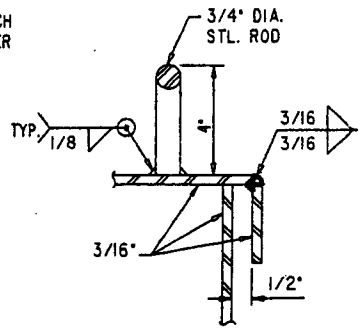


SIDE VIEW

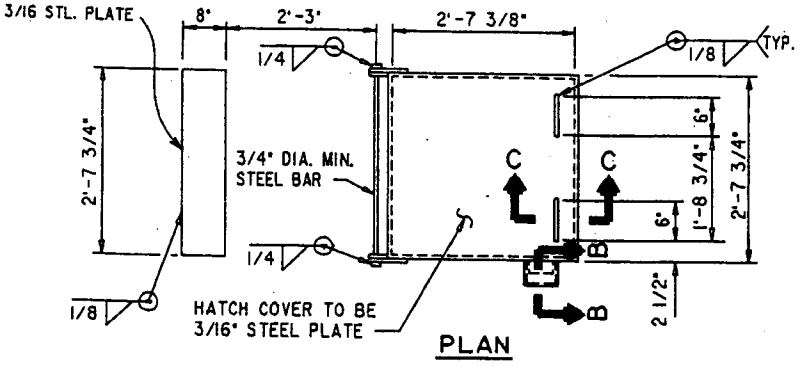


FRONT VIEW

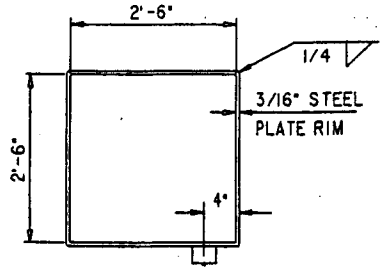
DETAIL "B"
LOCK AND HASP



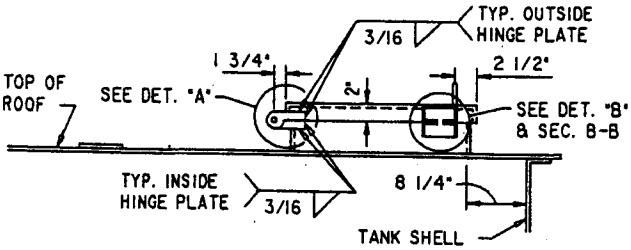
SECTION C-C
HATCH HANDLE



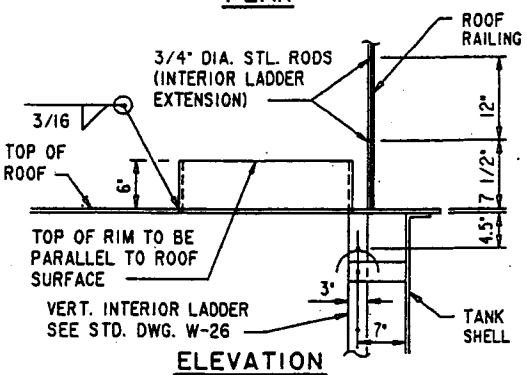
PLAN



PLAN



ELEVATION
ROOF ACCESS HATCH COVER



ELEVATION
ROOF ACCESS HATCH COVER

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

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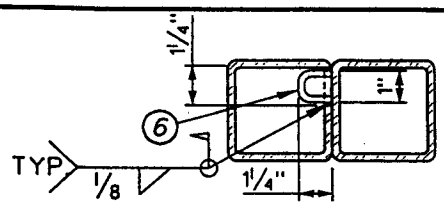
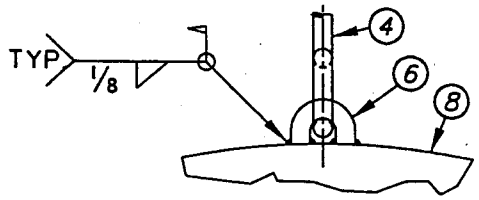
STANDARD PLAN
W-27
SHEET 1 OF 1

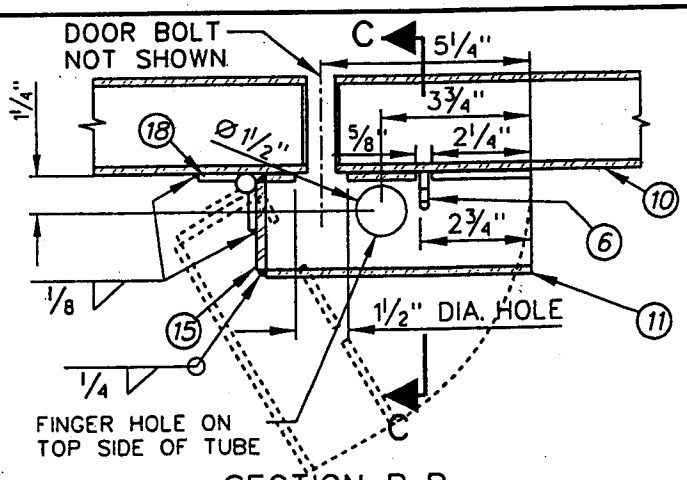
TANK - 36" MONOBOLT ACCESS HOLE



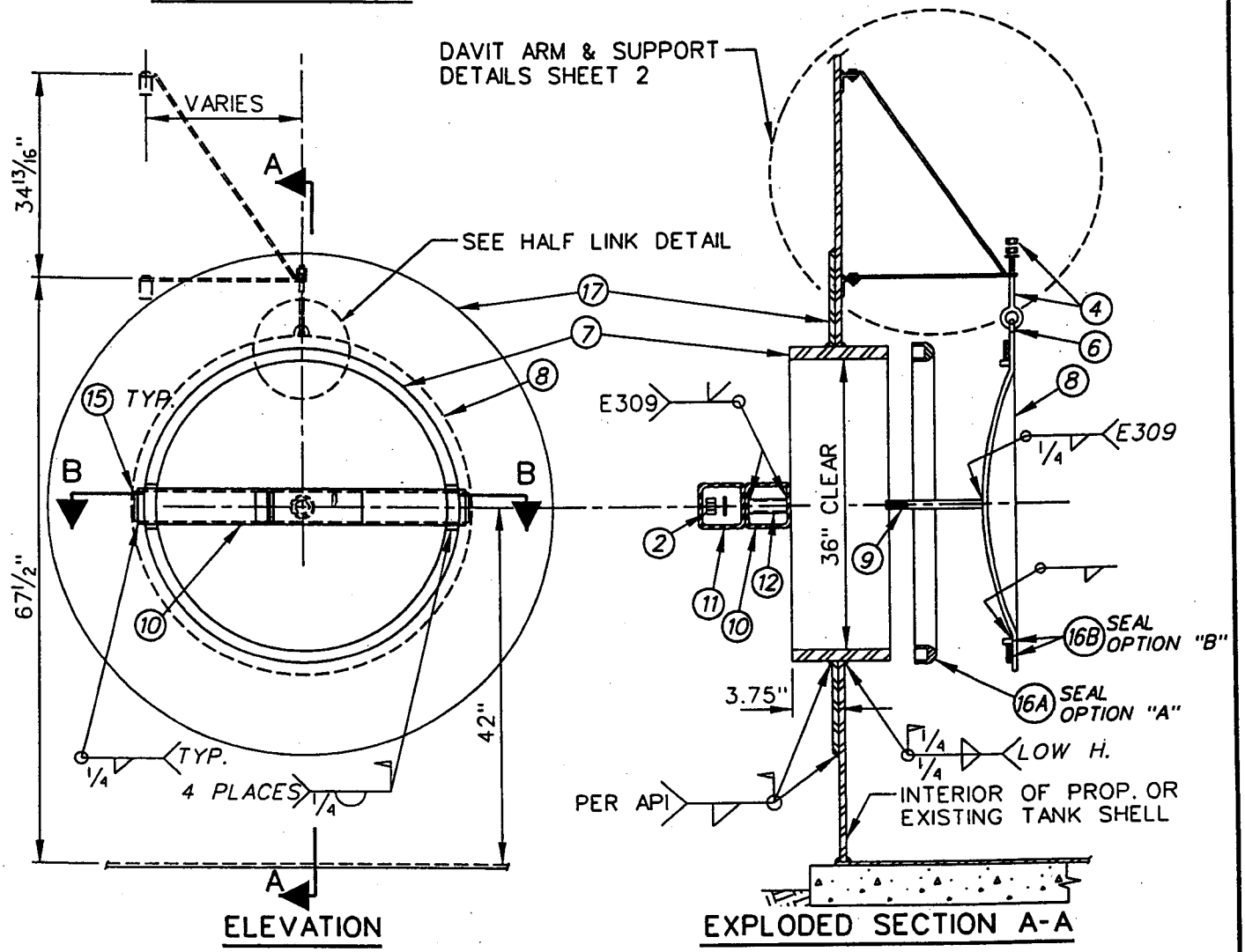
SECTION C-C



HALF LINK DETAIL



SECTION B-B
PADLOCK ASSEMBLY



ELEVATION

EXPLODED SECTION A-A

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

STANDARD PLAN
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APPROVED Dean Efstathiou
ASSISTANT DEPUTY DIRECTOR

OCTOBER 1999
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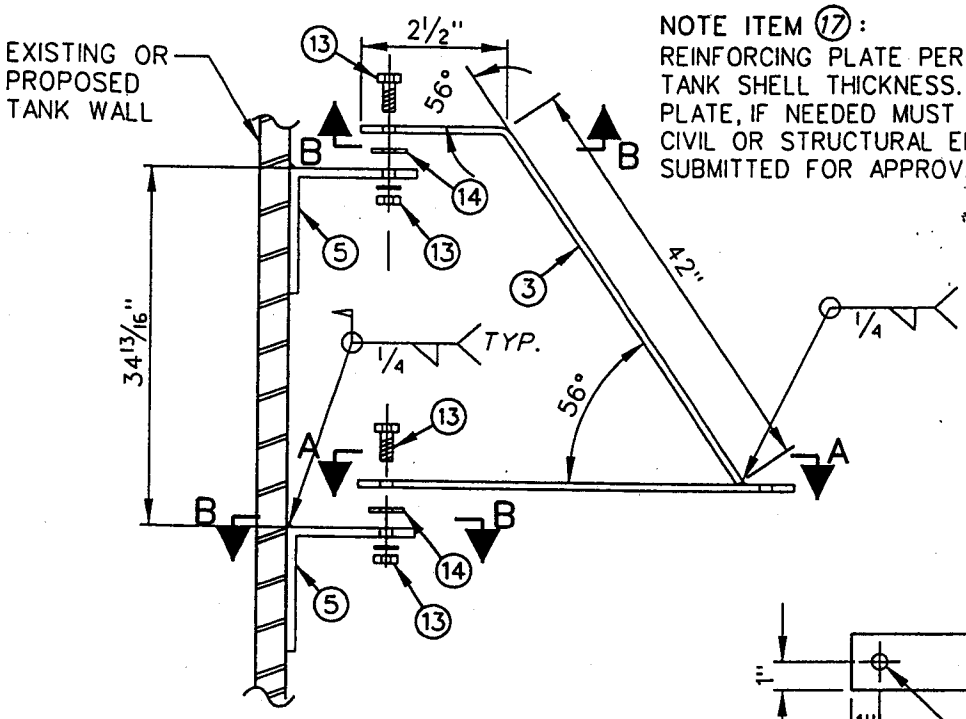
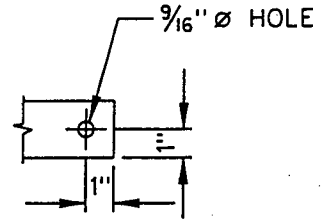
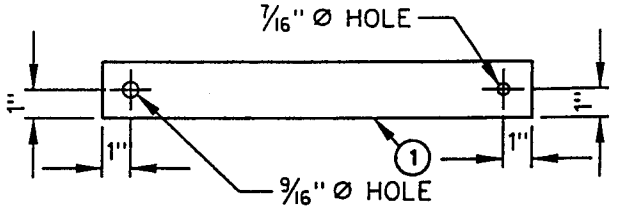


DAVIT ARM & SUPPORT DETAILS

NOTE ITEM (17):
REINFORCING PLATE PER API STANDARD 650 DEPENDS ON TANK SHELL THICKNESS. DETAILS & SIZE OF REINFORCING PLATE, IF NEEDED MUST BE DESIGNED BY A LISCENSED CIVIL OR STRUCTURAL ENGINEER. DETAILS MUST BE SUBMITTED FOR APPROVAL WITH SHOP DRAWINGS.



