

<b>AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT</b>				1. CONTRACT ID CODE N/A	PAGE OF PAGES 1
2. AMENDMENT/MODIFICATION NO. 0001	3. EFFECTIVE DATE 19 NOV 98	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (If applicable) W99B0001		
6. ISSUED BY U.S. ARMY ENGINEER DISTRICT, LOS ANGELES P.O. BOX 532711 LOS ANGELES, CALIFORNIA 90053-2325		7. ADMINISTERED BY (If other than Item 6) CODE			
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)				(v) X	9A. AMENDMENT OF SOLICITATION NO. DACW09-99-B-0001
					9B. DATED (SEE ITEM 11) 01 DEC 98 (BID OPENING)
					10A. MODIFICATION OF CONTRACT/ORDER NO. N/A
					10B. DATED (SEE ITEM 13) N/A
CODE	FACILITY CODE				

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers  is extended,  is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning 1 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

<input checked="" type="checkbox"/>	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
<input type="checkbox"/>	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
<input type="checkbox"/>	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
<input type="checkbox"/>	D. OTHER (Specify type of modification and authority)

**E. IMPORTANT:** Contractor  is not,  is required to sign this document and return \_\_\_\_\_ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

RIO HONDO CHANNEL IMPROVEMENTS, WHITTER NARROWS DAM TO FIRESTONE BOULEVARD  
LOS ANGELES COUNTY, CALIFORNIA

- \*REPLACE TABLE OF CONTENTS With Enclosure No.1
- \*REPLACE PAGES 00010-5 thru 00010-9 (BIDDING SCHEDULE) With Enclosure No.2
- \*REPLACE SECTION 00750, RATES OF WAGES With Enclosure No.3
- \*REPLACE SECTION 01200, GENERAL REQUIREMENTS With Enclosure No.4

- CONTINUED ON BACK OF SHEET -

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
 (Signature of person authorized to sign)		 BY (Signature of Contracting Officer)	

**RIO HONDO CHANNEL IMPROVEMENTS, WHITTER NARROWS DAM TO  
FIRESTONE BOULEVARD  
LOS ANGELES COUNTY, CALIFORNIA(Continued)**

- \*REPLACE SECTION 01250, MEASUREMENT AND PAYMENT With Enclosure No.5**
- \*REPLACE SECTION 01430, ENVIRONMENTAL PROTECTION With Enclosure No.6**
- \*REPLACE SECTION 01451, CONTRACTOR QUALITY CONTROL With Enclosure No.7**
- \*REPLACE SECTION 03301, CAST-IN PLACE STRUCTURAL CONCRETE With Enclosure No.8**
- \*ADD SECTION 03361, SHOTCRETE With Enclosure No.9**

**10 Encls:**

- 1. TABLE OF CONTENTS**
- 2. PAGES 00010-5 thru 00010-9(BIDDING SCHEDULE)**
- 3. SECTION 00750, RATES OF WAGES**
- 4. SECTION 01200, GENERAL REQUIREMENTS**
- 5. SECTION 01250, MEASUREMENT AND PAYMENT**
- 6. SECTION 01430, ENVIRONMENTAL PROTECTION**
- 7. SECTION 01451, CONTRACTOR QUALITY CONTROL**
- 8. SECTION 03301, CAST-IN PLACE STRUCTURAL CONCRETE**
- 9. SECTION 03361, SHOTCRETE**
- 10. REVISED DRAWINGS: Dwg. No. (District File No.):**  
374/426, 374/427, 374/428, 374/429, 374/430, 374/432, 374/433, 374/435, 374/437, 374/440, 374/441, 374/443, 374/444, 374/446, 374/447, 374/448, 374/449, 374/450, 374/451, 374/452, 374/453, 374/454, 374/455, 374/461, 374/464, 374/465, 374/467, 374/468, 374/482, 374/484, 374/486, 374/489, 374/490, 374/494, 374/495, 374/496, 374/497, 374/509, 374/518, 374/528, 374/530, 374/532, 354/533, 374/539, 374/540, 374/541, 374/542, 374/544, 374/545, 374/546, 374/547, 374/552, 374/554, 374/555, 374/556, 374/557, 374/558, 374/559, 374/561, 374/562, 374/563, 374/568, 374/569, 374/571, 374/576, 374/577, 374/585, 374/587, 374/590, 374/593, 374/594, 374/596, 374/599, 374/601, 374/602, 374/611, 374/615, 374/616, 374/638, 374/639, 374/640, 374/641, 374/642, 374/646, 374/647, 374/648, 374/652, 374/663, 374/666, 374/668, 374/675, 374/676, 374/677, and 374/678 (all Rev "A")

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## SECTION 00010

BIDDING SCHEDULE

<u>Item No.</u>	<u>Description</u>	<u>Estimated Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Estimated Amount</u>
1.	CLEAR SITE AND REMOVE OBSTRUCTIONS	1	Job	L.S.	_____
2.	EXCAVATION	3,776	Cu.Yd.	_____	_____
3.	COMPACTED FILL	215,538	Cu.Yd.	_____	_____
4.	RIPRAP, 24-INCH	2,489	Ton	_____	_____
5.	STONE PROTECTION(LANDSCAPE STONE)	12,790	Ton	_____	_____
6.	GROUTED LANDSCAPE STONE	400	Ton	_____	_____
7.	GROUTED STONE	21,700	Ton	_____	_____
8.	CONCRETE PARAPET WALL	1	Job	L.S.	_____
9.	RETAINING WALL NO. 437	1	Job	L.S.	_____
10.	RETAINING WALL NO. 394	1	Job	L.S.	_____
11.	RETAINING WALL NO. 390	1	Job	L.S.	_____
12.	RETAINING WALL NO. 381	1	Job	L.S.	_____
13.	RETAINING WALL NO. 380	1	Job	L.S.	_____
14.	RETAINING WALL NO. 378	1	Job	L.S.	_____
15.	RETAINING WALL NO. 371	1	Job	L.S.	_____
16.	RETAINING WALL NO. 370	1	Job	L.S.	_____
17.	RETAINING WALL NO. 369	1	Job	L.S.	_____
18.	RETAINING WALL NO. 368	1	Job	L.S.	_____
19.	RETAINING WALL NO. 309	1	Job	L.S.	_____
20.	RETAINING WALL NO. 307	1	Job	L.S.	_____
21.	RETAINING WALL NO. 243	1	Job	L.S.	_____
22.	RETAINING WALL NO. 241	1	Job	L.S.	_____
23.	RETAINING WALL NO. 235	1	Job	L.S.	_____
24.	RETAINING WALL NO. 232	1	Job	L.S.	_____
25.	RETAINING WALL NO. 224	1	Job	L.S.	_____
26.	RETAINING WALL NO. 219	1	Job	L.S.	_____

## SECTION 00010

BIDDING SCHEDULE

<u>Item No.</u>	<u>Description</u>	<u>Estimated Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Estimated Amount</u>
27.	RETAINING WALL NO. 215	1	Job	L.S.	_____
28.	RETAINING WALL NO. 214	1	Job	L.S.	_____
29.	RETAINING WALL NO. 206	1	Job	L.S.	_____
30.	RETAINING WALL NO. 200	1	Job	L.S.	_____
31.	RETAINING WALL NO. 184	1	Job	L.S.	_____
32.	RETAINING WALL NO. 183	1	Job	L.S.	_____
33.	RETAINING WALL NO. 182	1	Job	L.S.	_____
34.	RETAINING WALL NO. 181	1	Job	L.S.	_____
35.	RETAINING WALL NO. 180	1	Job	L.S.	_____
36.	RETAINING WALL NO. 179	1	Job	L.S.	_____
37.	RETAINING WALL NO. 176	1	Job	L.S.	_____
38.	RETAINING WALL NO. 175	1	Job	L.S.	_____
39.	RETAINING WALL NO. 155	1	Job	L.S.	_____
40.	RETAINING WALL NO. 154	1	Job	L.S.	_____
41.	RETAINING WALL NO. 153	1	Job	L.S.	_____
42.	RETAINING WALL NO. 149	1	Job	L.S.	_____
43.	RETAINING WALL NO. 147	1	Job	L.S.	_____
44.	RETAINING WALL NO. 146	1	Job	L.S.	_____
45.	RETAINING WALL NO. 145	1	Job	L.S.	_____
46.	RETAINING WALL NO. 101	1	Job	L.S.	_____
47.	RETAINING WALL NO. 100	1	Job	L.S.	_____
48.	RETAINING WALL NO. 98	1	Job	L.S.	_____
49.	RETAINING WALL NO. 97	1	Job	L.S.	_____
50.	RETAINING WALL NO. 96	1	Job	L.S.	_____
51.	RETAINING WALL NO. 82	1	Job	L.S.	_____
52.	RETAINING WALL NO. 81	1	Job	L.S.	_____
53.	RETAINING WALL NO. 80	1	Job	L.S.	_____

## SECTION 00010

BIDDING SCHEDULE

<u>Item No.</u>	<u>Description</u>	<u>Estimated Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Estimated Amount</u>
54.	CONCRETE PAVEMENT	1	Job	L.S.	_____
55.	CONCRETE CHANNEL LINING	1	Job	L.S.	_____
56.	CONCRETE CHANNEL INVERT	1	Job	L.S.	_____
57.	CONCRETE DRIVEWAY	1	Each	_____	_____
58.	CONCRETE LOCAL DEPRESSION	1	Job	L.S.	_____
59.	DOWN DRAIN	6	Each	_____	_____
60.	ASPHALT CONCRETE PAVEMENT	<b>10,789</b>	Ton	_____	_____
61.	6" ASPHALT CONCRETE CURB/BERM	3,327	LF	_____	_____
62.	AGGREGATE BASE COURSE	<b>30,529</b>	Ton	_____	_____
63.	DECOMPOSED GRANITE	<b>738</b>	Ton	_____	_____
64.	ACCESS ROAD DRAIN	410	Each	_____	_____
65.	SAFETY RAILING	4,364	L.F.	_____	_____
66.	BREAKAWAY SAFETY RAILING	1,052	L.F.	_____	_____
67.	FENCING, CHAIN LINK, 4' H	253	L.F.	_____	_____
68.	FENCING, CHAIN LINK, 5' H	35,023	L.F.	_____	_____
69.	FENCING, ORNAMENTAL, 5' H	5,852	L.F.	_____	_____
70.	FENCING, ORNAMENTAL, 8' H	6,808	L.F.	_____	_____
71.	GATES, CHAIN LINK MAINTENANCE	12	Each	_____	_____
72.	GATES, ORNAMENTAL PEDESTRIAN, 5' H	5	Each	_____	_____
73.	GATES, ORNAMENTAL PEDESTRIAN, 8' H	5	Each	_____	_____
74.	GATES, ORNAMENTAL MAINTENANCE, 5' H	4	Each	_____	_____
75.	GATES, ORNAMENTAL MAINTENANCE, 8' H	3	Each	_____	_____
76.	REINFORCED CONCRETE STAIRWAY, LEFT LEVEE-STA 392+50,371+00, 367+75,350+00,311+50,271+50, AND 245+61	1	Job	L.S.	_____
77.	HYDROSEEDING	1	Job	L.S.	_____
78.	HYDROSEEDING, MAINTENANCE	1	Job	L.S.	_____

## SECTION 00010

BIDDING SCHEDULE

<u>Item No.</u>	<u>Description</u>	<u>Estimated Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Estimated Amount</u>
79.	TREE, SHRUB, GROUND COVER, AND VINE PLANTINGS	1	Job	L.S.	_____
80.	TREE, SHRUB, GROUND COVER AND VINE PLANTINGS, MAINTENANCE	1	Job	L.S.	_____
81.	JUTE MESH	498,000	Sq. Ft.	_____	_____
82.	IRRIGATION SYSTEM	1	Job	L.S.	_____
83.	BENCHES, BICYCLE RACKS, PADS AND SIGN PEDESTAL	1	Job	L.S.	_____
84.	BICYCLE TRAIL STRIPING AND SIGNING	1	Job	L.S.	_____
85.	BICYCLE TRAIL CLOSURE AND DETOUR	1	Job	L.S.	_____
86.	INLET STRUCTURE OF DIVERSION CHANNEL - STA 397+75, LEFT BANK	1	Job	L.S.	_____
87.	SWIFT-WATER RESCUE ANCHOR DEVICE	16	EACH	_____	_____
88.	SIDE DRAIN, STA 431+00	1	Job	L.S.	_____
89.	SIDE DRAIN, STA 236+70	1	Job	L.S.	_____
90.	SIDE DRAIN, STA 230+50	1	Job	L.S.	_____
91.	SIDE DRAIN, STA 206+50	1	Job	L.S.	_____
92.	SIDE DRAIN, STA 183+90	1	Job	L.S.	_____
93.	SIDE DRAIN, STA 182+85	1	Job	L.S.	_____
94.	SIDE DRAIN, STA 165+20	1	Job	L.S.	_____
95.	SIDE DRAIN, STA 152+00	1	Job	L.S.	_____
96.	SIDE DRAIN, STA 151+00	1	Job	L.S.	_____
97.	SIDE DRAIN, STA 136+00	1	Job	L.S.	_____
98.	SIDE DRAIN, STA 135+00	1	Job	L.S.	_____
99.	SIDE DRAIN, STA 128+35	1	Job	L.S.	_____
100.	SIDE DRAIN, STA 114+45	1	Job	L.S.	_____
101.	SIDE DRAIN, STA 110+00	1	Job	L.S.	_____
102.	SIDE DRAIN, STA 105+50	1	Job	L.S.	_____
103.	SIDE DRAIN, STA 104+50	1	Job	L.S.	_____

## SECTION 00010

BIDDING SCHEDULE

<u>Item No.</u>	<u>Description</u>	<u>Estimated Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Estimated Amount</u>
104.	SIDE DRAIN, STA 104+00	1	Job	L.S.	_____
105.	SIDE DRAIN, STA 100+40	1	Job	L.S.	_____
106.	SIDE DRAIN, STA 95+90	1	Job	L.S.	_____
107.	SIDE DRAIN, STA 93+13	1	Job	L.S.	_____
108.	SIDE DRAIN, STA 91+98	1	Job	L.S.	_____
109.	SIDE DRAIN, STA 90+73	1	Job	L.S.	_____
110.	SIDE DRAIN, STA 90+05	1	Job	L.S.	_____
111.	SIDE DRAIN, STA 89+36	1	Job	L.S.	_____
112.	SIDE DRAIN, STA 88+11	1	Job	L.S.	_____
113.	SIDE DRAIN, STA 86+86	1	Job	L.S.	_____
114.	SIDE DRAIN, STA 86+41	1	Job	L.S.	_____
115.	SIDE DRAIN, STA 85+96	1	Job	L.S.	_____
116.	SIDE DRAIN, STA 84+71	1	Job	L.S.	_____
117.	SIDE DRAIN, STA 83+25	1	Job	L.S.	_____
118.	<b>MODIFY SEWER SIPHON VAULT STRUCTURE</b>	1	Job	L.S.	_____
119.	ADJUST MANHOLE TO GRADE	1	Job	L.S.	_____
<b>120.</b>	<b>SHOTCRETE</b>	<b>28</b>	<b>Cu. Yd.</b>	_____	_____
<b>121.</b>	QUALITY ASSURANCE VEHICLE	10	EACH	_____	_____
<b>122.</b>	AS-BUILT DRAWINGS	1	Job	L.S.	_____
<b>TOTAL ESTIMATED AMOUNT \$</b>					_____

**NOTES** All extensions of the unit prices shown will be subject to verification by the Government. In case of variation between the unit price and the extension, the unit price will be considered to be the bid.

Bids shall be submitted on all items of the Bidding Schedule, otherwise, the bid will be considered nonresponsive and will be rejected.

Amounts and prices shall be indicated in either figures or words, not both.

SECTION 00750

RATES OF WAGES

**General Decision Number CA980033**

General Decision Number **CA980033**  
Superseded General Decision No. CA970033

State: **California**  
Construction Type:  
BUILDING  
DREDGING  
**HEAVY** HIGHWAY

County(ies):  
**LOS ANGELES**  
BUILDING CONSTRUCTION PROJECTS; DREDGING PROJECTS (does not include hopper dredge work); **HEAVY** CONSTRUCTION PROJECTS (does not include water well drilling); HIGHWAY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	02/13/1998
1	04/10/1998
2	07/10/1998
3	09/04/1998
4	10/09/1998
5	10/23/1998
6	10/30/1998
7	11/06/1998

COUNTY(ies):

**LOS ANGELES**

ASBE0005B 09/21/1997

	Rates	Fringes
INSULATOR/ASBESTOS WORKER Includes the application of all insulating materials, protective coverings, coatings, and finishings to all types of mechanical systems	28.21	7.53

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ASBE0208B 06/01/1996

	Rates	Fringes
ASBESTOS REMOVAL WORKER/ HAZARDOUS MATERIAL HANDLER Includes preparation, wetting, stripping, removal, scrapping, vacuuming, bagging and disposing of all insulation materials from mechanical systems, whether they contain asbestos or not	19.70	4.81

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BOIL0092F 10/01/1998

	Rates	Fringes
BOILERMAKER	28.81	9.81

TUBE WELDER	30.31	9.81
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\* BRCA0004A 05/01/1997

	Rates	Fringes
<b>LOS ANGELES, ORANGE, RIVERSIDE, SAN BERNARDINO AND VENTURA</b>		
COUNTIES:		

BRICKLAYER; MARBLE SETTER	25.75	6.35
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BRCA0018H 06/01/1996

	Rates	Fringes
TILE SETTER	22.84	3.95

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BRCA0018K 06/01/1996

	Rates	Fringes
TERRAZZO WORKER	25.97	4.15
TERRAZZO FINISHER	20.16	4.15

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\* CARP0002A 07/01/1998

	Rates	Fringes
DRYWALL/LATH INSTALLER	24.75	6.28

CARPENTERS:

Carpenter, cabinet installer,  
insulation installer, floor  
worker and acoustical installer

	24.75	6.28
Shingler	24.88	6.28
Roof loader of shingles	17.42	6.28
Saw filer	24.83	6.28
Table power saw operator	24.85	6.28
Pneumatic nailer or power stapler	25.00	6.28
Fence builder	22.30	6.28
Millwright	25.25	6.28
Pile driver; Derrick barge; Bridge or dock carpenter; Cable splicer; <b>Heavy</b> framer;		
Rockslinger	24.88	6.28
Head rockslinger	24.98	6.28
Rock barge or scow	24.78	6.28
Scaffold builder	19.00	6.28

FOOTNOTE:

Work of forming in the construction of open cut sewers or storm drains, on operations in which horizontal lagging is used in conjunction with steel H-Beams driven or placed in pre-drilled holes, for that portion of a lagged trench against which concrete is poured, namely, as a substitute for back forms (which work is performed by piledrivers): \$0.13 per hour additional.

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CARP0002B 07/01/1998

	Rates	Fringes
DIVERS:		
Diver, wet	54.76	6.28
Diver, stand-by	27.38	6.28

Diver tender	26.38	6.28
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\* CARP0003H 07/01/1998

	Rates	Fringes
MODULAR FURNITURE INSTALLER	12.00	4.05
LOW WALL MODULAR TECHNICIAN	16.72	4.05
FULL WALL TECHNICIAN	21.00	4.05

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ELEC0011A 08/15/1998

	Rates	Fringes
ELECTRICIANS:		
Tunnel Work:		
Electrician	30.09	3% + 9.84
Cable splicer	30.69	3% + 9.84

All other electrical work including work on the building and the grounding/bonding system for intelligent transportation systems

and intelligent vehicle highway systems, including distribution panels, racks, switching systems, general lighting, convenience outlets for transformers of voltage, and device supply voltage:

Electrician	27.35	3% + 9.84
Cable splicer	27.95	3% + 9.84

All other electrical work on intelligent transportation systems and CCTV highway systems: Transportation Systems

Electrician	27.45	3% + 9.74
Cable Splicer	28.05	3% + 9.74
Technician	20.59	3% + 9.74

SCOPE OF WORK:

TRANSPORTATION SYSTEMS:

ELECTRICIAN:

Installation of street lights and traffic signals, including electrical circuitry, programmable controllers, pedestal-mounted electrical meter enclosures and laying of pre-assembled multi-conductor cable in ducts, layout of electrical systems and communication installation, including proper position of trench depths and radius at duct banks, location for man holes, pull boxes, street lights and traffic signals. Installation of underground ducts for electrical, telephone, cable television and communication systems. Pulling, termination and splicing of traffic signal and street lighting conductors and electrical systems including interconnect, detector loop, fiber optic cable and video/cable.

TECHNICIAN:

Distribution of material at job site, manual excavation and backfill, installation of system conduits and raceways for electrical, telephone, cable television and communication

systems. Pulling, terminating and splicing of traffic signal and street lighting conductors and electrical systems including interconnect, detector loop, fiber optic cable and video/data.

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ELEC0011B 08/01/1997

	Rates	Fringes
LINE CONSTRUCTION:		
Line technician	27.40	3% + 9.44
Cable splicer	28.00	3% + 9.44
Ground person	16.54	3% + 9.44

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ELEC0011H 12/01/1997

	Rates	Fringes
COMMUNICATIONS AND SYSTEMS WORK:		
(does not include any work on intelligent transportation systems or CCTV highway systems):		
COMMUNICATIONS & SYSTEMS:		
Installer	18.63	3% + 3.70
Technician	20.38	3% + 3.70
Sound technician	21.38	3% + 3.70

SCOPE OF WORK:

Installation, testing, service and maintenance of systems utilizing the transmission and/or transference of voice, sound, vision and digital for commercial, educational, security and entertainment purposes for the following: TV monitoring and surveillance, background-foreground music, intercom and telephone interconnect, inventory control systems, microwave transmission, multi-media, multiplex, nurse call systems, radio page, school intercom and sound, burglar alarms, fire alarm (see last paragraph below) and low voltage master clock systems in commercial buildings.

Communication Systems that transmit or receive information and/or control systems that are intrinsic to the above listed systems; inclusion or exclusion of terminations and testings of conductors determined by their function; excluding all other data systems or multiple systems which include control function or power supply; excluding installation of raceway systems, conduit systems, line voltage work, and energy management systems.

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ELEC0011J 09/01/1998

	Rates	Fringes
ALARM TECHNICIAN	17.60	3%

PAID HOLIDAYS:

New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Day after Thanksgiving, the last regularly scheduled working day before Christmas, Christmas Day, and two floating holidays by mutual agreement between the employer and the worker.

SCOPE OF WORK:

Fire alarm, hold-up alarm, burglar alarm and surveillance

systems. Does not cover the installation of conduit systems and/or the installation of line voltage to these aforesaid systems. Installation of an incidental run or runs of conduit for mechanical protection shall not be considered a conduit system.

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ELEC1245C 06/01/1998

	Rates	Fringes
OUTSIDE UTILITY TRANSMISSION WORK:		
Line worker; Cable splicer	29.50	4.5%+6.78
Powder worker	28.03	4.5%+6.54
Ground person	19.18	4.5%+6.50
Line worker, welding	30.98	4.5%+7.02

SCOPE OF WORK:

All outside work on electrical transmission lines, switchyards and substations, and outside work in electrical utility distribution systems owned, maintained and operated by electrical utility companies, municipalities, or governmental agencies.

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ELEV0018A 09/15/1998

	Rates	Fringes
ELEVATOR MECHANIC	31.025	6.675

FOOTNOTE:

Vacation Pay: 8% with 5 or more years of service, 6% for 6 months to 5 years service. Paid Holidays: New Years Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Friday after, and Christmas Day.

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\* ENGI0012C 07/01/1998

	Rates	Fringes
POWER EQUIPMENT OPERATORS:		
GROUP 1	25.05	10.15
GROUP 2	25.83	10.15
GROUP 3	26.12	10.15
GROUP 4	26.51	10.15
GROUP 5	27.61	10.15
GROUP 6	26.73	10.15
GROUP 7	26.84	10.15
GROUP 8	27.94	10.15
GROUP 9	26.96	10.15
GROUP 10	28.06	10.15
GROUP 11	27.13	10.15
GROUP 12	27.23	10.15
GROUP 13	27.26	10.15
GROUP 14	27.34	10.15
GROUP 15	27.46	10.15
GROUP 16	27.63	10.15
GROUP 17	27.73	10.15
GROUP 18	27.84	10.15
GROUP 19	27.96	10.15
GROUP 20	28.13	10.15
GROUP 21	28.23	10.15
GROUP 22	28.34	10.15
GROUP 23	28.46	10.15

GROUP 24	28.63	10.15
CRANES, PILEDIVING & HOISTING EQUIPMENT:		
GROUP 1	25.30	10.15
GROUP 2	26.08	10.15
GROUP 3	26.37	10.15
GROUP 4	26.51	10.15
GROUP 5	26.73	10.15
GROUP 6	26.84	10.15
GROUP 7	26.96	10.15
GROUP 8	27.13	10.15
GROUP 9	27.30	10.15
GROUP 10	28.30	10.15
GROUP 11	29.30	10.15
GROUP 12	30.30	10.15
GROUP 13	31.30	10.15
TUNNEL WORK:		
GROUP 1	26.58	10.15
GROUP 2	26.87	10.15
GROUP 3	27.01	10.15
GROUP 4	27.23	10.15
GROUP 5	27.34	10.15
GROUP 6	27.46	10.15
GROUP 7	27.76	10.15

#### POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Barge, brake, compressor operator, Ditch Witch, with seat or similar type equipment, elevator operator - inside, engineer oiler, generator operator, generator, pump or compressor plant operator, pump operator, signal, switch

GROUP 2: Asphalt-rubber plant operator (nurse tank operator), concrete mixer operator - skip type, conveyor operator, fire person, hydrostatic pump operator, oiler crusher (asphalt or concrete plant), skiploader (wheel type up to 3/4 yd. without attachment), tar pot fire person, temporary heating plant operator, trenching machine oiler

GROUP 3: Asphalt-rubber blend operator, equipment greaser (rack), Ford Ferguson (with dragtype attachments), helicopter radio (ground), stationary pipe wrapping and cleaning machine operator

GROUP 4: Asphalt plant fire person, backhoe operator (mini-max or similar type), boring machine operator, box or mixer (asphalt or concrete), chip spreading machine operator, concrete cleaning decontamination machine operator, concrete pump operator (small portable), drilling machine operator, small auger types (Texoma super economatic or similar types - Hughes 100 or 200 or similar types - drilling depth of 30' maximum), equipment greaser (grease truck), guard rail post driver operator, highline cableway signal, hydra-hammer-aero stomper, power concrete curing machine operator, power concrete saw operator, power-driven jumbo form setter operator, power sweeper operator, roller operator (compacting), screed operator (asphalt or concrete), trenching machine operator (up to 6 ft.)

GROUP 5: Equipment greaser (grease truck/multi-shift)

GROUP 6: Asphalt plant engineer, batch plant operator, bit sharpener, concrete joint machine operator (canal and similar type), concrete planer operator, deck engine operator, derrick (oilfield type), drilling machine operator, bucket or auger types (Calweld 100 bucket or similar types - Watson 1000 auger or similar types - Texoma 330, 500 or 600 auger or similar types - drilling depth of 45' maximum), drilling machine operator (including water wells incidental to building, **heavy** or highway construction), hydrographic seeder machine operator (straw, pump or seed), Jackson track maintainer, or similar type, Kalamazoo switch tamper, or similar type, machine tool operator, Maginnis internal full slab vibrator, mechanical berm, curb or gutter (concrete or asphalt), mechanical finisher operator (concrete, Clary-Johnson-Bidwell or similar), pavement breaker operator (truck mounted), road oil mixing machine operator, roller operator (asphalt or finish), rubber-tired earth moving equipment (single engine, up to and including 25 yds. struck), self-propelled tar pipelining machine operator, skiploader operator (crawler and wheel type, over 3/4 yd. and up to and including 1-1/2 yds.), slip form pump operator (power driven hydraulic lifting device for concrete forms), tractor operator - bulldozer, tamper-scraper (single engine, up to 100 h.p. flywheel and similar types, up to and including D-5 and similar types), tugger hoist operator (1 drum), ultra high pressure waterjet cutting tool system operator, vacuum blasting machine operator

GROUP 7: Asphalt or concrete spreading operator (tamping or finishing), asphalt paving machine operator (Barber Greene or similar type), asphalt-rubber distribution operator, backhoe operator (up to and including 3/4 yd.), small Ford, Case or similar, cast-in-place pipe laying machine operator, combination mixer and compressor operator (gunite work), compactor operator (self-propelled), concrete mixer operator (paving), crushing plant operator, drill doctor, drilling machine operator, bucket or auger types (Calweld 150 bucket or similar types - Watson 1500, 2000 2500 auger or similar types - Texoma 700, 800 auger or similar types - drilling depth of 60' maximum), elevating grader operator, grade checker, gradall operator, grouting machine operator, heavy-duty repair person, **heavy** equipment robotics operator, Kalamazoo balliste regulator or similar type, Kolman belt loader and similar type, Le Tourneau blob compactor or similar type, loader operator (Athey, Euclid, Sierra and similar types), pneumatic concrete placing machine operator (Hackley-Presswell or similar type), pumpcrete gun operator, rotary drill operator (excluding caisson type), rubber-tired earth-moving equipment operator (single engine, caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. up to and including 50 cu. yds. struck), rubber-tired earth-moving equipment operator (multiple engine up to and including 25 yds. struck), rubber-tired scraper operator (self-loading paddle wheel type - John Deere, 1040 and similar single unit), self-propelled curb and gutter machine operator, skiploader operator (crawler and wheel type over 1-1/2 yds. up to and including 6-1/2 yds.), soil remediation plant operator, surface heaters and planer operator, tractor compressor drill combination operator, tractor operator (any type larger than D-5 - 100 flywheel h.p.

and over, or similar - bulldozer, tamper, scraper and push

tractor single engine), tractor operator (boom attachments), traveling pipe wrapping, cleaning and bending machine operator, trenching machine operator (over 6 ft. depth capacity, manufacturer's rating), ultra high pressure waterjet cutting tool system mechanic