SECTION B-B



SECTION A-A

MATERIALS

Item	Description	Matl	PcWt LBS.	Reqd
1	FLAT BAR, 3/8" x 2" x 28" LG.	SS304	6	1
2	NUT, 3/4" HEAVY HEX & WASHER	BRNZ	---	1
3	FLAT BAR, 1/4" x 2" x 44 1/2" LG.	SS304	7	1
4	EYE BOLT, 3/8" x 3" w\WASHER & (2) NUTS	SS18-8	---	1
5	ANGLE, 3" x 3" x 3/8" x 2" LG.	SS304	1	2
6	HALF RING, 5/16" x 2 1/4"	SS18-8	---	2
7	PLATE, 1" x 8 1/2" x 9'-8 1/4" LG. Rolled to 36" I.D.	A516-70	277	1
8	DISHED (HAT) HEAD 3/8" X 32" ID X 41 1/2" OD. X 32" RAD.	A285	136	1
9	ROUND BAR, 3/4" DIA. x 9" LG. W\2" NC T.O.E.	SS18-8	2	1
10	TUBE, SQUARE, STRUCTURAL, 3" x 3" x 1/4" x 39" LONG	A500	24	1
11	TUBE, SQUARE, STRUCTURAL, 3" x 3" x1/4" x 7" LONG	A36	---	1
12	PIPE, 3/4" x STD. WT. x 3" LG.	SS304	---	1
13	BOLT, 1/2"-13 NC x 1" LG. w\NYLOCK NUT & WASHER	SS304	---	2
14	NYLON WASHER	NYLON	---	2
15	FLAT BAR, 2 1/2" x 1/4" x 2 1/2" LG.	A36	1	3
16A	OPTION "A": C RING GASKET x 1/4" x 35" I.D. 50 Duro-Hard	NEOPR.	---	1
16B	OPTION "B": NEOPRENE GASKET, 1/4" x 1 1/4" x 35" I.D. &	NEOPR.	---	1
	1/4" x 1/2" x 9'-6 5/16" BAR ROLLED TO 35" I.D.	A36	4	1
17	REINFORCING PLATE PER API STANDARD 650 (SEE NOTE HEREON)	A36	---	1
18	STEEL HINGE, 1" X 2 1/2"	A36	---	1

LOS ANGELES COUNTY WATERWORKS DISTRICTS

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APPROVED Dean E. Hoffman
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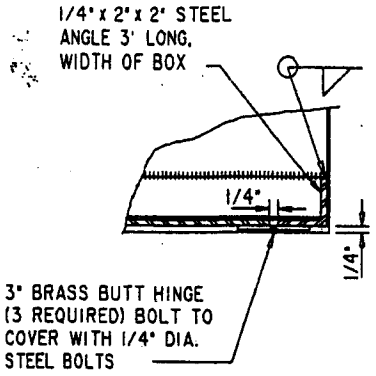
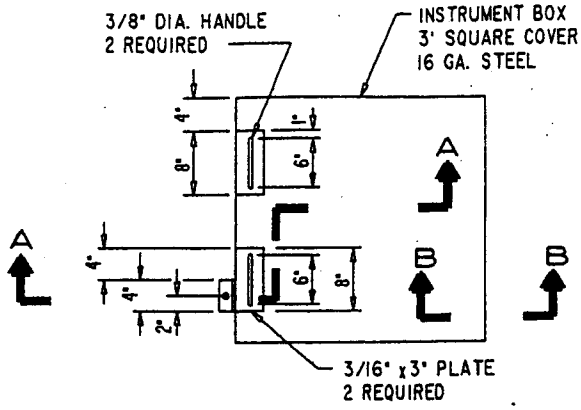
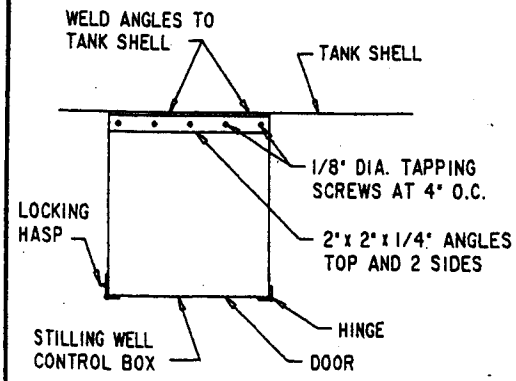
TANK - STILLING WELL DETAILS



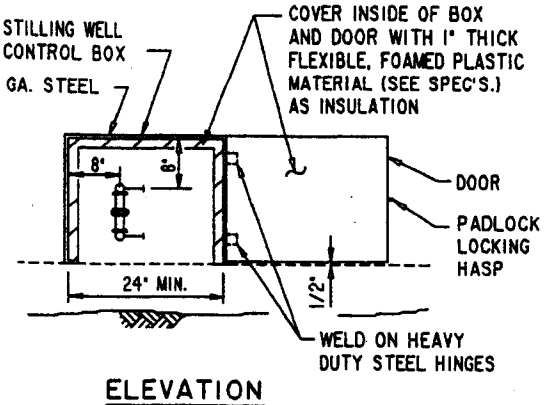
SECTION B-B



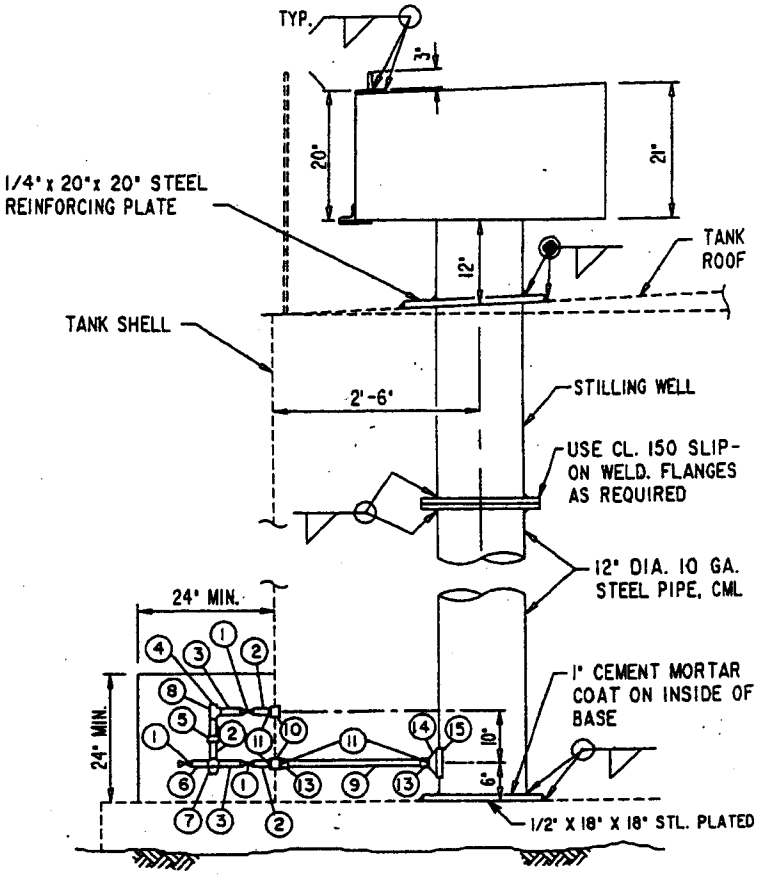
PLAN



PLAN



ELEVATION



ELEVATION

LOS ANGELES COUNTY WATERWORKS DISTRICTS

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APPROVED Dean D. Efstathiou
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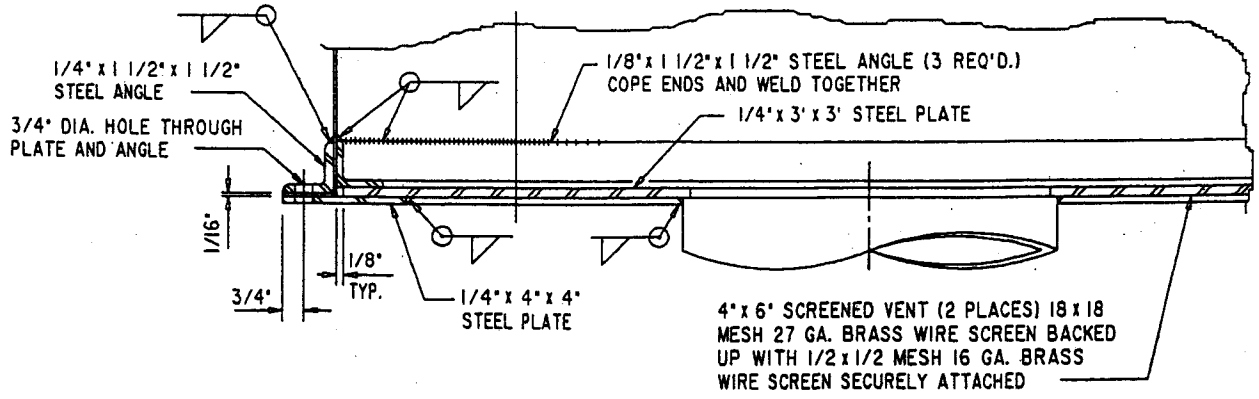
TANK - STILLING WELL DETAILS (CONTINUED)



SECTION A-A

NOTES:

1. WELD 1/4" x 4" x 6" STEEL PLATE 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	
ITEM NO.	DESCRIPTION
①	1" BALL VALVE, BRONZE
②	1" x 3" NIPPLE, BRASS
③	1" x 2" NIPPLE, BRASS
④	1" PLUG, BRASS
⑤	1" x 1" PIPE UNION, BRASS
⑥	1" x 1" NIPPLE, BRASS
⑦	1" CROSS, BRASS
⑧	1" TEE, BRASS
⑨	1" DIA. COPPER TUBING, TYPE K, SOFT
⑩	1 1/2" STEEL COUPLING, BRONZE
⑪	1 1/2" x 1" DIELECTRIC BUSHING
⑬	1" BRONZE COUPLING, COPPER - I.P.
⑭	4" x 1 1/2" REDUCER, BRONZE
⑮	4" WELDING COUPLING, BRONZE

LOS ANGELES COUNTY WATERWORKS DISTRICTS

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APPROVED Dean D. Efstathiou
ASSISTANT DEPUTY DIRECTOR

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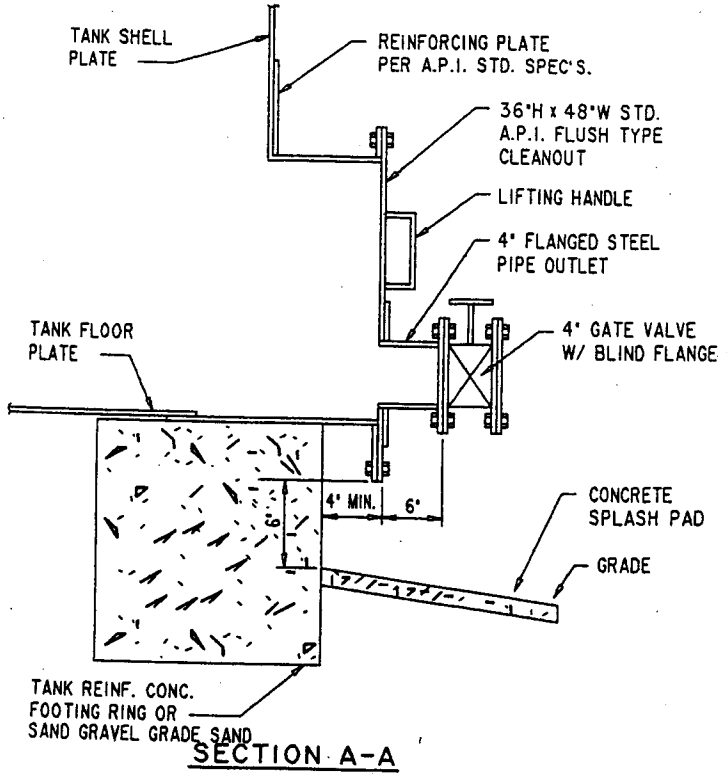
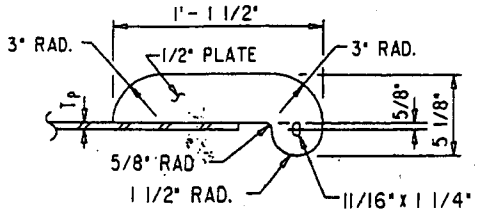
SHEET 2 OF 2

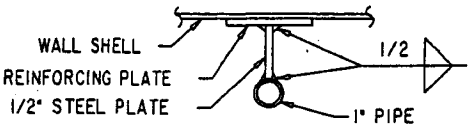
TANK - CLEANOUT DOOR



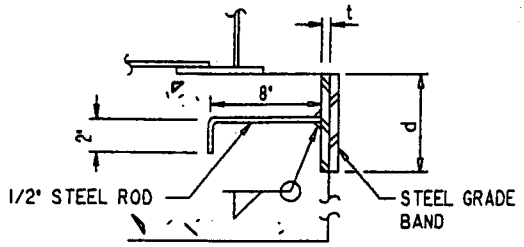
SECTION A-A



DETAIL "D"

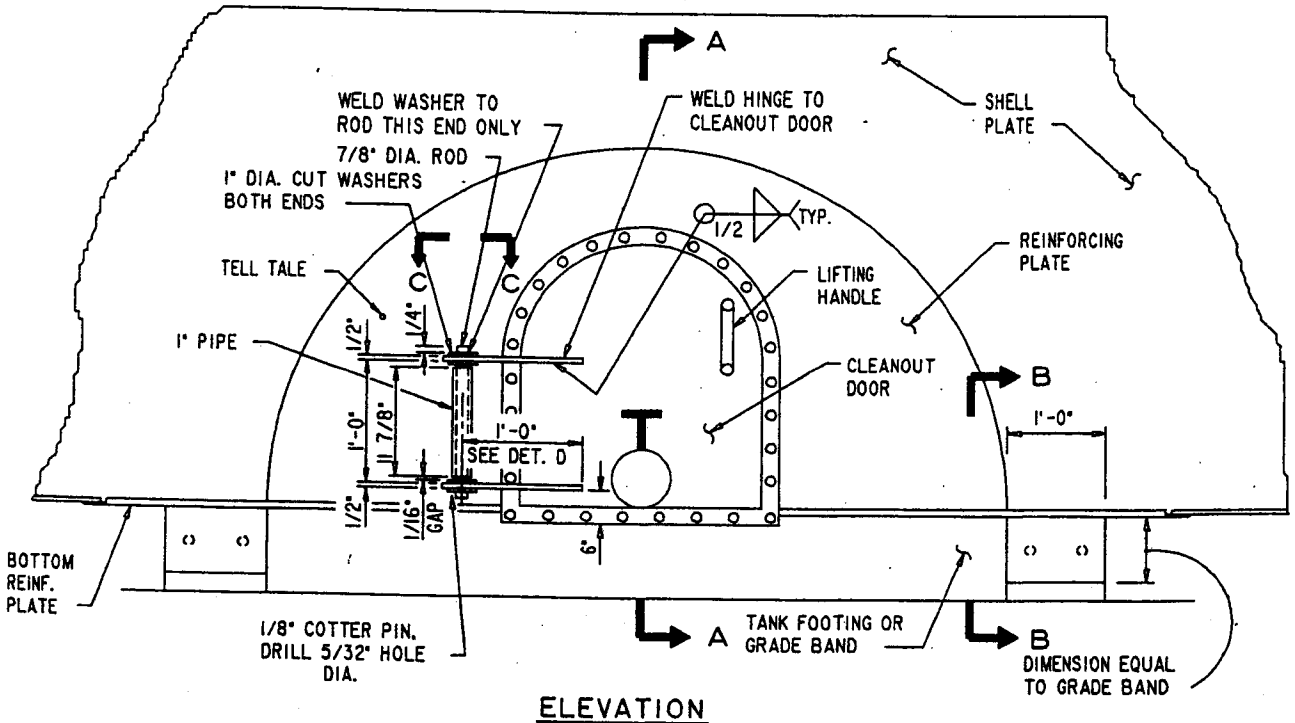


SECTION C-C



t = THICKNESS EQUAL TO THICKNESS OF GRADE BAND
d = DEPTH EQUAL TO DEPTH OF GRADE BAND

SECTION B-B



ELEVATION

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

APPROVED Deane D. Eptothion
ASSISTANT DEPUTY DIRECTOR

AUGUST 93
DATE

STANDARD PLAN
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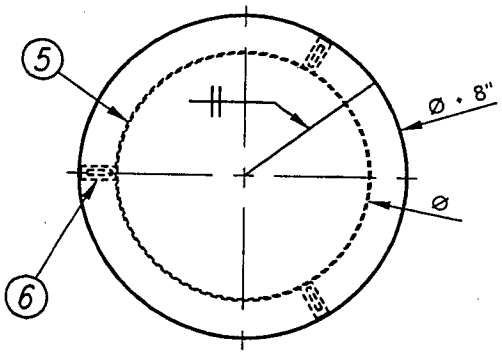
NOTES

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.