GROUP 8: Heavy-duty repair person (multi-shift)

GROUP 9: Drilling machine operator, bucket or auger types (Calweld 200 B bucket or similar types - Watson 3000 or 5000 auger or similar types - Texoma 900 auger or similar types - drilling depth of 105' maximum), dual drum mixer, dynamic compactor LDC350 (or similar types), heavy-duty repair-welder combination, monorail locomotive operator (diesel, gas or electric), motor patrol - blade operator (single engine), multiple engine tractor operator (Euclid and similar type - except Quad 9 cat.), rubber-tired earth-moving equipment operator (single engine, over 50 yds. struck), rubber-tired earth-moving equipment operator (multiple engine, Euclid, caterpillar and similar over 25 yds. and up to 50 yds. struck), tower crane repair person, tractor loader operator (crawler and wheel type over 6-1/2 yds.), Woods mixer operator (and similar Pugmill equipment)

GROUP 10: Heavy-duty repair-welder combination (multi-shift)

GROUP 11: Auto grader operator, automatic slip form operator, drilling machine operator, bucket or auger types (Calweld, auger 200 **CA** or similar types - Watson, auger 6000 or similar types - Hughes Super Duty, auger 200 or similar types - drilling depth of 175' maximum), hoe ram or similar with compressor, mass excavator operator, mechanical finishing machine operator, mobile form traveler operator, motor patrol operator (multi-engine), pipe mobile machine operator, rubber-tired earth-moving equipment operator (multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck), rubber-tired self-loading scraper operator (paddle-wheel-auger type self-loading - two (2) or more units)

GROUP 12: Rubber-tired earth-moving equipment operator operating equipment with push-pull system (single engine, up to and including 25 yds. struck)

GROUP 13: Canal liner operator, canal trimmer operator, remote-control earth-moving equipment operator, wheel excavator operator

GROUP 14: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and up to and including 50 yds. struck), rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine - up to and including 25 yds. struck)

GROUP 15: Rubber-tired earth-moving equipment operator,

operating equipment with push-pull system (single engine, over 50 yds. struck), rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine,

Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

GROUP 16: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine, Euclid, Caterpillar and similar, over 50 cu. yds. struck), tandem tractor operator (operating crawler type tractors in tandem - Quad 9 and similar type)

GROUP 17: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - single engine, up to and including 25 yds. struck)

GROUP 18: Rotex concrete belt operator (or similar types), rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and up to and including 50 cu. yds. struck), rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - multiple engine, up to and including 25 yds. struck)

GROUP 19: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - single engine, over 50 yds. struck), rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps, and similar types in any combination, excluding compaction units - multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

GROUP 20: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck)

GROUP 21: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, up to and including 25 yds. struck)

GROUP 22: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and up to and including 50 yds. struck), rubber-tired earth-moving equipment operator, operating with the tandem push-pull system (multiple engine, up to and including 25 yds. struck)

GROUP 23: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, over 50 yds. struck), rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

GROUP 24: Concrete pump operator - truck mounted, rubber-tired

earth-moving equipment operator, operating equipment with the tandem push-pull system (multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck)

#### CRANES, PILEDIVING AND HOISTING EQUIPMENT CLASSIFICATIONS

GROUP 1: Engineer oiler; Fork lift operator (includes loed, lull or similar types)

GROUP 2: Truck crane oiler

GROUP 3: A-frame or winch truck operator; Ross carrier operator (jobsite)

GROUP 4: Bridge-type unloader and turntable operator; Helicopter hoist operator

GROUP 5: Stinger crane (Austin-Western or similar type); Tugger hoist operator (1 drum)

GROUP 6: Bridge crane operator; Cretor crane operator; Hoist operator (Chicago boom and similar type); Lift mobile operator; Lift slab machine operator (Vagtborg and similar types); Material hoist operator; Polar gantry crane operator; Shovel, backhoe, dragline, clamshell operator (over 3/4 yd. and up to 5 cu. yds. mrc); Tugger hoist operator

GROUP 7: Pedestal crane operator; Shovel, backhoe, dragline, clamshell operator (over 5 cu. yds. mrc); Tower crane repair; Tugger hoist operator (3 drum)

GROUP 8: Crane operator (up to and including 25 ton capacity); Crawler transporter operator; Derrick barge operator (up to and including 25 ton capacity); Hoist operator, stiff legs, Guy derrick or similar type (up to and including 25 ton capacity); Shovel, backhoe, dragline, clamshell operator (over 7 cu. yds. mrc)

GROUP 9: Crane operator (over 25 tons and up to and including 50 tons mrc); Derrick barge operator (over 25 tons up to and including 50 tons mrc); Highline cableway operator; Hoist operator, stiff legs, Guy derrick or similar type (over 25 tons up to and including 50 tons mrc); K-crane operator; Polar crane operator

GROUP 10: Crane operator (over 50 tons and up to and including 100 tons mrc); Derrick barge operator (over 50 tons up to and including 100 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 50 tons up to and including 100 tons mrc),

Mobile tower crane operator (over 50 tons, up to and including 100 tons M.R.C.); Tower crane operator and tower gantry

GROUP 11: Crane operator (over 100 tons and up to and including 200 tons mrc); Derrick barge operator (over 100 tons up to and including 200 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 100 tons up to and including 200 tons mrc); Mobile tower crane operator (over 100 tons up to and including 200 tons mrc)

GROUP 12: Crane operator (over 200 tons up to and including 300 tons mrc); Derrick barge operator (over 200 tons up to and including 300 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 200 tons, up to and including 300 tons mrc); Mobile tower crane operator (over 200 tons, up to and including 300 tons mrc)

GROUP 13: Crane operator (over 300 tons); Derrick barge operator (over 300 tons); Helicopter pilot; Hoist operator, stiff legs, Guy derrick or similar type (over 300 tons); Mobile tower crane operator (over 300 tons)

#### TUNNEL CLASSIFICATIONS

GROUP 1: Skiploader (wheel type up to 3/4 yd. without attachment)

GROUP 2: Power-driven jumbo form setter operator

GROUP 3: Dinkey locomotive or motorperson (up to and including 10 tons)

GROUP 4: Bit sharpener; Equipment greaser (grease truck); Slip form pump operator (power-driven hydraulic lifting device for concrete forms); Tugger hoist operator (1 drum); Tunnel locomotive operator (over 10 and up to and including 30 tons)

GROUP 5: Backhoe operator (up to and including 3/4 yd.); Small Ford, Case or similar; Drill doctor; Grouting machine operator; Heading shield operator; Heavy-duty repairperson; Loader operator (Athey, Euclid, Sierra and similar types); Mucking machine operator (1/4 yd., rubber-tired, rail or track type); Pneumatic concrete placing machine operator (Hackley-Presswell or similar type); Pneumatic heading shield (tunnel); Pumpcrete gun operator; Tractor compressor drill combination operator; Tugger hoist operator (2 drum); Tunnel locomotive operator (over 30 tons)

GROUP 6: Heavy-duty repair/welder combination

GROUP 7: Tunnel mole boring machine operator

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 ENGI0012D 08/01/1997

	Rates	Fringes
POWER EQUIPMENT OPERATORS:		
DREDGING:		
HYDRAULIC SUCTION DREDGES:		
Lever Person Operator	29.15	9.95
Deckmate; Watch Engineer; Welder	26.07	9.95
Winch (stern winch on dredge)	25.52	9.95
Bargehand; Deckhand; Fire		
Person-Oiler; Leveehand	24.98	9.95
Dozer	26.18	9.95
CLAMSHELL DREDGES:		
Lever Person Operator	29.15	9.95
Watch Engineer; Deckmate	26.07	9.95
Barge Mate	25.59	9.95
Bargehand; Deckhand; Fire		
Person-Oiler	24.98	9.95

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IRON0002D 07/01/1998

	Rates	Fringes
IRONWORKERS:		
Fence erector	22.79	13.17
Ornamental, reinforcing and structural	23.68	13.17

FOOTNOTE:

Work at Edwards Air Force Base: \$3.00 per hour additional.  
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LABO0001B 07/01/1998

	Rates	Fringes
BRICK TENDER	18.08	9.34

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LABO0002H 07/01/1998

	Rates	Fringes
LABORERS:		
GROUP 1	17.83	9.39
GROUP 2	18.23	9.39
GROUP 3	18.43	9.39
GROUP 4	19.48	9.39
GROUP 5	19.68	9.39

TUNNEL LABORERS:

GROUP 1	20.74	9.39
GROUP 2	20.86	9.39
GROUP 3	21.02	9.39
GROUP 4	21.30	9.39

GUNITE LABORERS:

GROUP 1	20.86	11.02
GROUP 2	19.91	11.02
GROUP 3	16.40	11.02

HOUSEMOVERS (ONLY WHERE HOUSEMOVING IS INCIDENTAL TO A CONSTRUCTION CONTRACT):

Housemover	15.50	8.38
Yard maintenance person	15.25	8.38

FOOTNOTE:

GUNITE PREMIUM PAY:

Workers working from a Bosn'n's Chair or suspended from a rope or cable shall receive 40 cents per hour above the foregoing applicable classification rates.

Workers doing gunite and/or shotcrete work in a tunnel shall receive 35 cents per hour above the foregoing applicable classification rates, paid on a portal-to-portal basis.

Any work performed on, in or above any smoke stack, silo, storage elevator or similar type of structure, when such structure is in excess of 75'-0" above base level and which work must be performed in whole or in part more than 75'-0" above base level, that work performed above the 75'-0" level shall be compensated for at 35 cents per hour above the applicable classification wage rate.

## LABORER CLASSIFICATIONS

GROUP 1: Cleaning and handling of panel forms; Concrete screeding for rough strike-off; Concrete, water curing; Demolition laborer, the cleaning of brick if performed by a worker performing any other phase of demolition work, and the cleaning of lumber; Fire watcher, limber, brush loader, piler and debris handler; Flag person; Gas, oil and/or water pipeline laborer; Laborer, asphalt-rubber material loader; Laborer, general or construction; Laborer, general clean-up; Laborer, landscaping; Laborer, jetting; Laborer, temporary water and air lines; Material hose operator (walls, slabs, floors and decks); Plugging, filling of shee bolt holes; Dry packing of concrete; Railroad maintenance, repair track person and road beds; Streetcar and railroad construction track laborers; Rigging and signaling; Scaler; Slip form raiser; Slurry seal crew (mixer operator, applicator operator, squeegee person, shuttle person, top person), filling of cracks by any method on any surface; Tar and mortar; Tool crib or tool house laborer; Traffic control by any method; Window cleaner; Wire mesh pulling - all concrete pouring operations

GROUP 2: Asbestos abatement; Asphalt shoveler; Cement dumper (on 1 yd. or larger mixer and handling bulk cement); Cesspool digger and installer; Chucktender; Chute handler, pouring concrete, the handling of the chute from readymix trucks, such as walls, slabs, decks, floors, foundation, footings, curbs, gutters and sidewalks; Concrete curer, impervious membrane and form oiler; Cutting torch operator (demolition); Fine grader, highways and street paving, airport, runways and similar type **heavy** construction; Gas, oil and/or water pipeline wrapper - pot tender and form person; Guinea chaser; Headerboard person - asphalt; Laborer, packing rod steel and pans; Membrane vapor barrier installer; Power broom sweeper (small); Riprap stonepaver, placing stone or wet sacked concrete; Roto scraper and tiller;

Sandblaster (pot tender); Septic tank digger and installer (lead); Tank scaler and cleaner; Tree climber, faller, chain saw operator, Pittsburgh chipper and similar type brush shredder; Underground laborer, including caisson bellower

GROUP 3: Buggymobile person; Concrete cutting torch; Concrete pile cutter; Driller, jackhammer, 2-1/2 ft. drill steel or longer; Dri-pak-it machine; Gas, oil and/or water pipeline wrapper, 6-in. pipe and over, by any method, inside and out; High scaler (including drilling of same); Hydro seeder and similar type; Impact wrench multi-plate; Kettle person, pot person and workers applying asphalt, lay-kold, creosote, lime caustic and similar type materials ("applying" means applying, dipping, brushing or handling of such materials for pipe wrapping and waterproofing); Operator of pneumatic, gas, electric tools, vibrating machine, pavement breaker, air blasting, come-alongs, and similar mechanical tools not separately classified herein; Pipelayer's backup person, coating, grouting, making of joints, sealing, caulking, diapering and including rubber gasket joints, pointing and any and all other services; Rock slinger; Rotary scarifier or multiple head concrete chipping scarifier; Steel headerboard and guideline setter; Tamper, Barko, Wacker and similar type; Trenching machine, hand-propelled

GROUP 4: Asphalt raker, lute person, ironer, asphalt dump person, and asphalt spreader boxes (all types); Concrete core cutter (walls, floors or ceilings), grinder or sander; Concrete saw person, cutting walls or flat work, scoring old or new concrete; Cribber, shorer, lagging, sheeting and trench bracing, hand-guided lagging hammer; Head rock slinger; Laborer, asphalt-rubber distributor boot person; Laser beam in connection with laborers' work; Oversize concrete vibrator operator, 70 lbs. and over; Pipelayer performing all services in the laying and installation of pipe from the point of receiving pipe in the ditch until completion of operation, including any and all forms of tubular material, whether pipe, metallic or non-metallic, conduit and any other stationary type of tubular device used for the conveying of any substance or element, whether water, sewage, solid gas, air, or other product whatsoever and without regard to the nature of material from which the tubular material is fabricated; No-joint pipe and stripping of same; Prefabricated manhole installer; Sandblaster (nozzle person), water blasting, Porta Shot-Blast; Welding in connection with laborers' work

GROUP 5: Blaster powder, all work of loading holes, placing and blasting of all powder and explosives of whatever type, regardless of method used for such loading and placing; Driller: All power drills, excluding jackhammer, whether core, diamond, wagon, track, multiple unit, and any and all other types of mechanical drills without regard to the form of motive power; Toxic waste removal

#### TUNNEL LABORER CLASSIFICATIONS

GROUP 1: Batch plant laborer; Bull gang mucker, track person; Changehouse person; Concrete crew, including rodder and spreader; Dump person; Dump person (outside); Swamper (brake person and switch person on tunnel work); Tunnel materials handling person

GROUP 2: Chucktender, cabletender; Loading and unloading agitator cars; Nipper; Pot tender, using mastic or other materials (for example, but not by way of limitation, shotcrete, etc.); Vibrator person, jack hammer, pneumatic tools (except driller)

GROUP 3: Blaster, driller, powder person; Chemical grout jet person; Cherry picker person; Grout gun person; Grout mixer person; Grout pump person; Jackleg miner; Jumbo person; Kemper and other pneumatic concrete placer operator; Miner, tunnel (hand or machine); Nozzle person; Operating of troweling and/or grouting machines; Powder person (primer house); Primer person; Sandblaster; Shotcrete person; Steel form raiser and setter; Timber person, retimber person, wood or steel; Tunnel Concrete finisher

GROUP 4: Diamond driller; Sandblaster; Shaft and raise work

#### GUNITITE LABORER CLASSIFICATIONS

GROUP 1: Nozzle person and rod person

GROUP 2: Gun person

GROUP 3: Rebound person

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LABO0300A 07/02/1996		
	Rates	Fringes
PLASTERER TENDER	20.05	8.88

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LABO0882B 01/01/1997		
	Rates	Fringes
ASBESTOS REMOVAL LABORER	10.37	3.51

SCOPE OF WORK: Includes site mobilization, initial site cleanup, site preparation, removal of asbestos-containing material and toxic waste (including lead abatement and any other toxic material), encapsulation, enclosure and disposal of asbestos-containing materials and toxic waste (including lead abatement and any other toxic materials) by hand or with equipment or machinery; scaffolding, fabrication of temporary wooden barriers and assembly of decontamination stations.

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LABO1184A 07/01/1998		
	Rates	Fringes
LABORERS - STRIPING:		
GROUP 1	18.36	7.85
GROUP 2	18.76	7.85
GROUP 3	20.33	7.85
GROUP 4	21.33	7.85

LABORERS - STRIPING CLASSIFICATIONS

GROUP 1: Protective coating, pavement sealing, including repair and filling of cracks by any method on any surface in parking lots, game courts and playgrounds; carstops; operation of all related machinery and equipment

GROUP 2: Traffic surface abrasive blaster; pot tender - removal of all traffic lines and markings by any method (sandblasting, waterblasting, grinding, etc.) and preparation of surface for coatings. Traffic control person: controlling and directing traffic through both conventional and moving lane closures; operation of all related machinery and equipment

GROUP 3: Traffic delineating device applicator: Layout and application of pavement markers, delineating signs, rumble and traffic bars, adhesives, guide markers, other traffic delineating devices including traffic control. This category includes all traffic related surface preparation (sandblasting, waterblasting, grinding) as part of the application process. Traffic protective delineating system installer: removes, relocates, installs, permanently affixed roadside and parking delineation barricades, fencing, cable anchor, guard rail, reference signs, monument markers; operation of all related machinery and equipment; power broom sweepers

GROUP 4: Striper: layout and application of traffic stripes and markings; hot thermo plastic; tape traffic stripes and markings, including traffic control; operation of all related machinery and

equipment

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PAIN0036A 07/01/1998

	Rates	Fringes
PAINTER (includes lead abatement):		
Work on service stations and and car washes; Small new commercial work (defined as construction up to and including 3 stories in height, such as small shopping centers, small stores, small office buildings and small food establishments); Small new industrial work (defined as light metal buildings, small warehouses, small storage facilities and tilt-up buildings); Repaint work (defined as repaint of  any structure with the exception of work involving the aerospace industry, breweries, commercial recreational facilities, hotels which operate commercial establishments as part of hotel service, and sports facilities); Tenant improvement work (defined as tenant improvement work not included in conjunction with the construction of the building, and all repainting of tenant improvement projects	20.15	5.56
All other work	23.42	5.56

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PAIN0036L 07/01/1997

	Rates	Fringes
IMPERIAL COUNTY; <b>LOS ANGELES</b> COUNTY (excluding Antelope Valley north of the following boundary: Kern County line to Hwy. #5, south on Hwy. #5 to Hwy. N2, east on Hwy. N2 to Palmdale Blvd., to Hwy. #14, south to Hwy. #18, east to Hwy. #395); ORANGE, RIVERSIDE, SAN BERNARDINO, SAN LUIS OBISPO, SANTA BARBARA AND VENTURA COUNTIES:		
DRYWALL FINISHER:		
Work on wood frame/structured residential construction	18.00	3.34
All other residential construction	24.06	5.52
KERN COUNTY; <b>LOS ANGELES</b> COUNTY (remainder of county):		

DRYWALL FINISHER:

Work on wood frame/structured residential construction	18.00	3.34
All other residential construction	20.99	5.52

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PAIN0636B 06/01/1998

	Rates	Fringes
GLAZIER	25.05	7.23

FOOTNOTES:

Work in a condor, from the third (3rd) floor and up: \$1.25 per hour additional.

Work on the outside of the building from a swing stage or any suspended contrivance, from the ground up: \$1.25 per hour additional.

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PAIN1247B 10/01/1997

	Rates	Fringes
SOFT FLOOR LAYER	24.10	6.07

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PLAS0200D 08/06/1997

	Rates	Fringes
PLASTERER	24.13	4.04

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PLAS0500B 07/01/1998

	Rates	Fringes
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CEMENT MASONS:

Work on projects where the total permit value of the general and all subcontracts is \$12 million or less:

Cement Mason; curb and gutter Machine; Clary and similar type of screed operator (cement only); grinder; Jackson vibratory, Texas screed and similar type screed operator; scoring machine operator	18.30	8.43
Cement mason (magnesite - epoxy)	18.42	8.43
Cement mason, floating and troweling machine operator	18.55	8.43
All other work:		
Cement mason; curb and gutter machine operator; Clary and similar type of screed operator (cement only); grinding machine (all types); Jackson vibratory, Texas screed and similar type screed operator; scoring machine operator	20.26	11.30
Cement mason (magnesite, magnesite - terrazzo and mastic composition, epoxy,		

urethanes and exotic coatings, Dex-O-Tex)	20.38	11.30
Cement Mason - floating and troweling machine operator	20.51	11.30

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PLUM0016A 07/01/1996		
	Rates	Fringes
PLUMBERS & PIPEFITTERS	28.31	7.54

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PLUM0250B 09/01/1997		
	Rates	Fringes
REFRIGERATION & AIR CONDITIONING	28.25	9.55

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PLUM0345A 07/01/1998		
	Rates	Fringes
LANDSCAPE & IRRIGATION FITTER	23.23	6.80

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ROOF0036B 09/01/1996		
	Rates	Fringes
ROOFERS:		
Roofer	21.77	6.385
Preparer (duties limited to the following: Roof removal of any type of roofing or roofing material; or spudding, or sweeping; and/or clean-up; and/or preload in, or in preparing the roof for application of roofing, damp and/or waterproofing material)	16.24	1.00

FOOTNOTE:

Pitch premium: Work on which employees are exposed to pitch fumes or required to handle pitch, pitch base or pitch impregnated products, or any material containing coal tar pitch, the entire roofing crew shall receive \$1.75 per hour "pitch premium" pay.

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SFCA0709B 09/01/1998		
	Rates	Fringes
<b>LOS ANGELES</b> (area within 25 miles of the City Limits of <b>Los Angeles</b> , the City of Pomona and Catalina Island); <b>ORANGE</b> (area within 25 miles of the City Limits of <b>Los Angeles</b> , the City of Santa Ana, and San Clemente Island); <b>VENTURA</b> (area within 25 miles of the City Limits of <b>Los Angeles</b> , and military installations at Point Magu and Port Hueneme) <b>COUNTIES</b>		
SPRINKLER FITTER (FIRE)	28.48	9.80

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SHEE0102A 09/01/1998		
	Rates	Fringes

SOUTH OF IMPERIAL HWY. TO THE CITY OF LONG BEACH AND THE CITIES OF POMONA AND CLAREMONT:

COMMERCIAL SHEET METAL WORKER:

Work on all commercial HVAC for creature comfort and computers clean rooms, architectural metals, metal roofing and lagging over insulation	27.51	9.00
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SHEE0102C 09/01/1998

	Rates	Fringes
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INDUSTRIAL SPECIALTIES SHEET METAL WORKER:

Work on all air pollution control systems, noise abatement panels, blow pipe, air-veyor systems, dust collecting, baghouses, heating, air conditioning, and ventilating (other than creature comfort) and all other industrial work, including metal insulated ceilings	25.21	12.32
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SHEE0108B 07/01/1997

	Rates	Fringes
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SOUTH OF A STRAIGHT LINE DRAWN BETWEEN GORMAN AND BIG PINES, CALIFORNIA; EXCLUDING LOS ANGELES COUNTY SOUTH OF IMPERIAL HWY. TO THE CITY LIMITS OF LONG BEACH, EXCLUDING THE CITIES OF LONG BEACH, CLAREMONT AND POMONA, AND THE ISLAND OF CATALINA:

COMMERCIAL SHEET METAL WORKER:

Work on commercial buildings over one year old, limited to not exceed five thousand (5,000) square feet, or less, without relation to the number of stories involved. Does not include modification, upgrading, energy management, or conservation improvements of central heating and air conditioning equipment	15.87	3.02
All other work	26.87	9.19

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SHEE0108E 01/01/1998

	Rates	Fringes
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NORTH OF A STRAIGHT LINE DRAWN BETWEEN GORMAN AND BIG PINES, CALIFORNIA:

COMMERCIAL SHEET METAL WORKER:

Light commercial work (10,000 sq. ft. or less)	13.74	2.31
All other work	22.90	8.12

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TEAM0011G 07/01/1998

	Rates	Fringes
TRUCK DRIVERS:		
Edwards Air Force Base:		
GROUP 1	21.79	11.89
GROUP 2	21.94	11.89
GROUP 3	22.07	11.89
GROUP 4	22.26	11.89
GROUP 5	22.20	11.89
GROUP 6	22.32	11.89
GROUP 7	22.57	11.89
GROUP 8	22.82	11.89
GROUP 9	23.02	11.89
GROUP 10	23.32	11.89
GROUP 11	23.82	11.89
Remainder of County:		
GROUP 1	19.79	11.89
GROUP 2	19.94	11.89
GROUP 3	20.07	11.89
GROUP 4	20.26	11.89
GROUP 5	20.20	11.89
GROUP 6	20.32	11.89
GROUP 7	20.57	11.89
GROUP 8	20.82	11.89
GROUP 9	21.02	11.89
GROUP 10	21.32	11.89
GROUP 11	21.82	11.89

#### TRUCK DRIVER CLASSIFICATIONS

GROUP 1: Truck driver

GROUP 2: Driver of vehicle or combination of vehicles - 2 axles; Traffic control pilot car excluding moving **heavy** equipment permit load; Truck-mounted broom

GROUP 3: Driver of vehicle or combination of vehicles - 3 axles; Boot person; Cement mason distribution truck; Fuel truck driver; Water truck - 2 axle; Dump truck, less than 16 yds. water level; Erosion control driver

GROUP 4: Driver of transit mix truck, under 3 yds.; Dumpcrete truck, less than 6-1/2 yds. water level

GROUP 5: Water truck, 3 or more axles; Truck greaser and tire person (\$0.50 additional for tire person); Pipeline and utility working truck driver, including winch truck and plastic fusion, limited to pipeline and utility work; Slurry truck driver

GROUP 6: Transit mix truck, 3 yds. or more; Dumpcrete truck, 6-1/2 yds. water level and over; Vehicle or combination of vehicles - 4 or more axle; Oil spreader truck; Dump truck, 16 yds. to 25 yds. water level

GROUP 7: A Frame, Swedish crane or similar; Forklift driver; Ross carrier driver

GROUP 8: Dump truck, 25 yds. or more water level; Truck repair person; Water pull - single engine; Welder

GROUP 9: Truck repair person/welder; Low bed driver, 9 axles or over

GROUP 10: Dump truck - 50 yds. or more water level; Water pull - single engine with attachment

GROUP 11: Water pull - twin engine; Water pull - twin engine with attachments; Winch truck driver - \$1.25 additional when operating winch or similar special attachments

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WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.  
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Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5(a)(1)(v)).

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In the listing above, the "SU" designation means that rates listed under that identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- \* an existing published wage determination
- \* a survey underlying a wage determination
- \* a Wage and Hour Division letter setting forth a position on a wage determination matter
- \* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations  
Wage and Hour Division

U. S. Department of Labor  
200 Constitution Avenue, N. W.  
Washington, D. C. 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator  
U.S. Department of Labor  
200 Constitution Avenue, N. W.  
Washington, D. C. 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board  
U. S. Department of Labor  
200 Constitution Avenue, N. W.  
Washington, D. C. 20210

4.) All decisions by the Administrative Review Board are final.  
END OF GENERAL DECISION

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SECTION 01200  
GENERAL REQUIREMENTS

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15. GRAFFITI REMOVAL . . . . . SECTION 01200 - PAGE 17

16. AS-BUILT DRAWINGS . . . . . SECTION 01200 - PAGE 17

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- ATTACHMENTS - **STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION**
- STANDARD PLANS OF THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
  - STANDARD DRAWINGS FOR CONSTRUCTION OF THE COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY

-- End of Table of Contents --

SECTION 01200

1. REFERENCES. The publications and standard specifications listed below form a part of this specification to the extent referenced. The publications are

The standard plans listed below form a part of this specification. References made corresponding Standard Specifications or in the other standard plans listed below.

1.1 Federal Specifications (FS).

	(Rev C) Bolts, Hexagon and Square
FS FF-N-105	Staples and Spikes: Wire, Cut and Wrought
	(Rev D; Am 2) Nut, Square, Hexagon, Cap, Slotted, Castle, Knurled,
FS MM-L-751	(Rev H) Lumber; Softwood
	(Rev G) Enamel, Alkyd, Semi-Gloss
FS TT-P-25	Exterior (Undercoat for Wood, Ready-Mixed, White and Tints)
NIST PS 1	(1983) Construction and Industrial

1.3 Standard Plans for Public Works Construction("SPPWC")(1997 Edition) - Included at the end of this section.

110-1	Driveway Approaches
	Curb and Gutter - Barrier
200-2	
203-0	Brick Sewer Manhole
	Sewer Manhole Adjustment
210-2	and Cover Locking Type
<b>312-2</b>	<b>Cover</b>
320-1	ID=900mm(36") or Larger

322-1	Manhole Pipe to Pipe (Large Side Inlet)
324-1	Manhole Shaft with Eccentric Reducer
326-1	Manhole Shaft 90mm(36") Without Reducer
328-1	Pressure Manhole Shaft With Eccentric Reducer
329-1	Pressure Manhole Shaft and Pressure Plate Detail 914mm(36") Without Reducer
351-1	CSP Flared Inlet
361-0	Trash Rack(Inclined)
380-2	Concrete Collar
600-1	Chain Link Fence and Gates
606-1	Metal Railing
617-1	Reinforced Concrete Retaing Wall Details
618-1	Masonry Retaining Wall
622-1	Concrete Block Slough Wall
630-2	610mm(24") Manhole Frame and Cover
633-3	914mm(36") Manhole Frame and Cover
635-2	Steel Step
636-1	Polypropylene Plastic Step
640-1	Reinforced Concrete Stairway

1.4 Standard Plans of the State of California Department of Transportation ("Caltrans SP")(July 1992 Edition) - Included at the end of this section.

A73A	Markers
A73B	Markers

1.5 Standard Drawings for Construction of the County Sanitation Districts of Los Angeles County(December 1994) - Included at the end of this section.

S-a-202	Standard Manhole, Type "B"
S-a-209	Standard Manhole Step
S-a-226	Standard 36" Manhole Frame

With 30" Cover

1.6 Standard Specifications for Public Works Construction by Public Works Standards, Inc. ("SSPWC" or "Green Book")(1997 Edition including 1998 Supplement).

Applicable sections referenced to in the "SPPWC" Standard Plans and project specifications.