TANK - ROOF VENT DETAILS

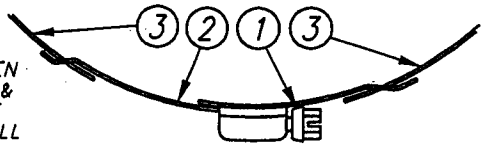
MATERIAL LIST

ITEM	DESCRIPTION	Matl	Reqd
1	DRIVER FOR WORM DRIVE CLAMP	STAINLESS	2
2	GRIPPING STRAP FOR WORM DRIVE CLAMP	STAINLESS	2
3	PERFORATED BAND, ½" X 0.025"	STAINLESS	2
4	MESH INSECT SCREEN, .017" x 18 x 18 WIRE	STAINLESS	1
5	PLATE, 3/16" X 18" ROLL TO DIAMETER ON PLAN	A36	1
6	FLAT BAR, 3/16" x 1½" x 4" LG. Punch as detailed	A36	3
7	14 GAGE STEEL VENT HOOD, WELD AS SHOWN	A36	1
8	BOLT, 3/8" X UNC X 1" LG W\NYLOCK NUT & WASHER	304SS	6
9	FB, 3/16" x 1 1/2" x 5 5/8" LG. Bend & Punch per template.	A36	3
10	BOLT, 1/2" X UNC X 1 1/2" LG W\NYLOCK NUT & (2) WASHERS	304SS	3

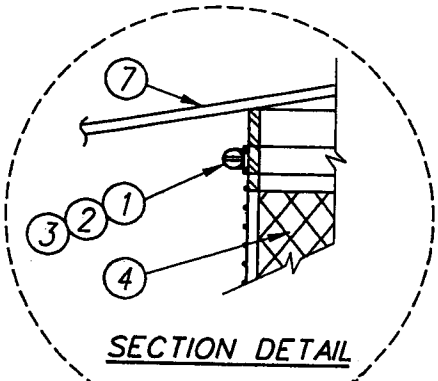


TOP VIEW

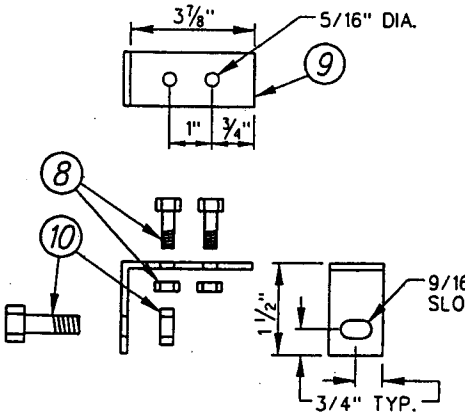
INSTALL CLAMPING RINGS AFTER SCREEN IS IN PLACE. RINGS & SCREEN ARE TO BE INSTALLED AFTER ALL PAINT IS DRY



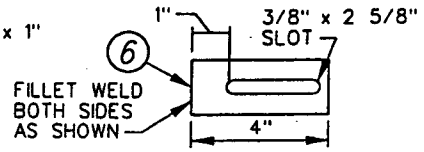
OUTER CLAMPING RING CONNECTION DETAIL



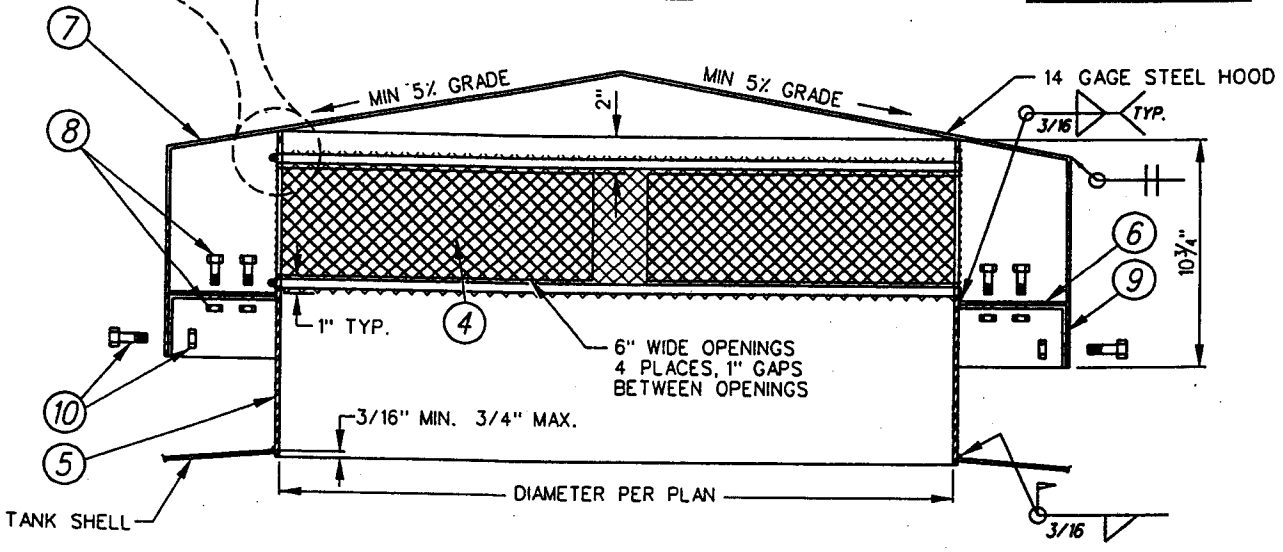
SECTION DETAIL



DETAIL ITEM 9



DETAIL ITEM 6



ROOF VENT ELEV. SECTION

LOS ANGELES COUNTY WATERWORKS DISTRICTS

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APPROVED Dean Efstathiou
ASSISTANT DEPUTY DIRECTOR

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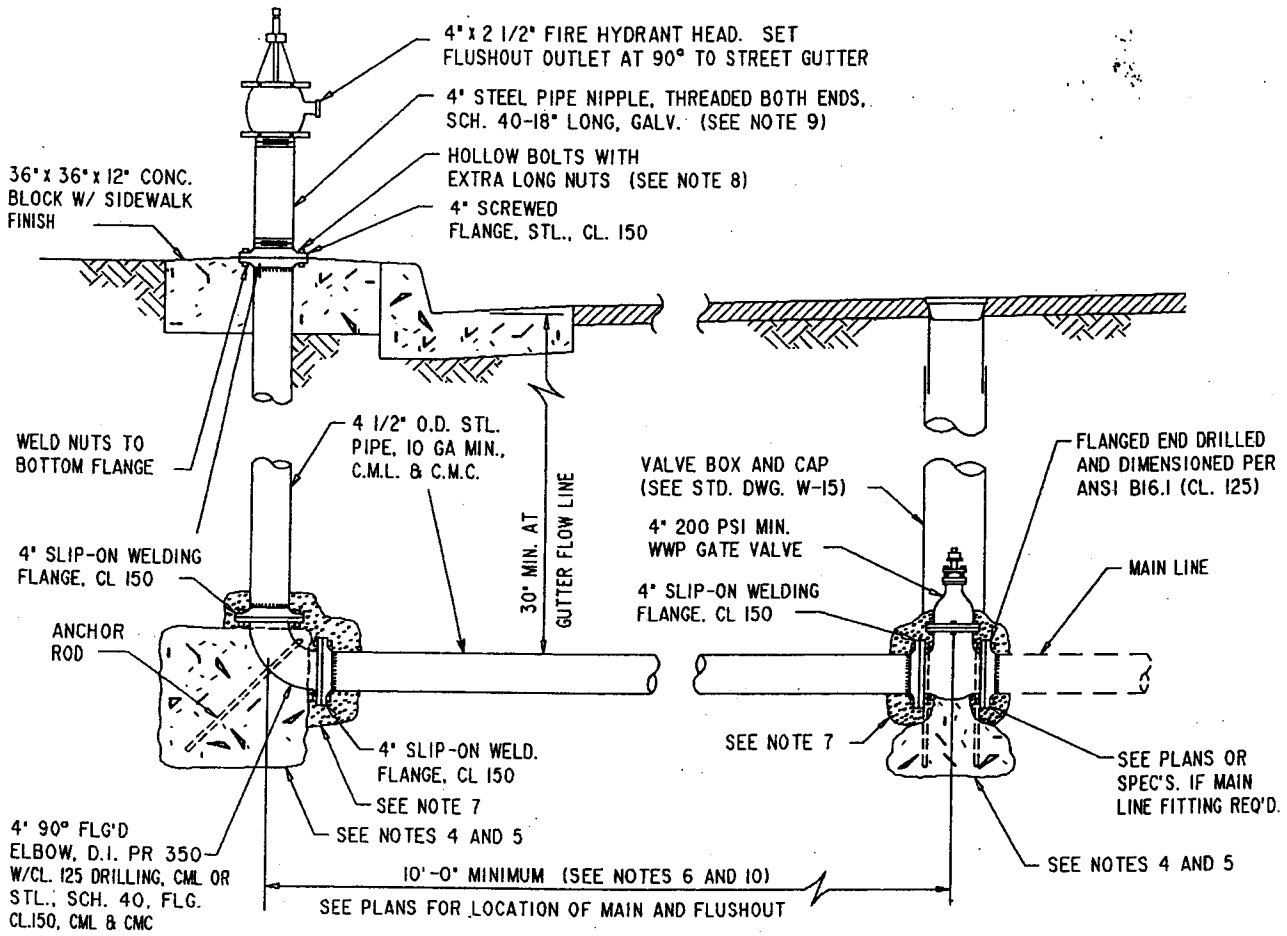
FLUSHOUT - COMPLETE
(200 PSI MAX. WWP. AT END OF MAIN)



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 (1 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, EXECEPT FOR THE THREADS, SHALL BE PAINTED WITH 2 COATS OF RED PRIMER RUST-OLEUM #1069 AND 2 COATS OF FOREST GREEN PAINT, RUST-OLEUM #1282.
10. INTERMEDIATE JOINTS SHALL BE EITHER LAP WELDED OR FLANGED.
11. OUTLET SHALL BE CAPPED WITH APPROVED PLASTIC CAP.

LOS ANGELES COUNTY WATERWORKS DISTRICTS

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APPROVED Dean D. Efstathiou
ASSISTANT DEPUTY DIRECTOR

OCTOBER 1998
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STANDARD PLAN
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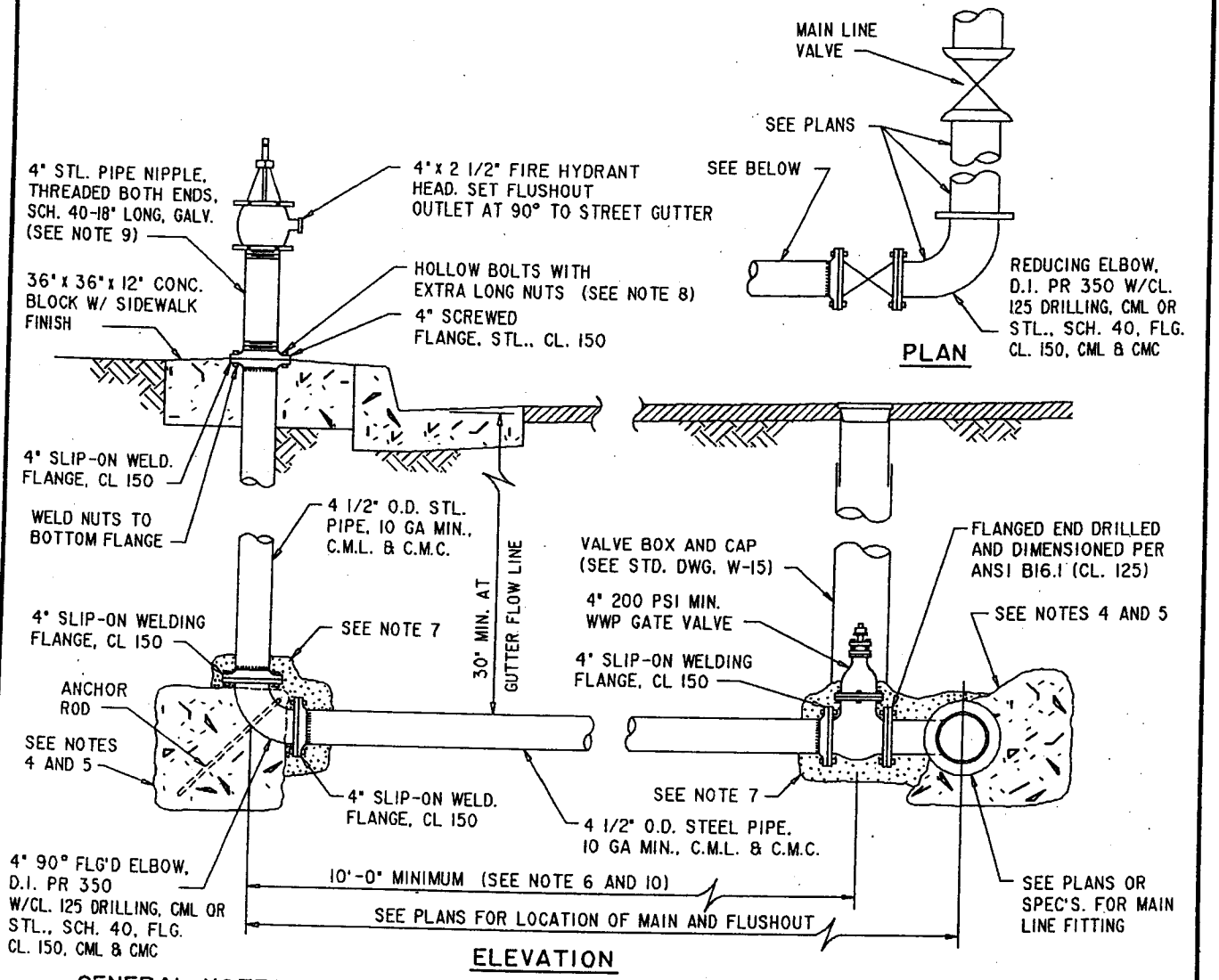
FLUSHOUT - COMPLETE

(200 PSI MAX. WWP. LATERAL AT RIGHT ANGLE TO MAIN)



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 (1 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 FLUSHOUT, EXCEPT FOR THREADS, SHALL BE PAINTED WITH 2 COATS OF RED PRIMER RUST-OLEUM #1069 AND 2 COATS OF FOREST GREEN PAINT, RUST-OLEUM #1282.
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. Efstathiou
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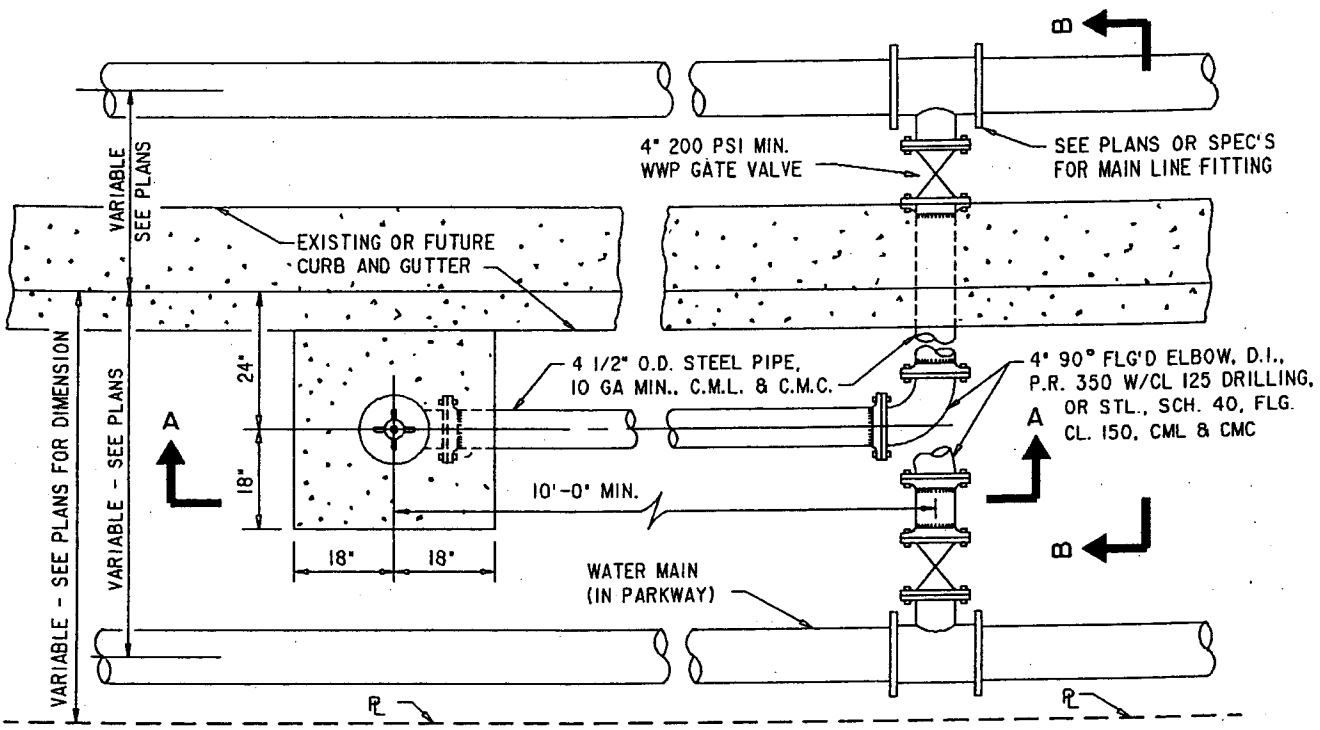
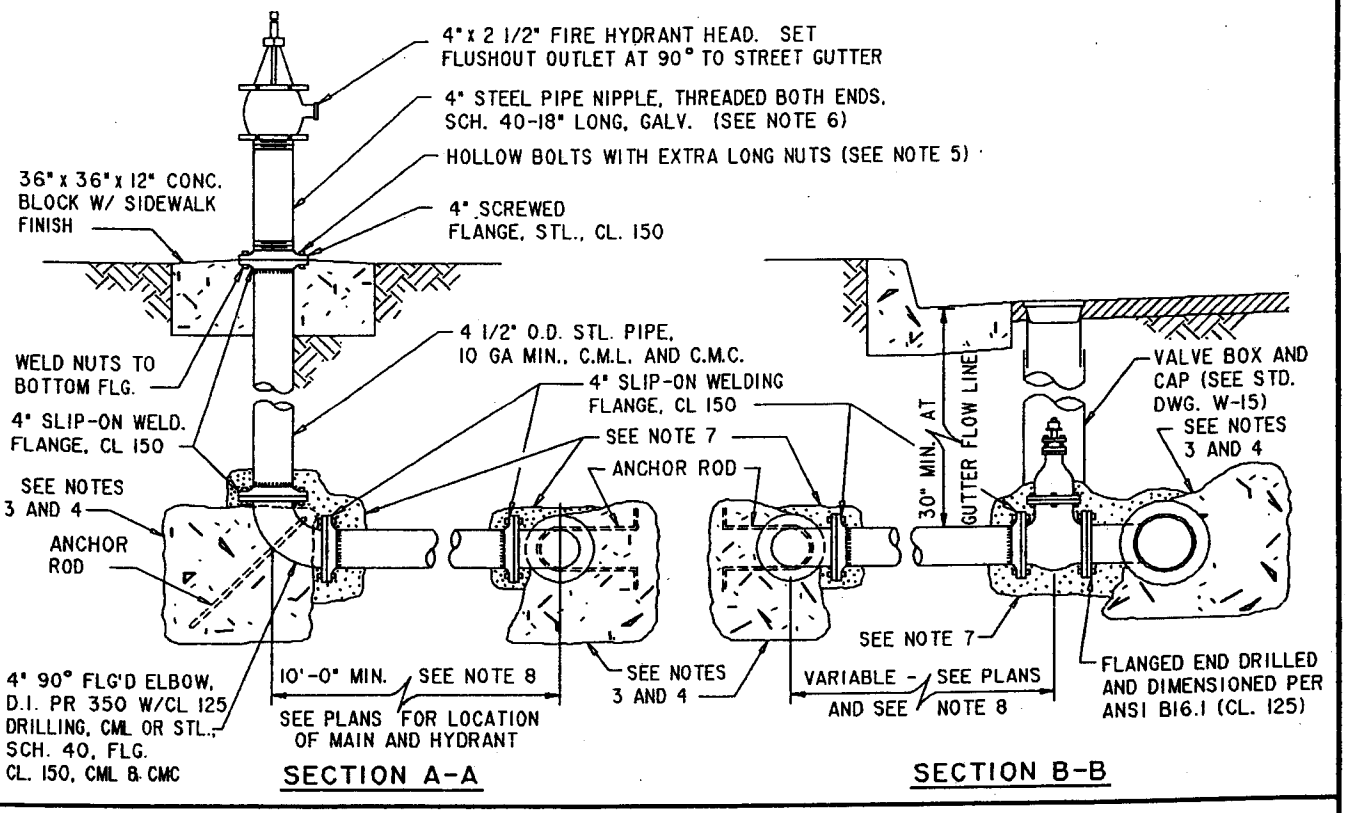
SHEET 1 OF 1

FLUSHOUT - COMPLETE

(200 PSI MAX WWP. PARALLEL TO MAIN)



PLAN VIEW



SECTION A-A

SECTION B-B

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

APPROVED Dean D. Efstathiou
ASSISTANT DEPUTY DIRECTOR

OCTOBER 1998
DATE

STANDARD PLAN
W-34
SHEET 1 OF 2

FLUSHOUT - COMPLETE (CONTINUED)

(200 PSI MAX WWP, PARALLEL TO MAIN)

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-21 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.
6. THE EXTERIOR OF THE ABOVE GROUND PORTION OF THE FLUSHOUT, EXCEPT FOR THE THREADS, SHALL BE PAINTED WITH 2 COATS OF RED-PRIMER RUST-OLEUM #1069 AND 2 COATS OF FOREST GREEN RUSTOLEUM #1282.
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.

LOS ANGELES COUNTY WATERWORKS DISTRICTS

DEPARTMENT OF PUBLIC WORKS

APPROVED Deon D. Ethathion
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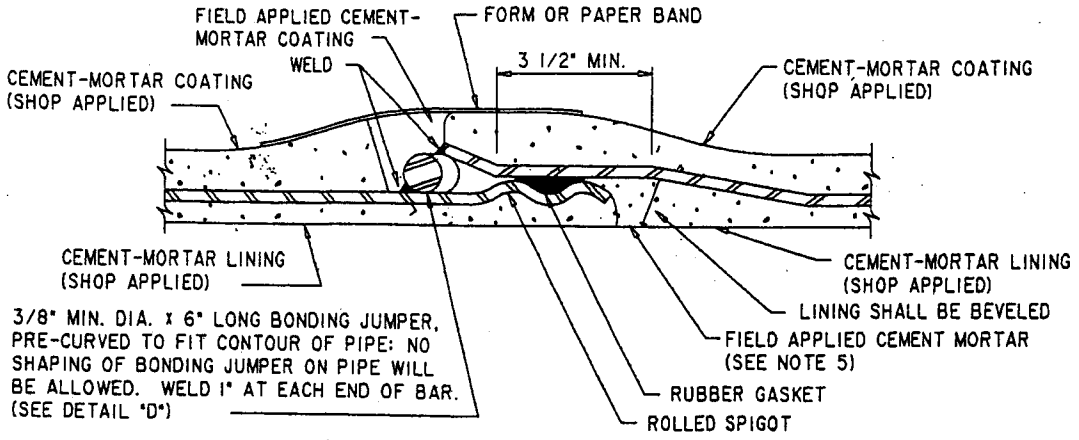
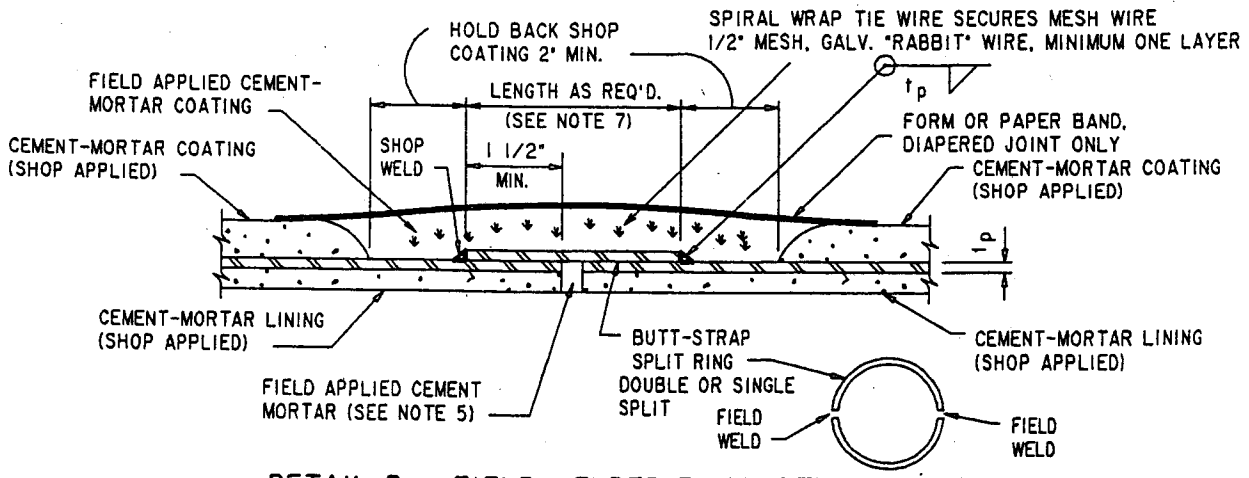
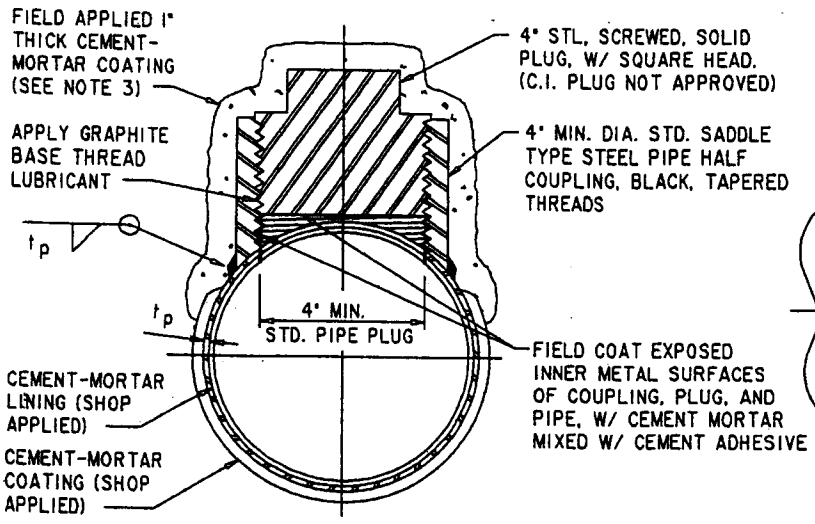
STEEL PIPE JOINT DETAILS