1.7 Standard Specifications of the State of California Department of Transportation("Caltrans SS")(July 1992 Edition).

Applicable sections referenced to in the Caltrans Standard Plans and project specifications.

1.8 Amendments to the Standard Specifications for Public Works Construction, 1994 Edition, of the County Sanitation Districts of Los Angeles County.

2. PROJECT FACILITIES. The Contractor shall construct and/or erect the following project facilities:

2.1 Construction Signs. The signs shall be erected as soon as possible and within 15 days after commencement of work under this contract.

2.1.1 Five Project Signs at locations designated by the Contracting Officer.

2.1.2 Warning Signs facing approaching traffic on all roads crossing under overhead power transmission lines.

2.1.3 Six hard hat signs at locations directed.

2.2 Project Engineer's Office, including a fenced parking area.

2.3 Bulletin Board at the Contractor's office. Immediately upon beginning of work, the Contractor shall provide a weatherproof glass-covered bulletin board not less than 36 by 48 inches in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the contract, Wage Rate Information poster, and other information approved by the Contracting Officer. The bulletin board shall be located at the project site in a conspicuous place easily accessible to all employees, as approved by the Contracting Officer. Legible copies of the aforementioned data shall be displayed until work is completed. Upon completion of work the bulletin board shall be removed by and remain the property of the Contractor.

2.4 Sanitary Facilities. The Contractor shall provide and maintain within the construction area minimum field-type sanitary facilities approved by the Contracting Officer.

3. CONSTRUCTION SIGNS.

3.1 Materials.

3.1.1 Lumber shall conform to FS MM-L-751, and shall be seasoned Douglas Fir, S4S, Grade D or better except that posts, braces and spacers shall be construction Grade (WCLB).

3.1.2 Plywood shall conform to NIST PS 1, grade A-C, Group 1, exterior type.

3.1.3 Bolts, Nuts and Nails. Bolts shall conform to FS FF-B-575, nuts shall conform to FS FF-N-836, and nails shall conform to FS FF-N-105.

3.1.4 Paints and Oils. Paints shall conform to FS TT-P-25 for primer and FS TT-E-529 for finish paint and lettering.

### 3.2 Construction.

3.2.1 Project and hard hat signs shall be constructed. Decals and safety signs will be furnished by the Contracting Officer.

3.2.2 Warning Signs shall be constructed of plywood not less than ½ inch thick and shall be securely bolted to the supports with the bottom of the sign face 3 feet above the ground. The sign face shall be 2 x 4 feet, all letters shall be 4 inches in height, and the wording shall be: "WARNING: OVERHEAD TRANSMISSION LINES."

3.3 Painting. All exposed surfaces and edges of plywood shall be given one coat of linseed oil and be wiped prior to applying primer. All exposed surfaces of signs and supports shall be given one coat of primer and 2 finish coats of white paint. Except as otherwise indicated, lettering on all signs shall be black and sized as indicated.

4. PROJECT ENGINEER'S OFFICES. No later than 30 days after issuance of notice to proceed, the Contractor shall provide office facilities for the project engineer as specified in 4.1 below. The proposed floor plan shall be submitted and approved by the Contracting Officer prior to delivery. The trailer shall be delivered to 5525 East Imperial Highway, South Gate, CA and shall be placed in a location designated by the Contracting Officer.

4.1 Office Trailer (24 x 60). The Contractor shall provide a new 24' x 60' office trailer. The trailer shall be installed with appropriate hold-downs and finished with appropriate skirting around the perimeter of the trailer. The Contractor shall provide a covered deck, 8 feet wide, along the entire entrance side of the trailer. The deck shall include appropriate railing, stairs and handicapped ramp. The trailer shall be adequately heated, well lighted, suitably ventilated, and cooled with a properly sized air conditioning unit. An adequate supply of cooled drinking water shall be supplied and maintained. Sewer, permanent water supply, telephone, and electrical service shall be provided and maintained. The cost for sewer, water, and telephone usage will be the responsibility of the Government. It is estimated that the trailer will require a 200 amp, 120/240 V single phase service. However, the Contractor shall verify all utility requirements as the Government does not guarantee the accuracy of these power requirements or any existing sources. The trailer shall have two 5' x 6' bathrooms consisting of a water closet, sink and related items. The Contractor shall provide commercial grade furniture for the project engineer's office, consisting of two desks, two desk chairs, two 3' x 6' tables, a conference table with eight chairs, two each four drawer filing cabinets, two book shelves, one copy machine and one plain paper FAX machine. Items shall be maintained by the Contractor. At the conclusion of the performance period of this contract, the trailer and the furniture items described herein, shall become the property of the Government, and the Contractor's responsibilities for maintenance of the trailer as described above will cease.

4.2 Cleaning and Janitorial Services. The Contractor shall provide cleaning and janitorial services for the new trailer and also for the existing trailer located in the South Imperial Yard(also 48'x60') for the duration of the contract. Service shall be provided three times a week and all cleaning and janitorial materials(including paper towels, toilet paper and hand soap) shall be provided by the Contractor. Trash service shall also be provided(3 cy trash dumpster with weekly pick-ups).

4.3 The Contractor shall provide fencing around the Project Engineer's Office as directed by the Contracting Officer. Fencing shall be a woven wire fence approximately 6 feet high with a 10-foot wide lockable gate accessible from a road or street. The fenced area shall be of sufficient size to permit ease in the parking of vehicles and a 10 foot clearance around the structure.

5. MAINTENANCE OF PROJECT FACILITIES.

5.1 General. The Contractor shall maintain the project facilities in good condition throughout the life of the project. Upon completion of work under this contract, the contractor-furnished facilities covered under this section will remain the property of the Contractor and shall be removed from the site at his expense.

6. SCRAP MATERIAL. Materials indicated to be removed and not indicated to be salvaged, stored or reinstalled are designated as scrap and shall become the property of the Contractor and be removed from the site of work. The Contractor by signing this contract hereby acknowledges that he made due allowance for value, if any, of such scrap in the contract price.

7. SALVAGE MATERIALS. All materials removed and indicated to be either stored or reinstalled are designated as salvaged materials. Any salvaged materials which are excess upon completion of the work and are not indicated to be stored shall become the property of the Contractor.

**8. STAGING AREAS. Contractor may use the staging areas provided by the Government at the locations shown on Sheet 6 of the Project Drawings. Contractor's use of these staging areas is subject to all the environmental provisions contained in SECTION 01430 ENVIRONMENTAL PROTECTION. After Contractor's use of each staging area, the Contractor shall remove all equipment, materials and debris from the staging area and restore the staging area to its pre-construction condition.**

9. PUBLIC UTILITIES, NOTICES, AND RESTRICTIONS.

9.1 General. The approximate location of all railroads, pipe lines, power and communication lines, and other utilities known to exist within the limits of the work are indicated on the drawings. The sizes, locations, and names of owners of such utilities are given from available information, but their accuracy is not guaranteed. Except as otherwise indicated on the drawings, all existing utilities will be left in place and the Contractor shall conduct his operations in such a manner that the utilities will be protected from damage at all times, or arrangements shall be made by the Contractor for their relocation at the Contractor's own expense. The Contractor shall be responsible for any damage to utilities known to exist and shall reimburse the owner for such damage caused by his operations.

9.2 Relocation or Removal. Utilities to be relocated or removed not as part of this contract are designated "To be Relocated by Others" or "To be Removed by Others," respectively. Utilities shown on the plans and not so designated will be left in place and be subject to the clause of the contract: PROTECTION OF EXISTING VEGETATION, STRUCTURES, UTILITIES, AND IMPROVEMENTS of the CONTRACT CLAUSES. The Contractor may make arrangements with the owner for the temporary relocation and restoration of utilities not designated to be relocated, or for additional work in excess of the work needed to relocate utilities designated for relocation at no additional cost to the Government.

9.3 Utilities Not Shown. If the Contractor encounters, within the construction limits of the entire project, utilities not shown on the plans and not visible as of the date of this contract and if such utilities will interfere with

construction operations, he shall immediately notify the Contracting Officer in writing to enable a determination by the Contracting Officer as to the necessity for removal or relocation. If such utilities are left in place, removed or relocated, as directed by the Contracting Officer, the Contractor shall be entitled to an equitable adjustment for any additional work or delay.

#### 9.4 Coordination.

9.4.1 Utilities. The Contractor shall consult and cooperate with the owner of utilities that are to be relocated or removed by others to establish a mutual performance schedule and to enable coordination of such work with the construction work. These consultations shall be held as soon as possible after award of the contract or sufficiently in advance of anticipated interference with construction operations to provide required time for the removal or relocation of affected utilities.

9.4.2 Concurrent Construction. Contractor's attention is directed to the following future Government and private projects that are located within the Rio Hondo Channel right of way and are scheduled to be constructed concurrently with this contract:

<u>Project</u>	<u>Proposed Construction Schedule</u>
1) Pier Nose Extensions at Whittier Blvd and at Telegraph Ave. Bridges.	May 1999 to Sept 1999
2) Pier Modifications at Firestone Blvd, SPRR(N)(N/O Telegraph Rd), SPRR(S)(N/O Firestone Blvd) and Splash Guards at Suva St.	June 1999 to Sept 1999
3) Removal of Ex. Pedestrian Bridge at Sta 129+00 and Construction of New Ped. Bridge at Approx. Sta 100+00 (North of UPRR(S)).	June 1999 to Sept 1999
4) Relocation of 10" Waterline on Ex. Pedestrian Bridge at Sta 129+00.	Start: June 1999
5) Widening of UPRR Bridge (downstream of Whittier Blvd)	May 1999 to Sept 2000
6) Raising of B.N.&.S.F.C. RR Bridge at Sta 268+26.	Start: June 1999
7) Construction of Trunk Sewer in the Left Levee from Just D/S of I-5 U/S to Just U/S of Washington Blvd.	Start: June 1999

Contractor shall allow the contractor of each of the above projects joint-use of the channel right of way to gain vehicular and equipment access to its project site(s). The Contractor shall coordinate his activities with each of the contractors to allow for the timely completion of all the projects.

#### 9.5 Notices.

9.5.1 Utilities To be Relocated or Protected. Unless otherwise specified, the Contractor shall notify the Contracting Officer, in writing, 30 calendar days prior to starting work on any utility to be protected. On each protection,

notification shall include dates on which the Contractor plans excavation, and construction work, as applicable. The Contractor shall also notify the following representatives of utility owners not less than 14 days, unless otherwise specified, prior to start of work in the vicinity of their respective utilities:

Arco Pipe Line Co.  
Mr. Robert Streed  
Telephone: (310) 428-9483

County Sanitation District of Los Angeles County  
Mr. John Redner  
Telephone: (213) 774-7272

General Telephone Company  
Mr. Stephen Deck  
Telephone: (714) 375-6706

Southern California Gas Company  
ML 8286 Box 3249  
Los Angeles, CA 90051-1249  
Mr. Larry Jacquez  
Telephone: (213) 689-4169 (Mon-Fri)  
(213) 881-8113 (Sat/Emergency)

Central Basin Municipal Water District(Reclaimed Water)  
17140 South Avalon Boulevard  
Carson, CA 90746

City of Downey  
Water and Sanitation Division  
Mr. Gary Stewart, Assistant Superintendent of Water  
(562)904-7202

**City of Los Angeles Department of Water and Power(Transmission)**  
**Mr. Richard Schweiner**  
**Telephone: (818)771-4572**  
**(213)367-3236(Emergency)**

Southern California Edison Company (Distribution)  
500 N. State College  
Suite 750  
Orange, CA 92668  
Mr. Mark Meizner  
Telephone: (714) 939-4736 (Mon-Fri)  
(714) 646-2914 (Sat/Emergency)

Southern California Edison Company (Transmission)  
Mr. Wally Zimmerman  
Telephone (310) 608-5131

Metropolitan Fiber Systems  
R. Wilson  
(714)289-0085

Mobil Oil Corporation  
Teri A. Shinde  
(310)212-1794

Pacific Bell  
3939 E. Coronado  
Anaheim, CA 92807  
Mr. Ian Mac Innes  
Telephone: (714) 666-5715

Pacific Energy Resources  
Mr. David Dalmann  
Telephone: (310) 436-6566

Sprint  
Mr. Jack R. Fry  
(714)781-7053

Texaco Trading and Transportation, Inc.  
Mr. Roger Ang  
Telephone: (805) 328-2338

Tosco Distribution Company  
(562)906-7558

9.5.2 Permanent Utility Relocations by Others. Except as otherwise specified, the Contractor shall notify the Contracting Officer, in writing, not less than 14 days in advance of the date on which he will complete trenching, excavation, fill or rough grading, as applicable, at each location where such completed work is required for temporary or permanent relocations by others. The Contractor shall allow a period of 14 calendar days at each relocation, after which time the Contractor may resume his operations.

9.5.3 Unocal. The Contractor shall notify the Unocal at least forty-eight (48) hours prior to any work in the vicinity of UNOCAL facilities. The P.O.C's are Mr. V. Hayes, Energy Resources (310) 946-6242 and Mr. Todd Dvorak, Pipeline Division (310) 538-7711.

9.5.4 The Contractor shall notify Mr. Ken McGuire of the Los Angeles County Department of Public Works 14 days prior to start of construction to post notification for the homeless to remove their personal belongings out of the project area; telephone (310)861-0316.

9.5.5 Police, Highway Patrol, and Fire Department. Police, Highway Patrol, and Fire Department shall be notified by the Contractor whenever a street is to be closed to traffic. If the closing is to be of long duration, a single notification to each department on the last working day before closing will be sufficient. A single notification shall then be made at the time the street is again opened to traffic. If the closing is to be of short duration or if different sections of the streets are to be closed at different times, notifications shall be made on a day-to-day basis.

9.5.6 Existing Bench Marks and R/W Markers. The Contractor shall notify the Contracting Officer, in writing, 7 days in advance of the time he proposes to remove any bench mark or right-of-way marker.

9.5.7 Spill Reporting. The Contractor shall notify the Contracting Officer immediately after all spills, regardless of quantity, including all personnel exposures. The Contractor shall submit a written notification not later than 7 calendar days after the initial notification. The written notification shall include the following:

a. Item spilled, leaked or released in an unauthorized manner  
(Identification, Quantity and Manifest Numbers)

- b. Whether the amount spilled, leaked or released in an unauthorized manner is EPA reportable and, if reported, a copy of the report.
- c. Exact location of the spill, leak or unauthorized release.
- d. Nature of exposure to personnel.
- e. Containment procedures initiated.
- f. Anticipated cleanup and disposal procedures.
- g. Disposal location of spill, leak or unauthorized release residue.