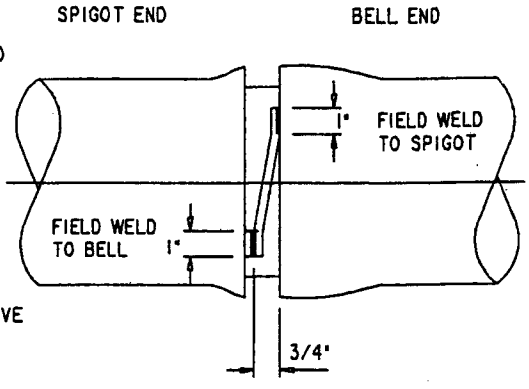
DETAIL A - RUBBER GASKET JOINT



DETAIL B - FIELD WELDED BUTT-STRAP JOINT



DETAIL C - POINTING HANDHOLE



DETAIL D - BONDING JUMPER

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STANDARD PLAN
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SHEET 1 OF 2

STEEL PIPE JOINT DETAILS (CONTINUED)

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 HANDHOLE 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 HANDHOLE, THE MINIMUM LENGTH OF THE BUTT STRAP SHALL BE 9 INCHES FOR ALL PIPE SIZES LISTED IN TABLE BELOW. WITHOUT HAND HOLE, THE MINIMUM LENGTH OF STRAP SHALL BE AS SHOWN IN THE FOLLOWING TABLE:

PIPE SIZES IN INCHES	MINIMUM LENGTH OF BUTT STRAP REQ'D. IN INCHES
6 THRU 18	4
20 THRU 36	6

8. A BOLTED FLANGED JOINT MAY BE USED AS AN ACCEPTABLE ALTERNATE TO THE RUBBER GASKET OR THE BUTT-STRAP JOINT.

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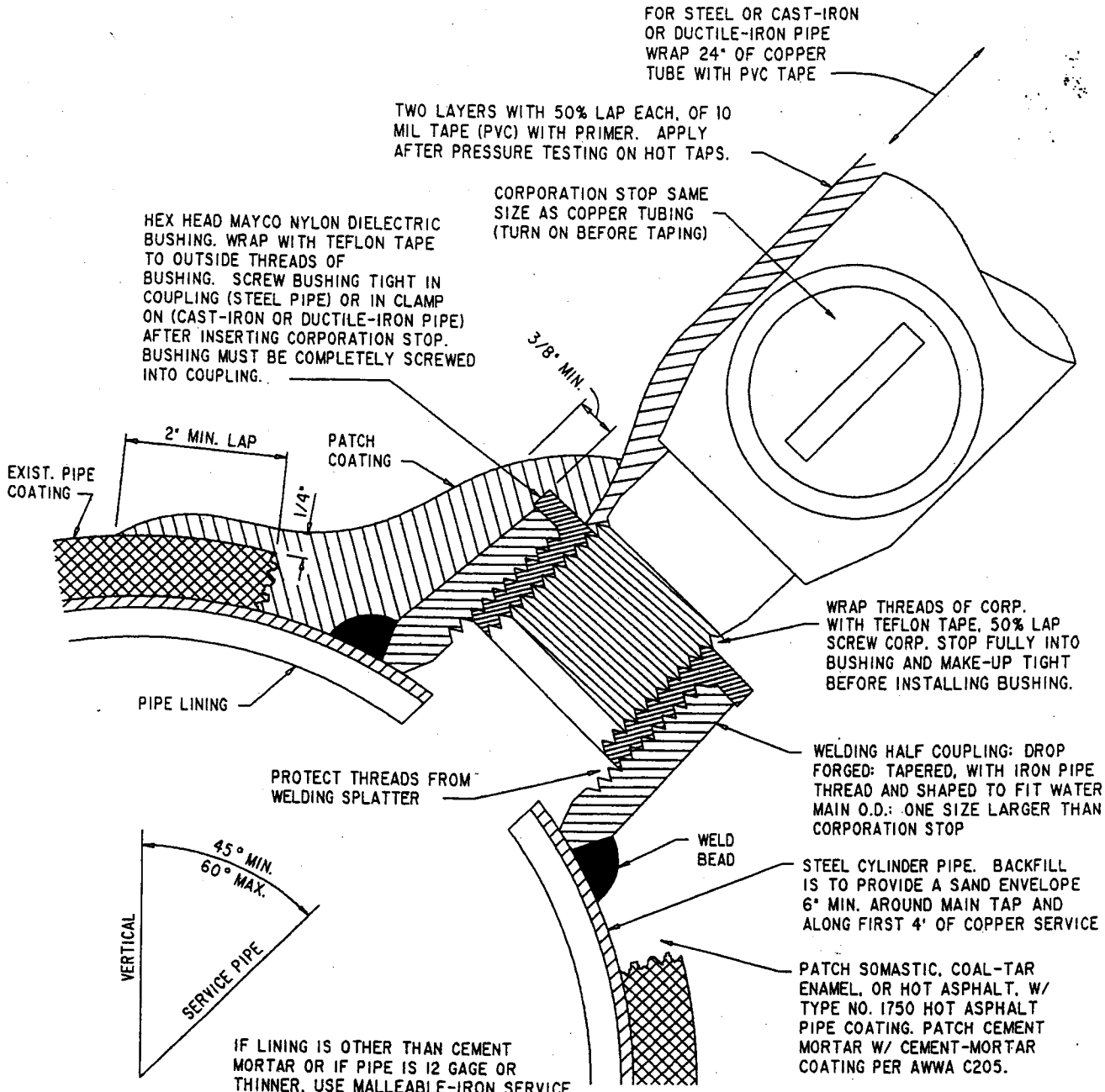
SHEET 2 OF 2

SERVICE TAP

(2" AND SMALLER, STEEL WATER MAIN)



IF LINING IS OTHER THAN CEMENT MORTAR OR IF PIPE IS 12 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

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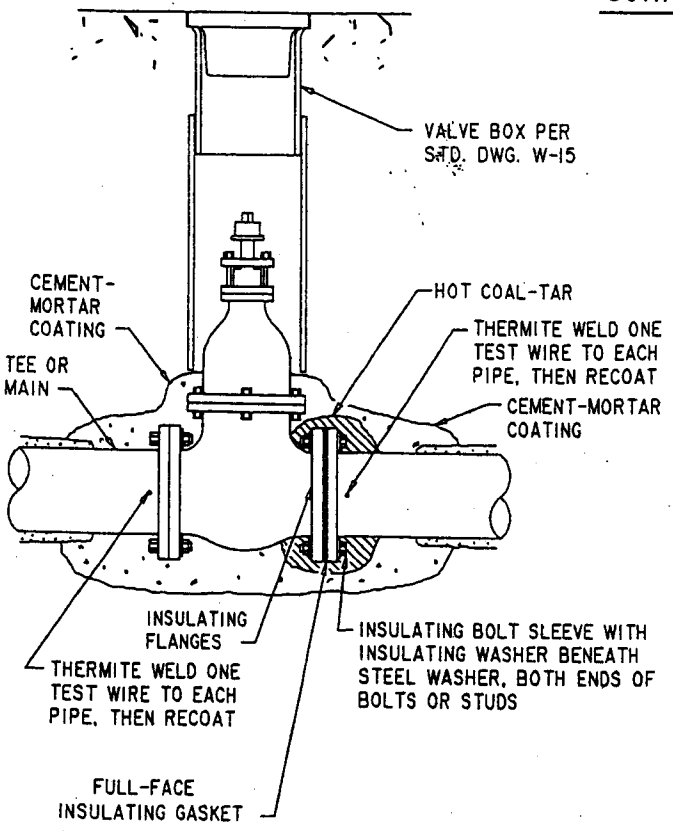
CATHODIC PROTECTION - INSULATED JOINT TEST STATION

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 25MV BETWEEN READINGS. IF 25MV CANNOT BE REACHED, CALL INSPECTOR FOR FURTHER TEST PROCEDURES.

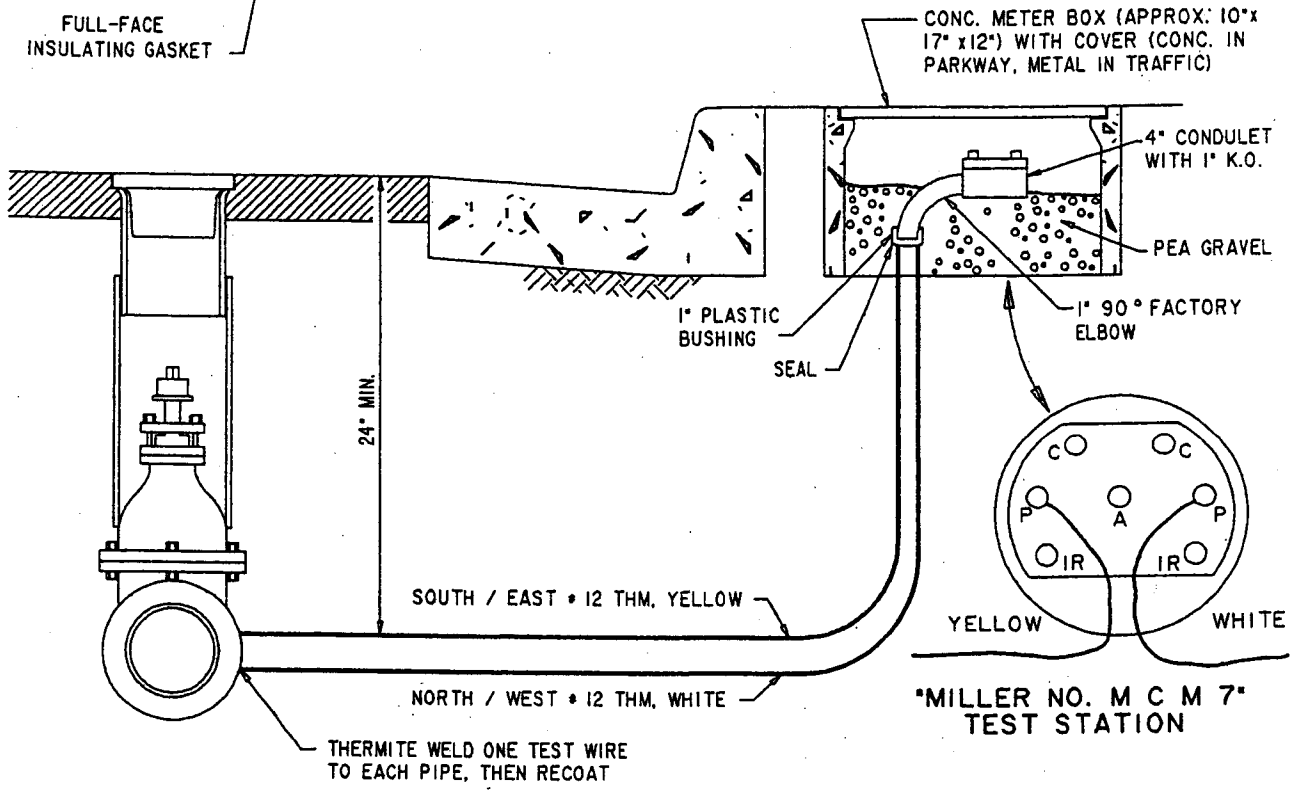
ALL OF THE ABOVE TESTS CAN BE MADE WITH A "MILLER PIPE TO SOIL I-A-04107", OR A "TINKER-RASOR PIPE TO SOIL CPV-2", OR EQUIVALENT INSTRUMENT.

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.



"MILLER NO. M C M 7" TEST STATION

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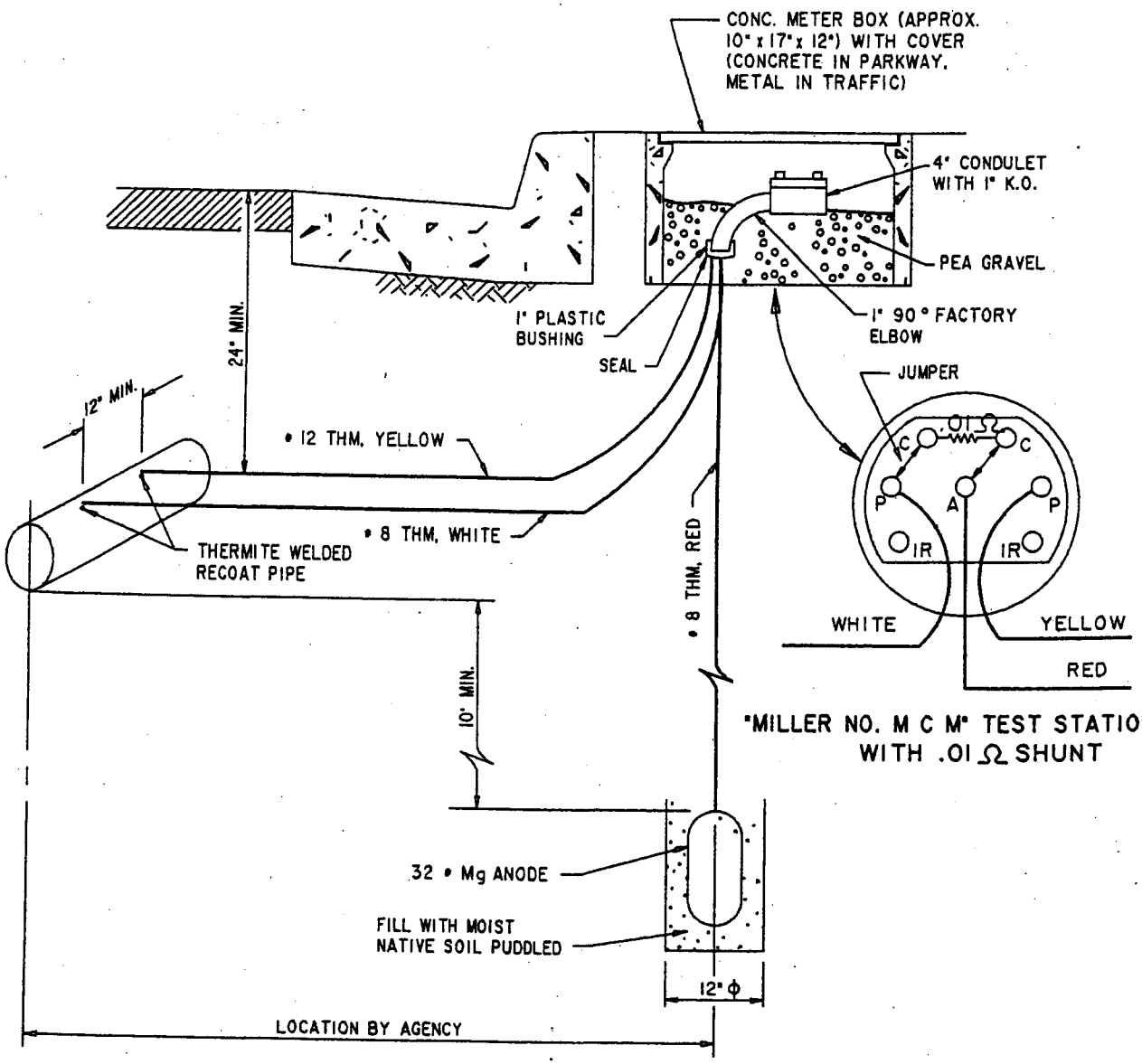
CATHODIC PROTECTION - SHALLOW Mg ANODE TEST STATION