**9.5.8 Chevron Pipe Line Company(CPL). To maintain compliance with Pipeline Safety Laws and Chevron Pipe Line Company (CPL) policy, Contractors shall comply with the following minimum facilities inspection requirements:**

1. A CPL representative must be present whenever Contractors are working over or near CPL facilities.
2. Notify CPL Facilities Inspection Office at (714) 228-1503 and Underground Service Alert at: (800) 227-2600 a minimum of two working days prior to any on-site work.
3. Excavators must verify exact elevations/depth of cover (DOC) of CPL facilities in conflict with the project by excavating with hand tools. CPL Facilities are to be exposed by hand digging only, before using power-operated equipment over or within pipeline easements operated or maintained by CPL. DOC information is proprietary and confidential property of Chevron Pipeline Company. The Project Design Team and Excavation Contractors may use data obtained, for the sole purpose of assisting with design of the project, to determine proper excavation techniques and construction requirements, to protect the pipelines in place during performance of project activity over or near CPL and to prevent unauthorized and illegal encroachment of CPL facilities.
4. CPL facilities must be protected from hazards causing pipelines to move or sustain abnormal loads, or excess localized stress and potential pipeline rupture. Anticipated external loads must be provided for during construction and upon completion of approved improvements over or near CPL facilities. DOC data must be obtained for calculation of safe load bearing factors to be determined before deployment of heavy equipment or placement of load-bearing structures over CPL product pipelines.
5. Final DOC over CPL facilities must meet minimum Department of Transportation depth of cover requirements, plus maximum allowable external load application and approved by CPL Engineering/Technical Services Department. Adequate ground cover is required and critical for maintaining safe pipeline operations. Existing cover over CPL is to be field verified by the Project Excavation Contractors under observation of the assigned CPL Facilities Inspector.
6. Specific details of proposed foreign utilities crossing CPL are required to be planned in advance with CPL. Installation of utility crossings must be placed below CPL facilities and provide 24" clearance if feasible, but not less than minimum 12" of clearance is required for any utility crossings.

Only lateral service crossings are permitted within CPL easements. Parallel utilities are not permitted.

7. CPL facilities are Cathodically Protected: In event of improvements proposing any metallic pipes or structures in proximity to the easement, it is absolutely necessary that arrangements be made for the protection of CPL facilities in order to prevent problems of electrical interference upon the pipelines.

8. Backfill must protect coating and support pipe. Only rock free native soil or clean sand may be used as backfill material. No cement slurry allowed within 12" of CPL pipelines.

9. No unapproved structures are permitted (e.g., foundations, footings, trees, etc.) within CPL easements.

10. Proposed structures or improvements adjacent to CPL easement boundaries require engineering/technical calculations to determine safe construction offset distances, appropriate angle of repose, surcharge or overburden factors, to insure prevention of undermining proposed improvements in the event of future CPL pipeline maintenance or emergency excavations to access pipeline facilities.

11. If it is determined by CPL Engineering/Technical Services that adequate cover, clearance or protection from load bearing forces cannot be obtained within the scope of proposed Project Design, then CPL would require CPL facilities to be relocated, lowered in place or additional fill placed above the pipelines. Except express terms and conditions in reference to responsibility for costs, it is expected, that improvements requiring pipeline system design changes that CPL would be reimbursed for actual costs to perform work for such changes (i.e., changes in DOC, lowering, relocation or removal of pipelines to accommodate new construction improvements for Project Site Development).

12. That all Developers and Contractors associated with the project agree to sign and abide by the terms of the Acknowledgment of Line Crossing Procedures and/or Hazardous Liquid Substructure Notification, as specified at time of construction by the CPL Facilities Inspector.

9.5.9 County Sanitation Districts of Los Angeles County(CSD). The installation of plastic liner plates for the adjustment of sanitary sewer manholes shall be performed in accordance with the following requirements:

a. Plastic liner material and installation shall be in accordance with Section 210-2 and 311-1 of the Standard Specifications for Public Works Construction (1997 Edition and its 1998 Supplement).

b. Contractor shall submit layout drawings of plastic liner to be used by installation and inspection personnel. District details may be used by the Contractor by reference (detail number, letter or type and CSD drawing sheet no.) On the Contractor's layout drawings, details not indicated here and which are required to complete the work shall be submitted along with the layout drawings for CSD review and approval.

c. The shape of the locking extensions shown is not mandatory and the size and spacing indicated are the minimum requirements. Contractor may submit alternative details to the Engineer for review and for approval.

d. Contractor shall exercise care during the cutting, notching and/or removing of locking extensions from the plastic liner. Any detrimental cuts, gouges or damage to the main sheet which cannot be properly repaired will be cause for rejection. Where liner is to overlap, locking extensions shall be removed to within 1/32" of the surface of the main sheet.

e. Back-up tape shown in the joint and edge details shall be gummed vinyl or polyethylene water proof tape with demonstrated adherence to plastic liner. The tape shall be minimum 6.5 mils thick and 2" wide. Contractor shall submit data sheets and sample to the Engineer for review and approval. The 1" weld strip shall be used in lieu of the tape wherever possible.

f. All joints between the plastic liner and metal, concrete, pipes, and around anchor studs penetrating the liner shall be thoroughly sealed with urethane mastic as manufactured by Linabond Inc., Los Angeles, California (213) 650-6077. Adhesive used to fasten plastic liner plain sheet to concrete or to plastic liner with locking extensions shall be the Linabond Co-Lining System as manufactured by Linabond Inc. Preparation of surfaces and application of sealant; preparation of concrete surfaces and application of primer, adhesive and cross-link activator shall be in strict conformance with the instructions of and to the satisfaction of Linabond Inc.

g. Locking extensions in the wall of the structures shall be placed vertically. At the bottom edge there shall be a termination strip with locking extensions placed horizontally.

h. All field joints shall be double-welded, front and back. All back welds shall be inspected visually and trowel-probed prior to placing concrete. Back-up tape may be used only at pre-approved locations with written permission of the Engineer.

i. All plastic liner plate sheets joined in the shop shall be fabricated by lapping basic size sheets a minimum of ½-inch and fusing the sheets together by high frequency dielectric fusion to produce continuous welded seams. All shop welds shall be inspected by visual inspection, trowel-probing and spark testing prior to shipment from the manufacturer.

j. When the lining installation is complete. The entire lining, including all welds, shall be tested with a high voltage pinhole or Holiday detector. Any defects shall be repaired per the special provisions before placing the lining into service.

k. Plastic-tipped chairs or 2-inch wide concrete blocks used to support reinforcing steel shall be placed between locking extensions on the plastic liner plate.

9.5.10 Tom Tedesco (Owner of Private Property Adjoining Left Levee Between Station 93+20 and Firestone Boulevard). Contractor shall notify owner at least 7 days prior to performing any work on owner's property.

9.6 Restrictions.

9.6.1 Representatives of Other Agencies. Personnel representing owners and agencies may be present for various portions of the work. However, the Contractor will be responsible only to the Contracting Officer.

9.6.2 The Contractor will not be permitted to cross existing paved roadways and residential roadways with construction equipment except at approved marked crossings. The Contractor shall maintain the crossings in accordance with applicable state, county, and city regulations.

9.6.3 Working Hours. The Contractor shall restrict all construction activities, including warming equipment, to the following schedule:

Monday through Friday	7 a.m. to 7:00 p.m.
Saturday	9 a.m. to 6:00 p.m.

Access to the job site will be allowed 30 minutes prior to starting time unless otherwise approved by the Contracting Officer. No work will be permitted on Sundays or Federal Holidays.

9.6.4 Bicycle Trail and Equestrian Trail Closures and Detours.

9.6.4.1 Closures and Detours. The bicycle trail and equestrian trail (where it is aligned on the top of the levee or is aligned along the backside of the levee) shall be closed during any construction in the portions of the channel levees and rights of way where a bicycle trail and/or equestrian trail exists. Contractor shall secure all trail openings in the channel right of way fencing to prevent use of the trails during construction. All other openings in the fence, except those accommodating DPW gates, shall also be secured by the Contractor. The trail openings and all the other openings shall be secured in a manner that is at least equivalent to the existing to prevent unauthorized access into the construction area. Signage with the limits, date and time of closure shall be posted along the trails in both directions two (2) weeks prior to the actual closing of the trails. Signage shall contain the period and extent of closure. The Contractor shall notify Greg Jaquez, Los Angeles County Department of Public Works (DPW) Bikeways Coordinator (626) 458-3941 and Jim Parks of the Los Angeles County Department of Parks and Recreation (DPR) (213) 738-2965, at least one (1) month prior to bicycle trail and equestrian trail closures and immediately after the signs have been placed.

9.6.5 Levee and Parapet Wall Construction. The contractor will be allowed to do any work on the landward side or the top of the levee during the flood season, November 15 to April 15, provided that the work does not effectively remove any more than the top one foot of the levee. This limitation will not impact the construction of the levee in the fill areas. In the fill areas only 2 feet of the concrete side slope will be removed and therefore approximately 1 foot of vertical drop in levee height is required to extend the concrete side slope to the proposed elevation. However, the excavation for the footing of the parapet wall will require approximately 6 feet of the concrete channel slope to be removed. This equates to approximately 3 feet vertically. Therefore, the contractor is restricted from building the parapet walls during the November 15 to April 15 rainy season unless the contractor can demonstrate, to the satisfaction of the Contracting Officer, that the parapet wall can be constructed by removing only a two foot portion of the concrete channel slope and reducing the effective levee height by 1 foot.

9.6.6 Special Considerations.

9.6.6.1 Construction Headings. Due to the magnitude of the project and the short contract duration, **four** construction headings are required: **two** for the reach between Firestone Boulevard and the Santa Ana Freeway and **two** for the reach

between the Santa Ana Freeway and Whittier Narrows Dam. Additional contractor supervisory personnel are also required. See SECTION 01451: CONTRACTOR QUALITY CONTROL.

9.6.6.2 Installation of irrigation main lines:

a. North of Whittier Blvd - left levee: installation shall start no earlier than 1 May.

b. South of Whittier Blvd - right levee: installation shall start no earlier than 1 July.

c. South of Whittier Blvd - left levee: installation shall start no earlier than 1 August.

9.6.6.3 Seed for hydroseeding shall be sown from October 1st to March 1st. See Section 02935A, paragraph 3.1.1.

**10. ARCHAEOLOGICAL FINDINGS DURING CONSTRUCTION.** Should the Contractor or any of his employees in the performance of this contract find or uncover any archaeological remains, he shall notify the Project Engineer immediately. Such notifications will be a brief statement in writing giving the location and nature of the findings. Should the discovery site require archaeological studies resulting in delays and/or additional work, the Contractor will be compensated by an equitable adjustment under the CONTRACT CLAUSES of the contract.

**11. PUBLIC SAFETY.** Attention is directed to the CONTRACT CLAUSE: PERMITS AND RESPONSIBILITIES. The Contractor shall furnish, install, maintain and remove temporary fencing, barricades, and/or guards, as required, to provide protection in the interest of public safety and in conformance with applicable Federal, State, and local laws and ordinances. As a minimum, this will include an 8-foot chain-link fence which completely encloses each and every part of the project which the Contractor worked in or is working on. The plan of this temporary fencing shall be furnished to the Contracting Officer for approval and the fence erected prior to commencement of any work. Whenever the Contractor's operations create a condition hazardous to the public, he shall furnish at his own expense and without cost to the Government, such flagmen and guards as are necessary to give adequate warning to the public of any dangerous conditions to be encountered and he shall furnish, erect, or maintain such fences, barricades, lights, signs and other devices as are necessary to prevent accidents and avoid damage or injury to the public. Flagmen and guards, while on duty and assigned to give warning and safety devices, shall conform to applicable city, county, and state requirements. Should the Contractor appear to be neglectful or negligent in furnishing adequate warning and protection measures, the Contracting Officer may direct attention to the existence of a hazard and the necessary warning and protective measures shall be furnished and installed by the Contractor without additional cost to the Government. Should the Contracting Officer point out the inadequacy of warning and protective measures, such action of the Contracting Officer shall not relieve the Contractor from any responsibility for public safety or abrogate his obligation to furnish and pay for those devices. The installation of any general illumination shall not relieve the Contractor of his responsibility for furnishing and maintaining any protective facility.

**12. OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA) STANDARDS.** The OCCUPATIONAL SAFETY and HEALTH ACT (OSHA) STANDARDS for CONSTRUCTION (Title 29, Code of Federal Regulations Part 1926 as revised from time to time) and the Corps of Engineers General Safety and Health Requirements Manual, EM 385-1-1, are both applicable to this contract. The most stringent requirement of the two standards will be applicable.

**12.1 Accident Reporting.** In accordance with EM 385-1-1, the Contractor shall submit a written summary of worker's compensation claims which have been filed by worker's in connection with work on the project. The summary shall be submitted at the time when the work is approximately 50 percent complete and at project completion. The summary shall include all subcontractors. The Contractor's and subcontractor's compensation insurance carrier shall certify that the summaries are "correct and true".

**13. PERMITS.**

**13.1 General.** Reference is made to the clause of the contract entitled "Permits and Responsibilities," which obligates the Contractor to obtain all required licenses and permits, including, but not necessarily limited to the following specified hereinbelow.

**13.1.1 National Pollutant Discharge Elimination System (NPDES) Permit.** The project requires an NPDES permit from the California State Water Resources Control Board, Division of Water Quality. The general permit requires development and implementation of Storm Water Pollution Prevention Plan (SWPPP), which shall be maintained on-site throughout the construction period. A copy of a plan will be furnished to the Contractor by the Government. The Contractor shall maintain a current copy of the plan on-site, and shall comply with all provisions of the plan. Modifications to the plan as necessary to reflect Contractor's construction methods shall be submitted by the Contractor to the Government for approval.

**13.1.2 City of Los Angeles Department of Water and Power(LADWP) Restoration Bond.** Contractor shall post a \$50,000 bond with LADWP to assure restoration of LADWP property along and adjoining the left levee from approximate Station 138+00(just south of Florence Avenue) to the Santa Ana Freeway. Contact Mr. Ron Brown of LADWP at (213)367-0573.

**14. REQUIRED INSURANCE.** Contractor shall maintain insurance in full force and effect throughout the term of this contract. The policy or policies of insurance maintained by Contractor shall provide the limits and coverages as set forth herein below.

**14.1** Insurance shall be in force the first day of the term of this contract.

**14.2** Each insurance policy required by this Contract shall contain the following clauses:

a. "This insurance shall not be canceled, limited in scope of coverage or nonrenewed until after thirty (30) days written notice has been given to Los Angeles County, Department of Public Works, 900 S. Fremont Avenue, P.O. Box 1460, Alhambra, CA 91802.

b. "All rights of subrogation are hereby waived against the County of Los Angeles, and the members of the Board of Supervisors and elective or appointive officers or employees, when acting within the scope of their employment or appointment, and County Districts and their Board or Commissions which are governed by the County Board of Supervisors."

c. "As respects operation of the named insured performed on behalf of the Government, the following are added as additional insureds:

The County of Los Angeles, the City of Bell Gardens, City of Commerce, City of Downey, City of Montebello, City of Pico Rivera and City of South Gate.

LIABILITY INSURANCE

<u>Coverage</u>	<u>Minimum Limits</u>
Comprehensive General Liability including Completed Operations, Broad Form Property Damage Endorsement, and Comprehensive Automobile Liability	\$1,000,000.00 combined single limit per occurrence.
Worker's Compensation	Statutory

**14.3** Worker's Compensation. Each liability and worker's compensation insurance policy required by this contract shall contain clause numbers 13.2 (a.) and (c.) above, and the following clause:

"It is agreed that any insurance maintained by the County of Los Angeles will apply in excess of, and not contribute with, insurance provided by this policy."

**14.3.1** The procuring of such required policies of insurance shall not be construed to limit Contractor's liability hereunder not to fulfill the indemnification provisions and requirements of this Contract.

**14.3.2** Contractor agrees to indemnify and save harmless Agency, its officers, and employees from and against any and all claims, demands, losses, defense costs, or liability of any kind or nature which Agency, its officers, agents and employees may sustain or incur or which may be imposed upon them for injury to or death of persons, or damage to property as a result of, arising out of, or in any manner connected with Contractors performance under the terms of this contract, excepting only liability arising out of the sole negligence of Agency.

**15.** GRAFFITI REMOVAL. The Contractor shall remove or cover all graffiti found in the work area within 48 hours of findings.

**16.** AS-BUILT DRAWINGS.

**16.1** General. The Contractor shall prepare and furnish the as-built drawings for the project. The as-built drawings shall be a record of the construction as installed and completed by the Contractor. They shall include all the information shown on the contract set of drawings and a record of all deviations, modifications, or changes from those drawings, however minor, which were incorporated in the work, all additional work not appearing on the contract drawings, and all changes which are made after final inspection of the contract work. In event the Contractor accomplishes additional work which changes the as-built conditions of the facility after submission of the as-built drawings, the Contractor shall furnish revised and/or additional drawings as required to depict as-built conditions. The requirements for these additional drawings will be the same as for the as-built drawings included in the original submission. The drawings shall show the following information, but not be limited thereto:

(a) The location and description of any utility lines or other installations of any kind or description known to exist within the construction area. The location includes dimensions to permanent features.

(b) The location and dimensions of any changes within the building or structures.

(c) Correct grade or alignment of roads, channels, structures or utilities if any changes were made from contract plans.

(d) Correct elevations if changes were made in site grading.

(e) Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor including but not limited to fabrication, erection, installation plans and placing details, pipe sizes, dimensions of equipment foundations, etc.

(f) The topography and grades of all drainage installed or affected as a part of the project construction.

(g) All changes or modifications which result from the final inspection.

**16.2 Preliminary As-Built Drawings.** The Contractor shall maintain one (1) set of full size, blue-line prints marked up in red to show the as-built conditions. This set of as-built prints shall be kept current and available at the job site at all times. All changes from what is shown on the contract plans, whether it be from changes requested by the Contracting Officer or resulting from additional information which might be uncovered in the course of construction, shall be accurately and neatly recorded as they occur by means of details and notes. The marked-up as-built prints will be jointly inspected for accuracy and completeness by the Contracting Officer and Contractor prior to submission of each monthly pay estimate. Information to be included on these preliminary drawings shall conform to the requirements as stated above. Any and all as-built modifications shall be reflected on all sheets affected by the modifications.

**16.2.1 Review Submittal.** Not later than 14 calendar days after acceptance of the project by the Government, the Contractor shall deliver to the Contracting Officer one (1) full size set of blue-line drawings marked up to depict the as-built conditions. If upon review, the drawings are found to contain errors and/or omissions, they shall be returned to the Contractor for corrections.

**16.3 Computer Drawing Files (CADD).**

**16.3.1 General.** The Contractor shall develop the final computer file as-built drawings from the approved preliminary drawings. The computer files shall be delivered in MicroStation file format DGN, a Computer Aided Design and Drafting (CADD) program. Drawings shall be prepared in general accordance with the Los Angeles District manual "Standards Manual for U.S. Army Corps of Engineers Computer-Aided Design and Drafting (CADD) Systems".

**16.3.2 Original contract CADD files.** The Government will provide all the computerized drawing files, along with a listing and description of the file contents, used to produce plans to advertise this contract on a CD Rom.

**16.3.3 Delivery.** Prior to finalizing the plans, two sets of drawings shall initially be provided to the Contracting Officer for review and approval. The Contracting Officer shall complete his review within ten (10) working days. Upon final approval, the Contractor shall furnish two (2) full size sets and two (2) half size sets of the final as-built plans on reproducible mylars, and the computerized project files in MicroStation file format DGN on CD ROM. All project files, whether revised or not, shall be provided to the Contracting Officer.

**17. NOTICE OF PARTNERSHIP.** The Government intends to encourage the foundation of a cohesive partnership with the Contractor and its subcontractors. This partnership will be structured to draw on the strengths of each organization to identify and achieve reciprocal goals. The objectives are effective and efficient contract performance and intended to achieve completion within budget, on schedule, and in accordance with plans and specifications. This partnership would be bilateral in makeup, and participation will be totally voluntary. Any cost associated with effectuating this partnership will be agreed to by both parties and will be shared equally with no change in contract price. To implement this partnership initiative, it is anticipated that within 60 days of Notice to Proceed

the Contractor's on-site project manager and the Government's Resident Engineer would attend a one or two day partnership development seminar/team building workshop together with the Contractor's key on-site staff and key Government personnel. Follow-up workshops of 1 to 2 days duration would be held periodically throughout the duration of the contract as agreed to by the Contractor and Government.

**18. TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER (ER 415-1-15, 31 OCT 89).**

**18.1** This provision specifies the procedure for determination of time extensions for unusually severe weather in accordance with the Contract Clause entitled: DEFAULT (FIXED PRICE CONSTRUCTION). In order for the Contracting Officer to award a time extension under this clause, the following conditions must be satisfied:

(a) The weather experienced at the project site during the contract period must be found to be unusually severe, that is, more severe than the adverse weather anticipation for the project location during any given month.

(b) The unusually severe weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without the fault or negligence of the Contractor.

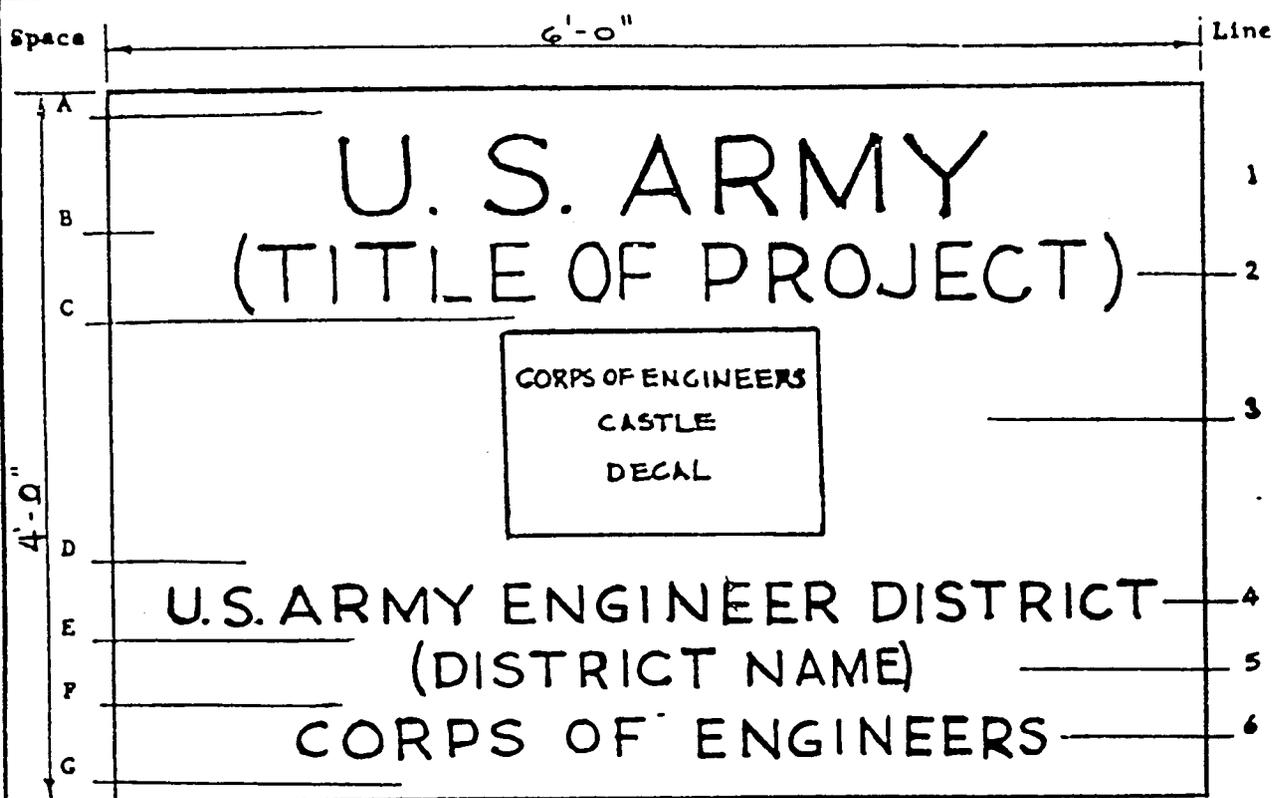
**18.2** The following schedule of monthly anticipated adverse weather delays will constitute the base line for monthly weather time evaluations. The Contractor's progress schedule must reflect these anticipated adverse weather delays in all weather dependent activities.

MONTHLY ANTICIPATED ADVERSE WEATHER DELAY WORK DAYS BASED ON FIVE (5) DAY WORK WEEK

<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>
10	10	2	1	0	0	1	1	3	3	5	5

**18.3** Upon acknowledgment of the Notice to Proceed (NTP) and continuing throughout the contract, the Contractor will record on the daily CQC report, the occurrence of adverse weather and resultant impact to normally scheduled work. Actual adverse weather delay days must prevent work on critical activities for 50 percent or more of the Contractor's scheduled work day. The number of actual adverse weather days shall include days impacted by actual adverse weather (even if adverse weather occurred in previous month), be calculated chronologically from the first to the last day of each month, and be recorded as full days. If the number of actual adverse weather delay days exceeds the number of days anticipated in subparagraph 18.2, ABOVE, the Contracting Officer will convert any qualifying delays to calendar days, giving full consideration for equivalent fair weather work days. and issue a modification in accordance with the Contract Clause entitled: DEFAULT (FIXED PRICE CONSTRUCTION).

End of Section --



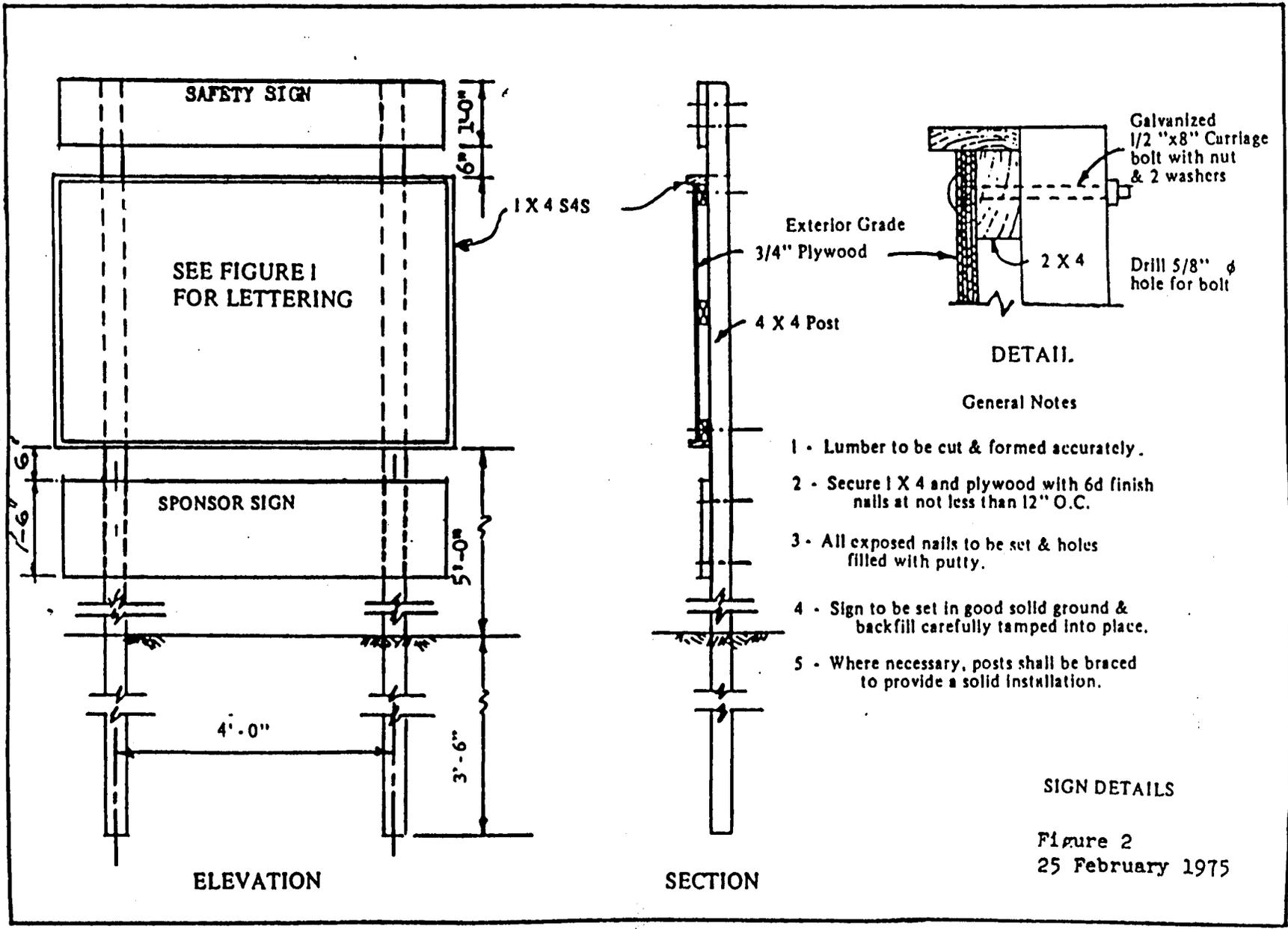
SCHEDULE

<u>Space</u>	<u>Height</u>	<u>Line</u>	<u>Description</u>	<u>Letter Height</u>	<u>Stroke</u>
A	3"	1	U. S. ARMY	5 1/2"	7/8"
B	2"	2	PROJECT NOMENCLATURE	4"	5/8"
C	2"	3	CORPS OF ENGINEERS CASTLE (DECAL)	1 1/2"	--
D	3"	4	U. S. ARMY ENGINEER DISTRICT	2 3/4"	3/8"
E	2"	5	DISTRICT NAME	2 1/4"	1/4"
F	2"	6	CORPS OF ENGINEERS	2 1/2"	3/8"
G	3"				

Lettering Color -- Black

PROJECT SIGN  
(Army-Civil Works)