"MILLER NO. M C M" TEST STATION WITH .01 Ω SHUNT

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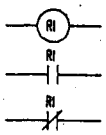
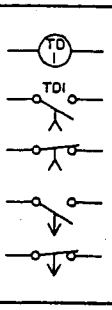
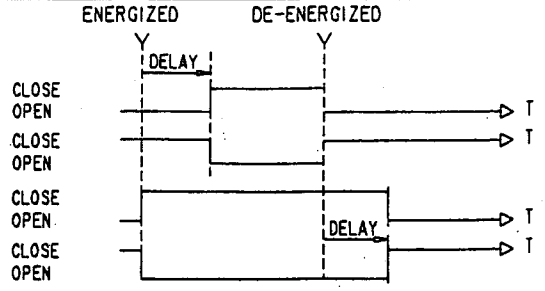
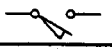
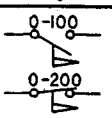
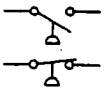
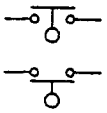
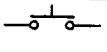
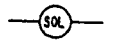
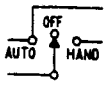
SHEET 1 OF 1

STANDARD ELECTRICAL SYMBOLS

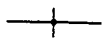
FOR SCHEMATIC CONTROL DIAGRAMS

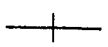
ITEMS	SYMBOL	IN WORDS	OPERATION FUNCTIONS
RELAY		RELAY COIL	
		NORMALLY OPEN CONTACT	CLOSES INSTANTANEOUSLY WHEN COIL IS ENERGIZED
		NORMALLY CLOSED CONTACT	OPENS INSTANTANEOUSLY WHEN COIL IS ENERGIZED
TIME DELAY RELAY		RELAY COIL	
		ON-DELAY: NORMALLY OPEN TIMED CLOSED	
		ON-DELAY: NORMALLY CLOSED TIMED OPEN	
		OFF-DELAY: NORMALLY OPEN TIMED OPEN	
		OFF-DELAY: NORMALLY CLOSED TIMED CLOSED	
LIMIT SWITCH		NORMALLY OPEN	CLOSES WHEN ACTUATED BY MECHANICAL FORCE
FLOW SWITCH		NORMALLY OPEN	CLOSES WHEN WATER STARTS TO FLOW
		NORMALLY CLOSED	OPENS WHEN WATER STARTS TO FLOW
PRESSURE SWITCH		NORMALLY OPEN	CLOSES AS THE PRESSURE INCREASES TO A SPECIFIC RANGE (IN PSI)
		NORMALLY CLOSED	OPENS AS THE PRESSURE INCREASES TO A SPECIFIC RANGE (IN PSI)
FLOAT SWITCH		PUMP UP OPERATOR	CLOSES AS THE WATER LEVER FALLS TO A SPECIFIC DEPTH
		PUMP DOWN OPERATOR	OPENS AS THE WATER LEVER FALLS TO A SPECIFIC DEPTH
PUSH BUTTON SWITCH		NORMALLY OPEN	PUSH TO CLOSE, RELEASE TO OPEN
		NORMALLY CLOSED	PUSH TO OPEN, RELEASE TO CLOSE

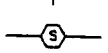

SOLENOID VALVE CONTROL

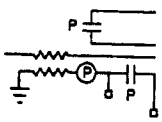

SELECTOR SWITCH

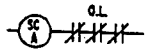

TIME METER


CONNECTED WIRES


NON-CONNECTED WIRES


OUT-GOING TERMINAL


PROBE


STARTER COIL

FOR FLOOR PLANS

- ○ LIGHTING FIXTURE, CEILING MOUNTED
- ○— LIGHTING FIXTURE, WALL MOUNTED AT HEIGHT SHOWN
- D FLOODLIGHT FIXTURE, WALL MOUNTED
- D—○ FLOODLIGHT FIXTURE MOUNTED ON POLE TOP.
- ▭ FLOURESCENT LIGHTING FIXTURE
- ⬡ A 2/40 LIGHTING FIXTURE DESIGNATIONS (LOCATED ADJACENT TO FIXTURES). "A" INDICATES FIXTURE TYPE. (SEE FIXTURE SCHEDULE FOR ALL TYPES). "2/40" = TWO 40 WATTS LAMPS
- ⊜ DUPLEX OUTLET, + 16"
- ⊜ DUPLEX OUTLET WITH BUILT-IN GROUND FAULT CIRCUIT INTERRUPTER, + 16"

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STANDARD PLAN
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STANDARD ELECTRICAL SYMBOLS (CONTINUED)

FOR FLOOR PLANS (CONTINUED)

- SPECIAL OUTLET AS INDICATED ON PLAN
- JUNCTION BOX, CEILING / WALL MOUNTED
- THERMOSTAT, + 3'-0"
- TELEPHONE CONDUIT SYSTEM, 3/4" CONDUIT UNLESS OTHERWISE NOTED
- TELEPHONE OUTLET, + 4'-6" ON WALL
- DISCONNECT SWITCH, SIZE AND POLE AS REQUIRED
- S • TOGGLE SWITCH, + 4'-0"
- S_3 • 3-WAY SWITCH, + 4'-0"
- DISTRIBUTION SWITCH BOARD, SEE DETAIL ON PLAN
- ELECTRICAL LIGHTING PANEL, + 6'-6" TO TOP, SEE SCHEDULE
- ELECTRICAL EQUIPMENT ENCLOSURE AS INDICATED, SEE DETAIL
- CONDUIT CONCEALED IN CEILING OR WALL
- CONDUIT IN OR BELOW FLOOR
- CONDUIT EXPOSED
- A-3 HOME RUN TO PANEL, LETTER DENOTES PANEL, NUMBER DENOTES CIRCUIT
- CONDUIT BEND UP OR DOWN

FOR HYDRAULIC FLOW SCHEMATIC DIAGRAMS

- GATE VALVE
- CHECK VALVE
- HYDRAULICALLY OPERATED VALVE (DIAPHRAGM)
- PISTON OPERATED VALVE
- PRESSURE SWITCH
- CONTROL WIRES
- A BOOSTER PUMP "A"
- 15 WELL PUMP (NO. 15)
- CL 2 CHLORINATOR
- PUMP DOWN
- PUMP UP
- FLOAT SWITCH
- FLOAT VALVE
- PSI PRESSURE GAGE

FOR HYDRAULIC FLOW SCHEMATIC DIAGRAMS (CONT.)

- P PROBE
- L LEVEL TELEMETER
- P PRESSURE TELEMETER
- F FLOW TELEMETER
- 1285 TONE EQUIPMENT (1285 HZ)
- 246 SURFACE TANK
- HYDROPNEUMATIC TANK
- ELEVATED TANK
- WATER SYSTEM GRID

FOR SINGLE LINE POWER DIAGRAMS

- S.C.E. 277/480V 3Φ-4W.- 60 HZ. WEATHER-HEAD FOR OVERHEAD POWER SERVICE. INDICATE POWER COMPANY AND SYSTEM TYPE (VOLTAGE, PHASE, WIRE AND FREQUENCY)
- M KILO-WATT-HOUR METER PER POWER COMPANY'S REQUIREMENT
- 200 A.F. 100 A.T. 3 P. CIRCUIT BREAKER. SHOW AMPERE RATING, NUMBER OF POLES, AND FRAME SIZE IF LARGER FRAME IS NEEDED IN THE FUTURE
- 2 MAGNETIC MOTOR STARTER, NEMA SIZE AS INDICATED
- 60A 3 P. DISCONNECT SWITCH, SHOW SIZE AND POLES
- 400V 2 KVA 120/240V TRANSFORMER, SHOW KVA RATING, PRIMARY AND SECONDARY VOLTAGE
- S/N SOLID NEUTRAL BLOCK
- 60 FLA=77A BOOSTER "A" PUMP OR MOTOR, SHOW HORSEPOWER AND PULL LOAD AMPERES
- A PANEL "A" 22.5KW 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

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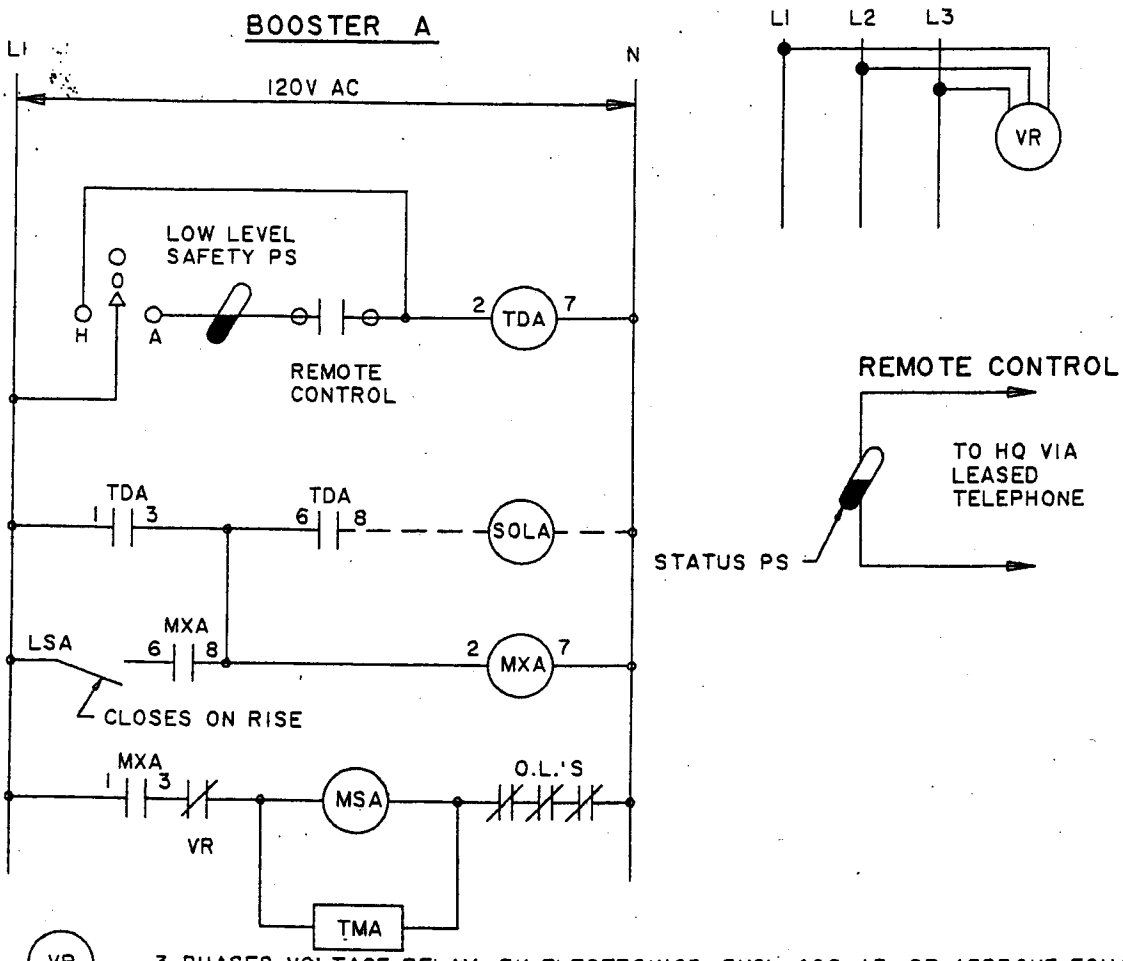
SHEET 2 OF 2

BOOSTER PUMP ELECTRICAL SCHEMATIC

(BASIC FOR EACH BOOSTER PUMP)



VR	3 PHASES VOLTAGE RELAY, RK ELECTRONICS, PVCL-400-AR, OR APPROVE EQUAL
TDA	TIME DELAY RELAY OCTAL 120 VAC POTTER BROMFIELD 0-180 SEC.
MXA	GENERAL PURPOSE OCTAL 120 VAC POTTER BROMFIELD KRPIIA
	PRESSURE SWITCH MERCOID DA 21
LSA	LIMIT SWITCH - ON CONTROL VALVE
SOLA	SOLENOID - ON CONTROL VALVE
MSA	MAG STARTER
TMA	TIME METER

NOTE : 3 AMMETERS W/SELECTOR SWITCH TO INDIVIDUAL BOOSTER
VOLTMETER W/SELECTOR SWITCH TO INDIVIDUAL PHASE

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STANDARD PLAN
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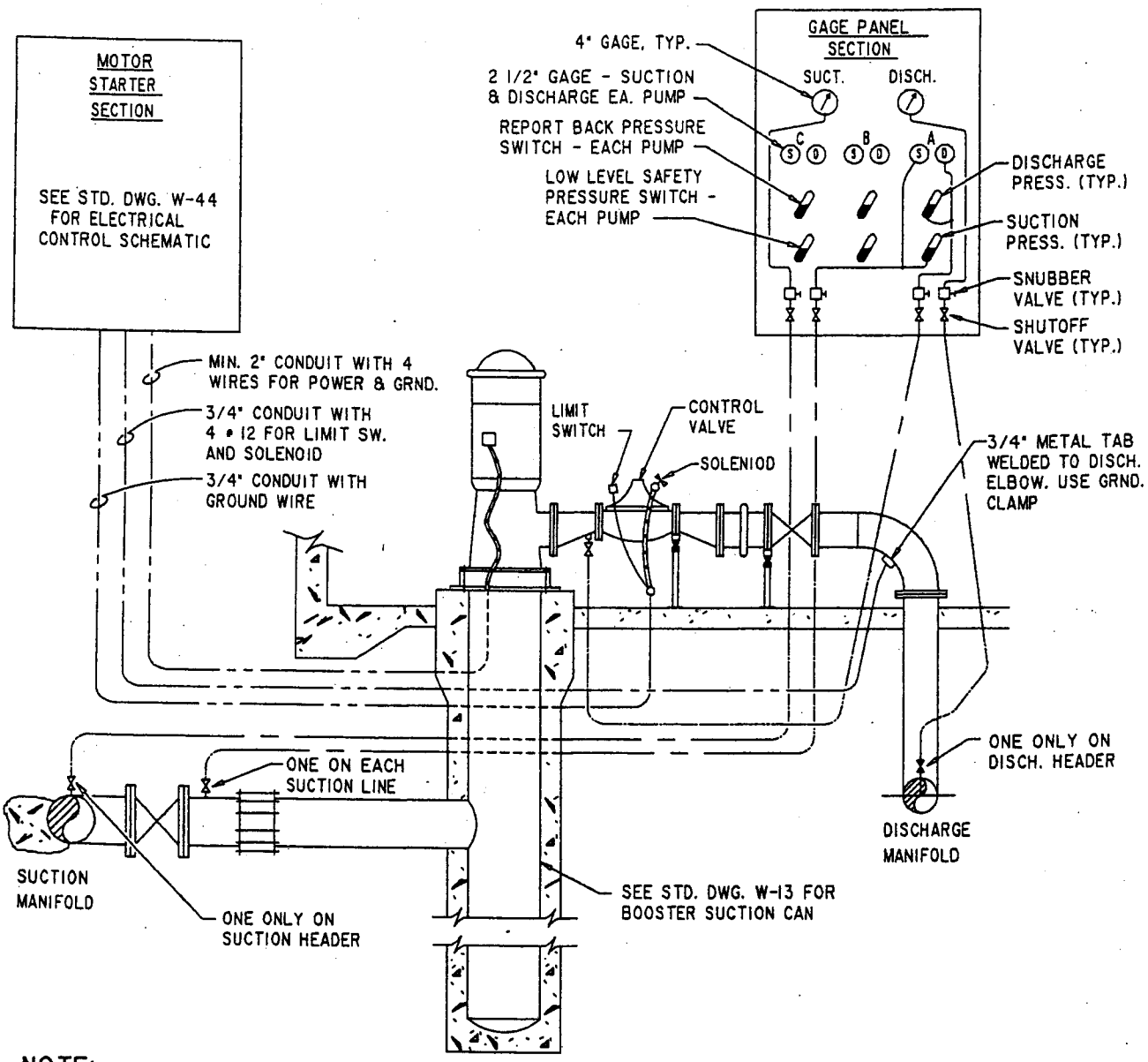
SHEET 1 OF 1

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
- Ⓢ SUCTION GAGE
- Ⓓ DISCHARGE GAGE

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PIPE TRENCH

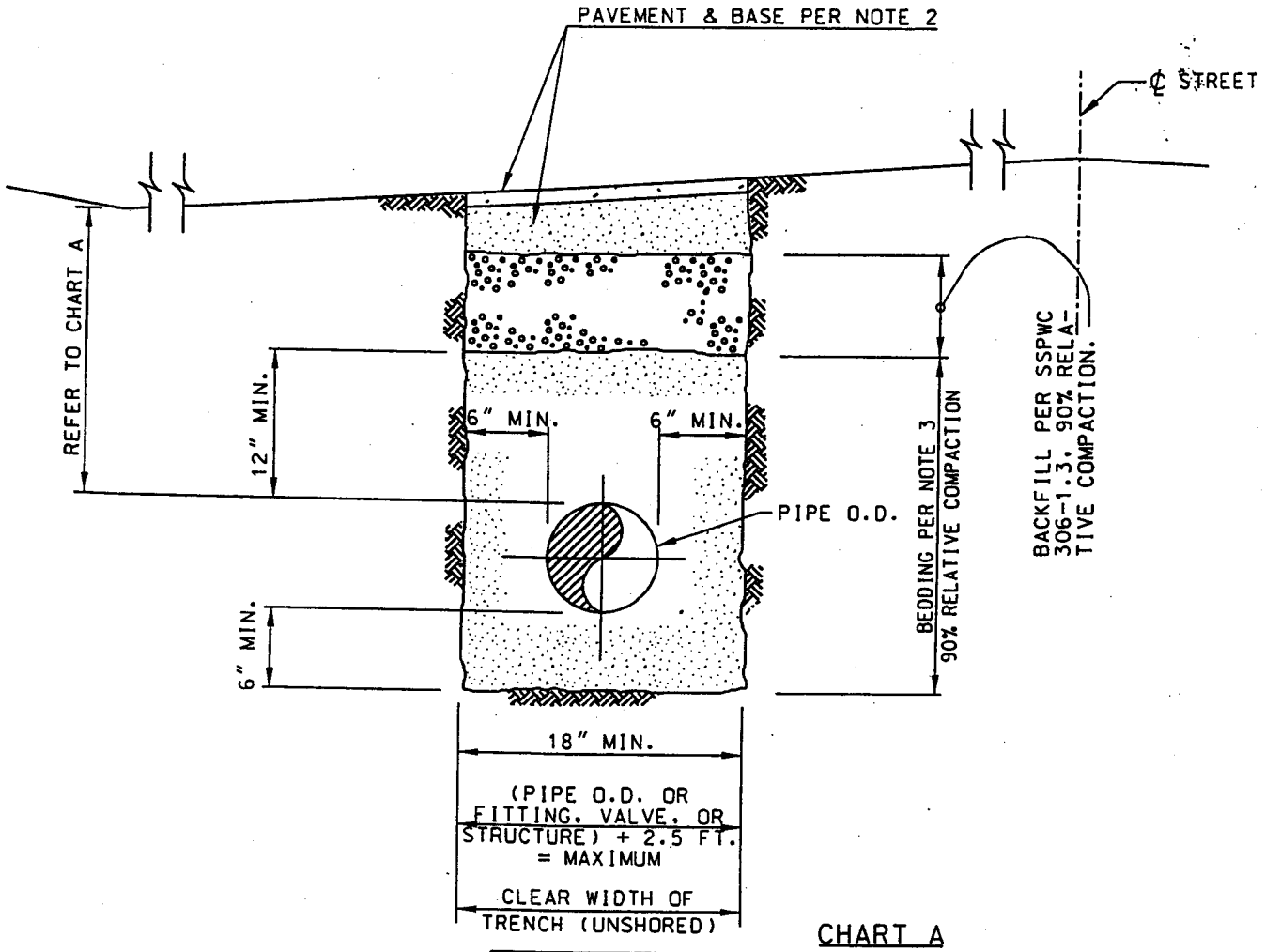

CHART A

SIZE OF PIPE (INCHES)	MIN. DEPTH OF COVER OVER PIPE IN INCHES (SEE NOTE 1).	MIN. DEPTH OF COVER OVER PIPE IN PRIVATE STREET (SEE NOTE 1).
4 TO 6	36	36
8 TO 10	42	48
12 OR LARGER	48	48

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.

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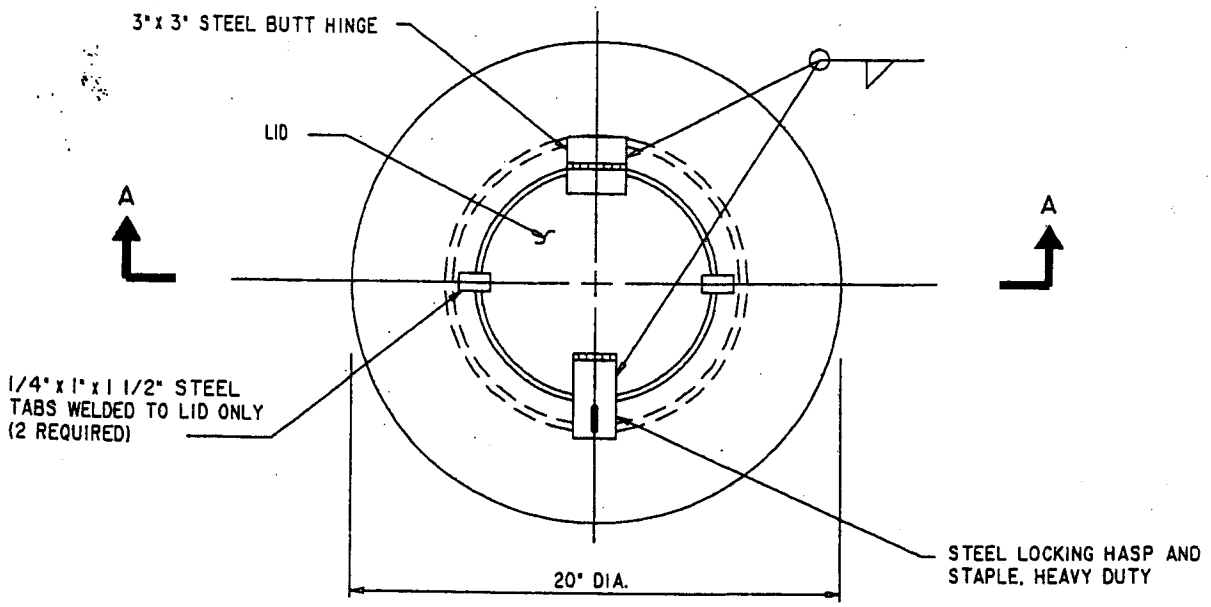
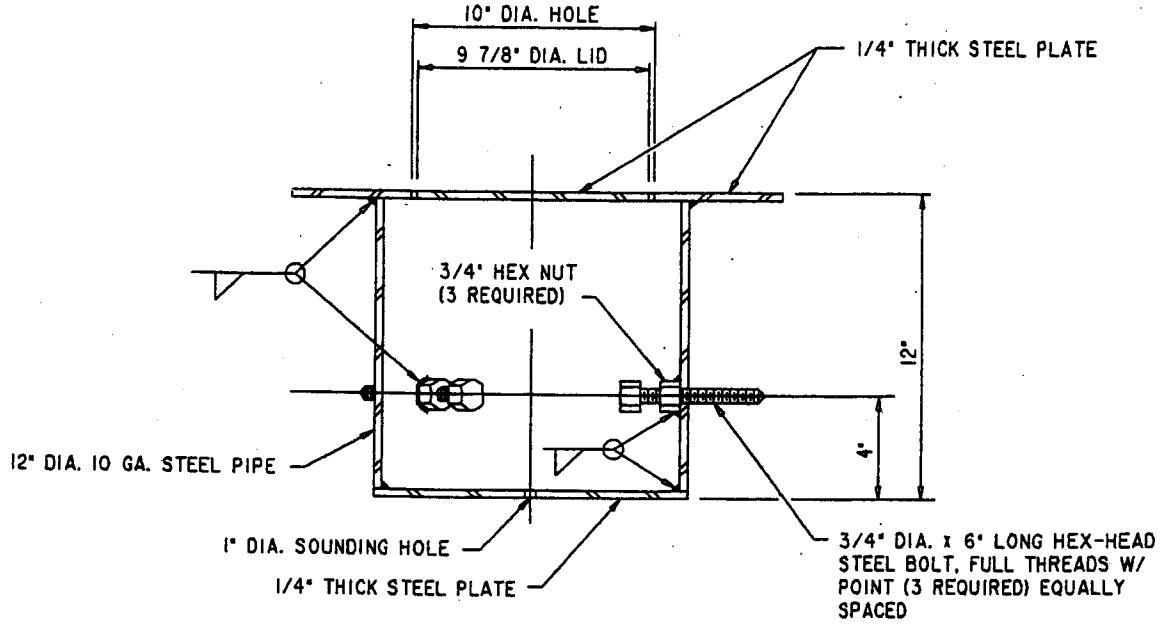
WELL COVER



PLAN



SECTION A-A

LOS ANGELES COUNTY WATERWORKS DISTRICTS

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STANDARD PLAN W-47

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AUGUST 93
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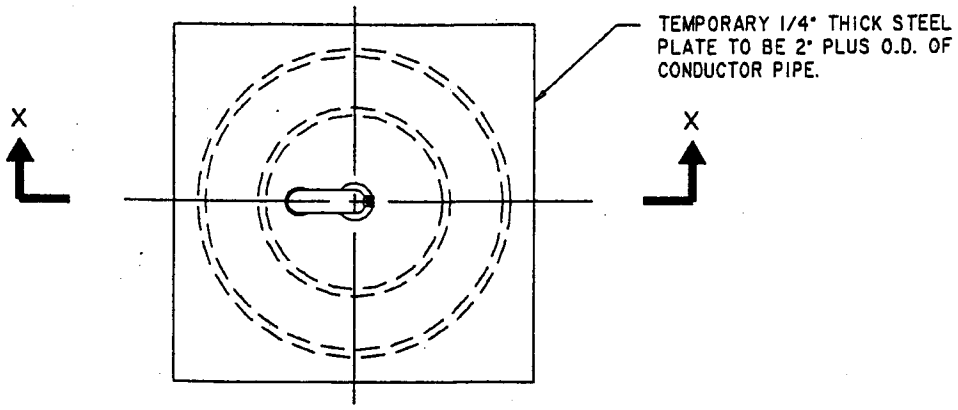
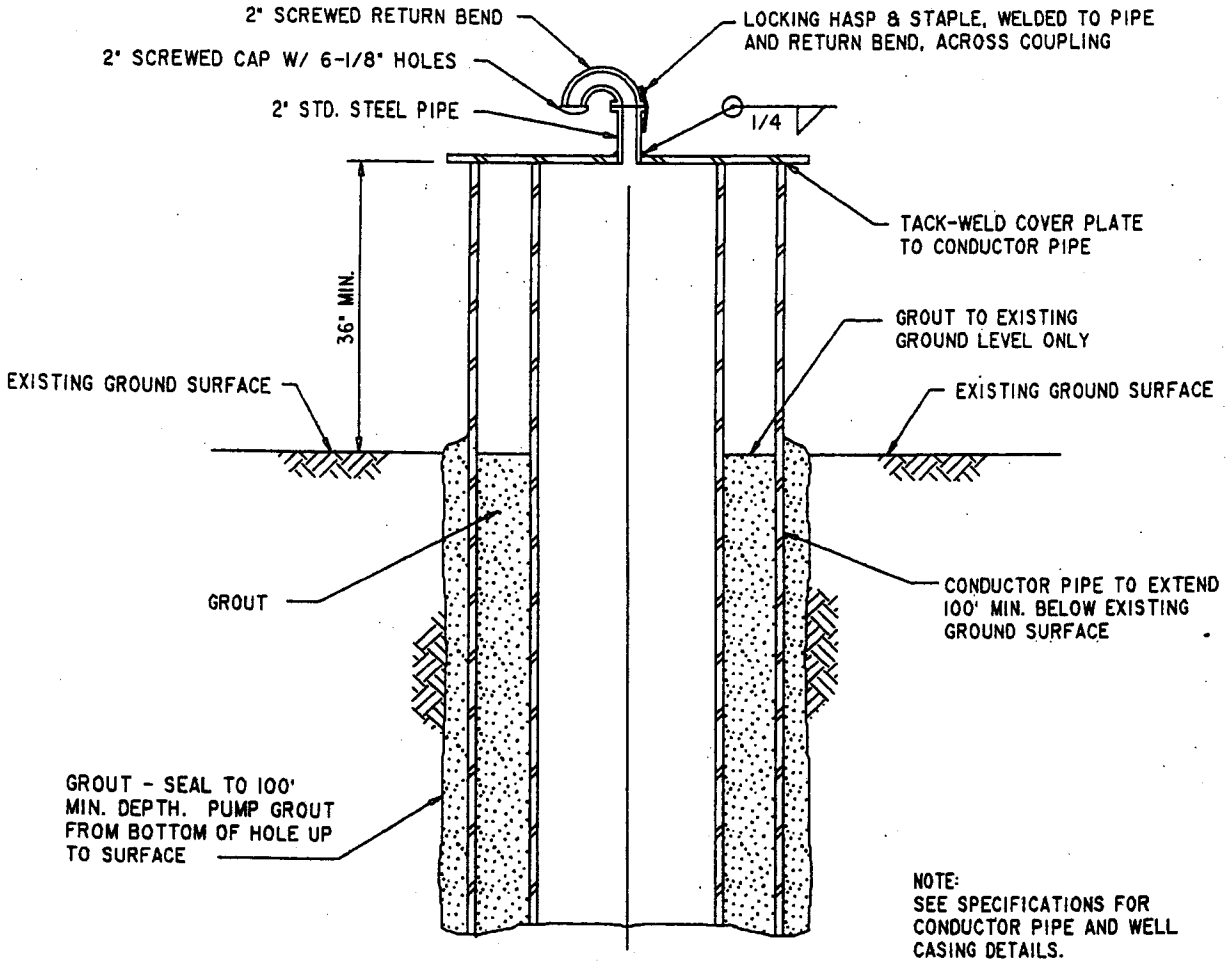
SHEET 1 OF 1

CABLE TOOL WELL HEAD



PLAN



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

SECTION X-X

LOS ANGELES COUNTY WATERWORKS DISTRICTS

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STANDARD PLAN
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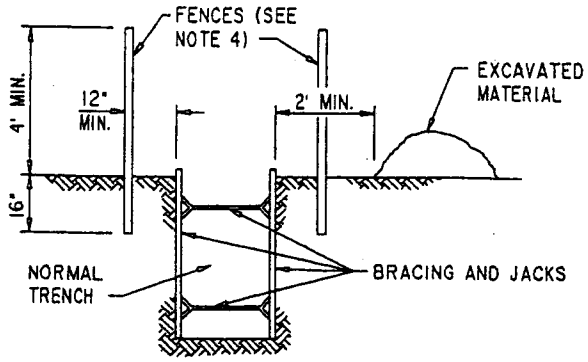
SHEET 1 OF 1

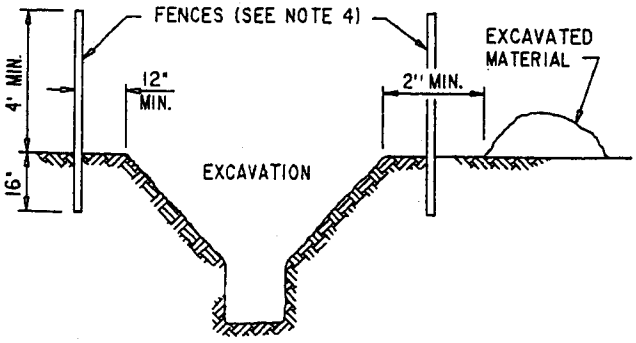
MINIMUM PUBLIC SAFETY REQUIREMENTS

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.

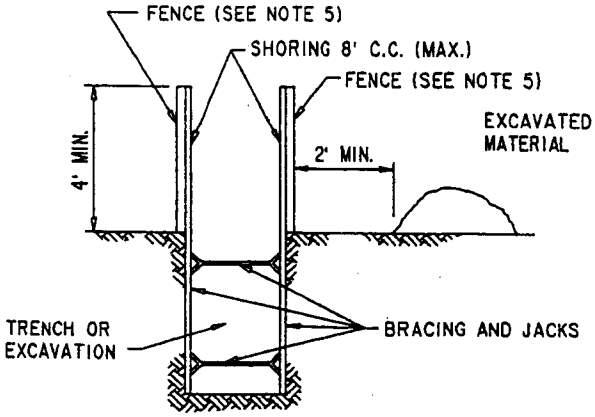
I. FENCES



CASE A

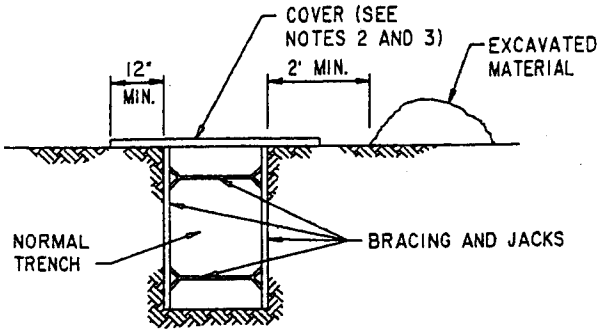


CASE B



CASE C

II. COVER



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 1:1 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
   } NON-VEHICULAR TRAFFIC
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 (WATCH).
4. FOR CASES "A" AND "B", FENCES MAY BE:
   WOOD PICKETS TIED WITH WIRE AND POSTS 6' C.C.
   a. 2" x 4" POSTS 8' C.C. AND WIRE MESH
   b. 2" x 4" POSTS 8' C.C. WITH TOP AND BOTTOM RAIL AND CHICKEN WIRE.
   c. 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

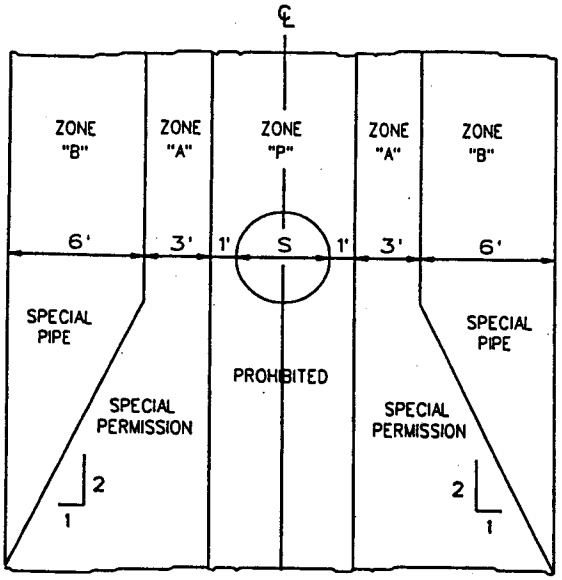
APPROVED Dean D. Efthimion
ASSISTANT DEPUTY DIRECTOR

AUGUST 93
DATE

SHEET 1 OF 1

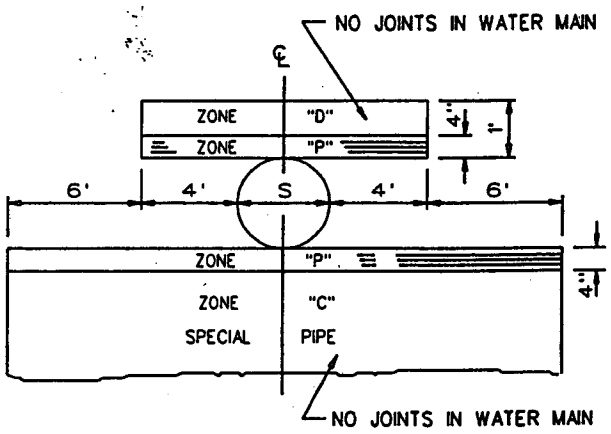
DESIGN REQUIREMENTS FOR WATER MAINS IN THE VICINITY OF SANITARY SEWERS

PARALLEL CONSTRUCTION



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



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.

ZONE	WATER MAIN CONSTRUCTION REQUIREMENTS
A	NO WATER MAINS PARALLEL TO SEWERS SHALL BE CONSTRUCTED WITHOUT APPROVAL FROM THE HEALTH AGENCY.
B	USE STEEL PIPE, CML AND CMC WITH WELDED JOINTS.
C	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.
D	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.
P	PROHIBITED ZONE - NO WATER MAINS ARE ALLOWED TO BE INSTALLED WITHIN THIS ZONE.

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 Efstathiou
ASSISTANT DEPUTY DIRECTOR

OCTOBER 1999
DATE

STANDARD PLAN
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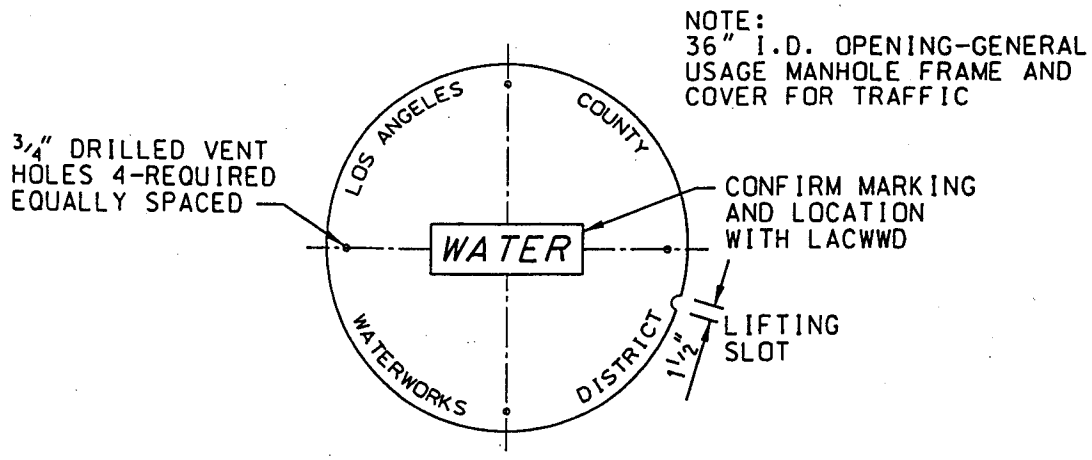
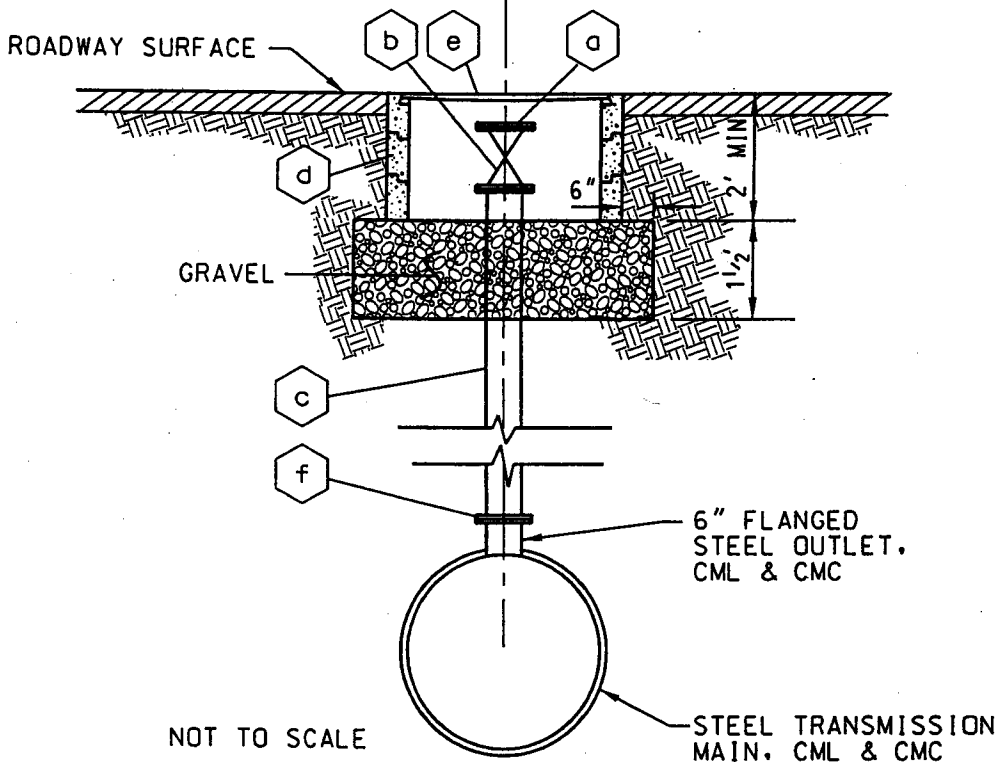
SHEET 1 OF 1

PUMP WELL



MANHOLE COVER DETAIL

NOT TO SCALE



⬡	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 Dean Efstathiou
ASSISTANT DEPUTY DIRECTOR

OCTOBER 1999
DATE

SHEET 1 OF 1