Figure 1  
14 August 1972



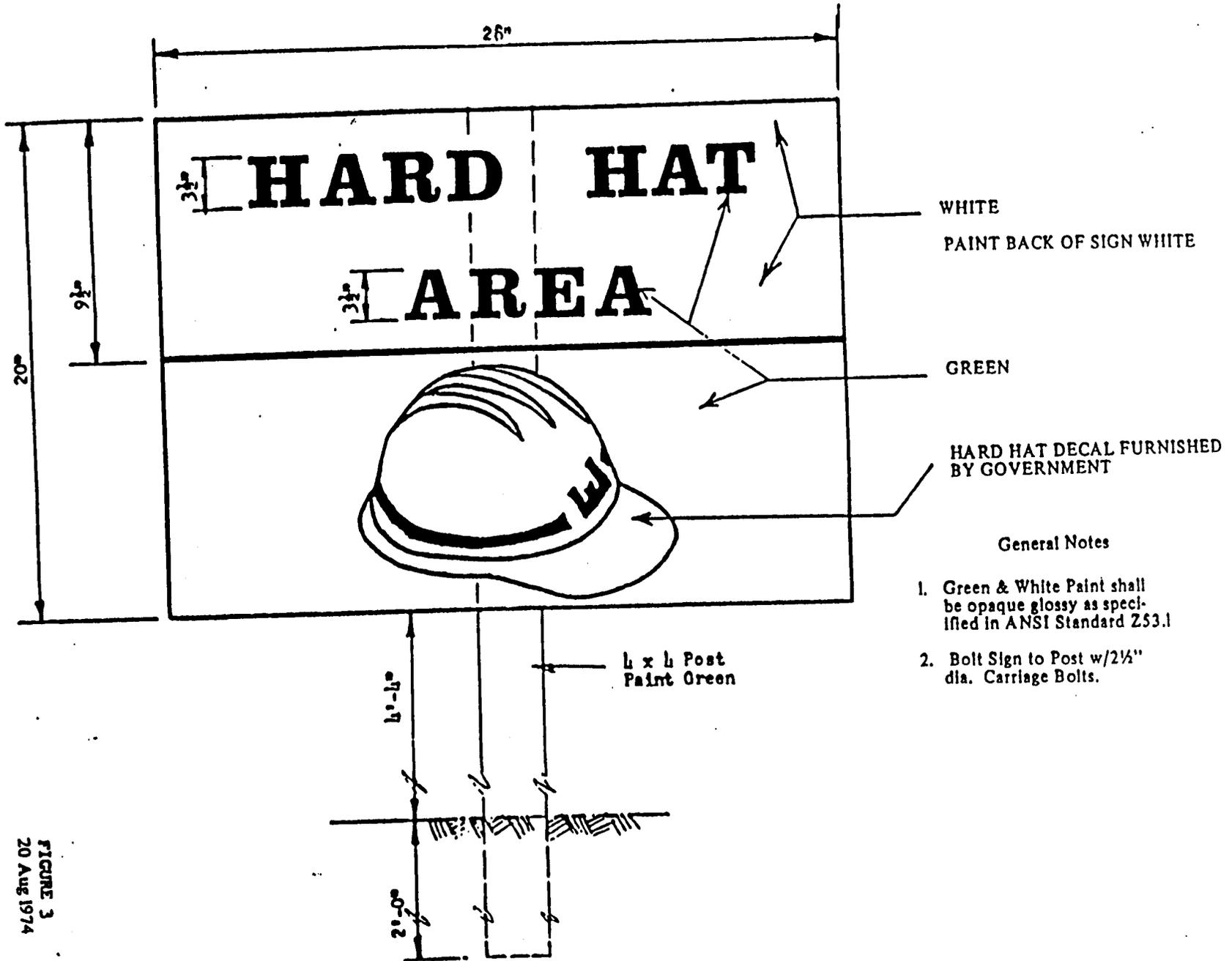
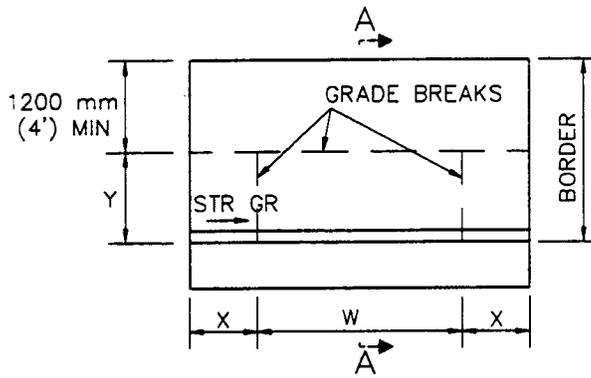
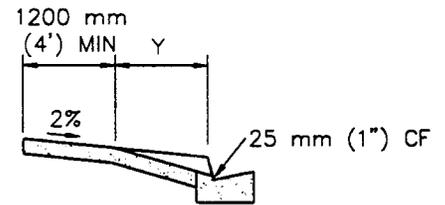


FIGURE 3  
20 Aug 1974



TYPE A

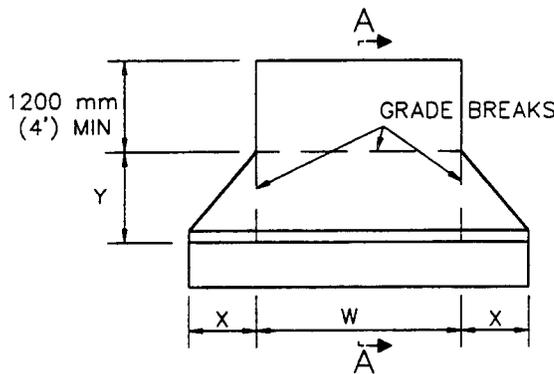


SECTION A-A

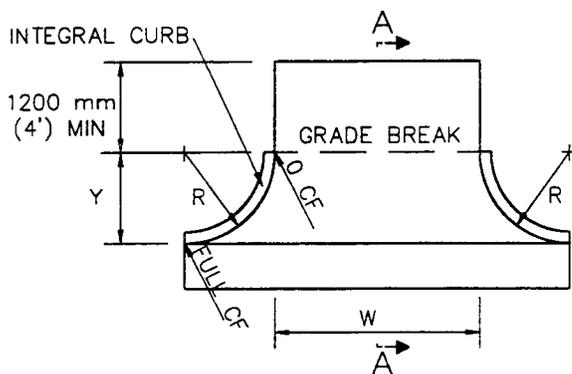
CURB FACE, mm	X, mm	Y, mm
150 (6") or less	900 (3'-0")	1200 (4'-0")
175 (7")	1050 (3'-6")	1425 (4'-9")
200 (8")	1200 (4'-0")	1700 (5'-8")
225 (9")	1350 (4'-6")	1950 (6'-6")
250 (10")	1500 (5'-0")	2175 (7'-3")
275 (11")	1650 (5'-6")	2400 (8'-0")
300 (12") or more	1800 (6'-0")	2625 (8'-9")

NOTES:

1. RESIDENTIAL DRIVEWAYS SHALL BE 100 mm (4") THICK PCC.
2. COMMERCIAL DRIVEWAYS SHALL BE 150 mm (6") THICK PCC.
3. WEAKENED PLANE JOINTS SHALL BE INSTALLED AT BOTH SIDE OF A DRIVEWAY AND AT APPROXIMATELY 3000 mm (10') INTERVALS.
4. CURB FOR TYPE C DRIVEWAY SHALL BE INTEGRAL AND MATCH ADJACENT CONSTRUCTION.
5. REFER TO LOCAL DEVELOPMENT REGULATIONS FOR AMERICANS WITH DISABILITIES ACCESS REQUIREMENTS AND MAXIMUM PERMITTED DRIVEWAY WIDTHS.
6. DIMENSIONS SHOWN ON THIS 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.



TYPE B



TYPE C

**AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER**

PROMULGATED BY THE  
PUBLIC WORKS STANDARDS INC.  
GREENBOOK COMMITTEE  
1984  
REV. 1996

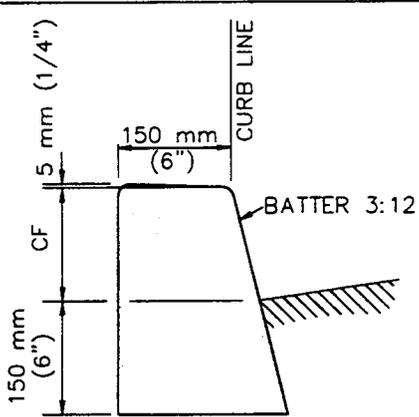
**DRIVEWAY APPROACHES**

STANDARD PLAN  
METRIC

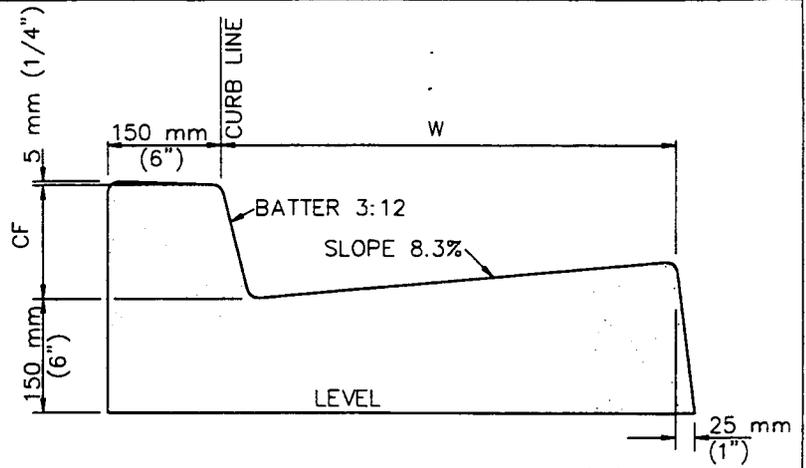
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USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

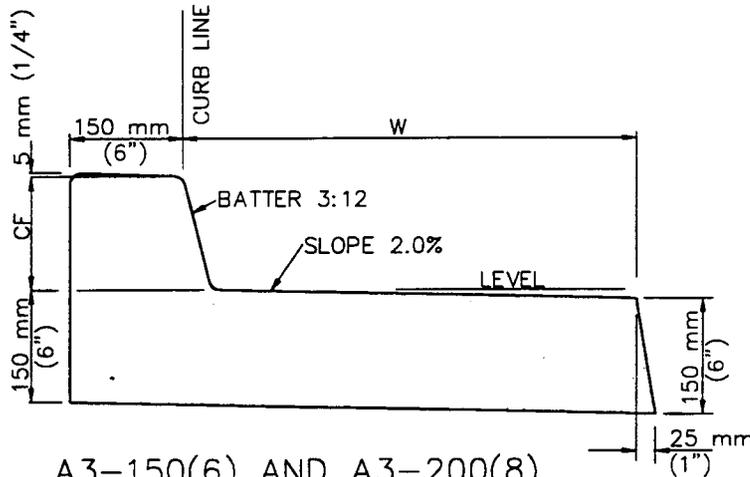
SHEET 1 OF 1



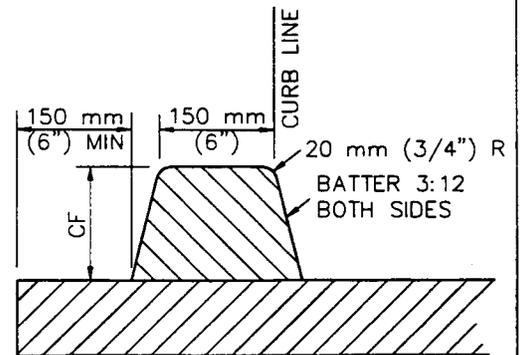
A1-150(6) AND  
A1-200(8)



A2-150(6) AND A2-200(8)



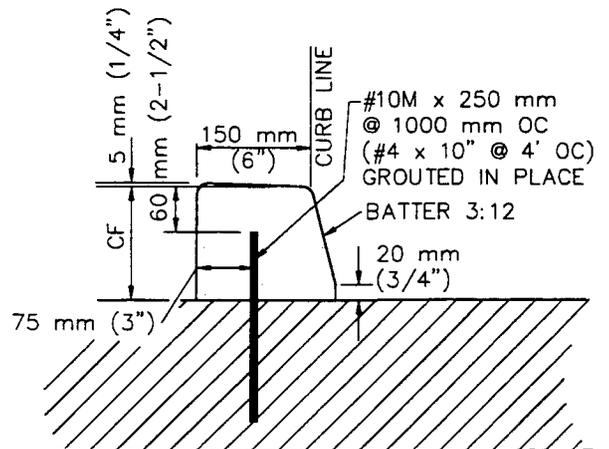
A3-150(6) AND A3-200(8)



D1-150(6) AND  
D1-200(8)

**NOTES:**

1. THE LAST NUMBER IN THE DESIGNATION IS THE CURB FACE (CF) HEIGHT, mm (INCHES).
2. GUTTER WIDTH, W, IS 600 mm (24") UNLESS OTHERWISE SPECIFIED.
3. TYPES A1, A2, A3 AND C1 SHALL BE CONSTRUCTED FROM PCC.
4. TYPE D1 CURB SHALL BE CONSTRUCTED FROM ASPHALT CONCRETE.
5. TYPE C1 CURB SHALL BE ANCHORED WITH STEEL DOWELS AS SHOWN OR WITH AN EPOXY APPROVED BY THE ENGINEER.
6. ALL EXPOSED CORNERS ON PCC CURBS AND GUTTERS SHALL BE ROUNDED WITH A 15 mm (1/2") RADIUS.
7. DIMENSIONS SHOWN ON THIS PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. USE EITHER METRIC OR ENGLISH VALUES, AS REQUIRED, BUT NOT BOTH, EXCEPT THAT ASTM 615 REINFORCING STEEL MAY BE SUBSTITUTED FOR ASTM 615M STEEL.



C1-150(6) AND C1-200(8)

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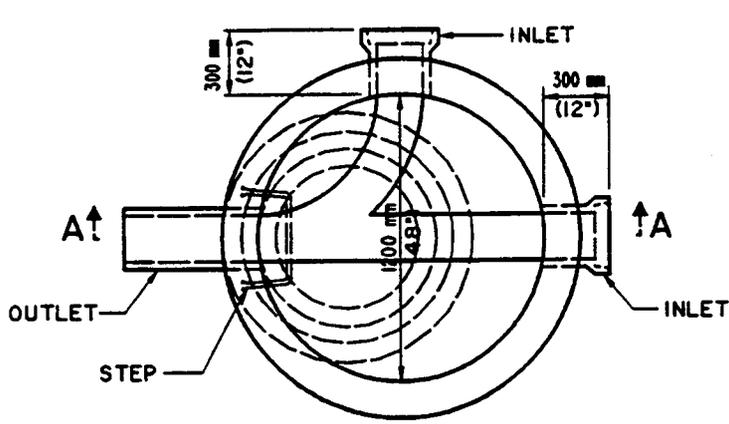
**CURB AND GUTTER — BARRIER**

STANDARD PLAN  
METRIC

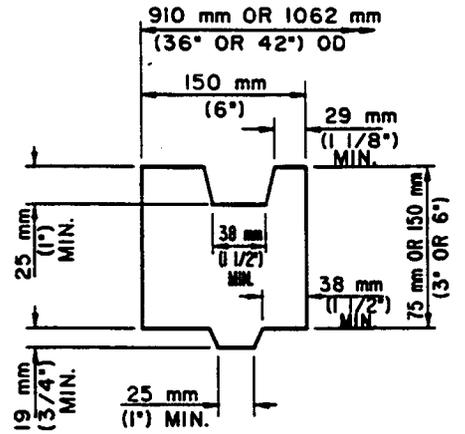
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USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

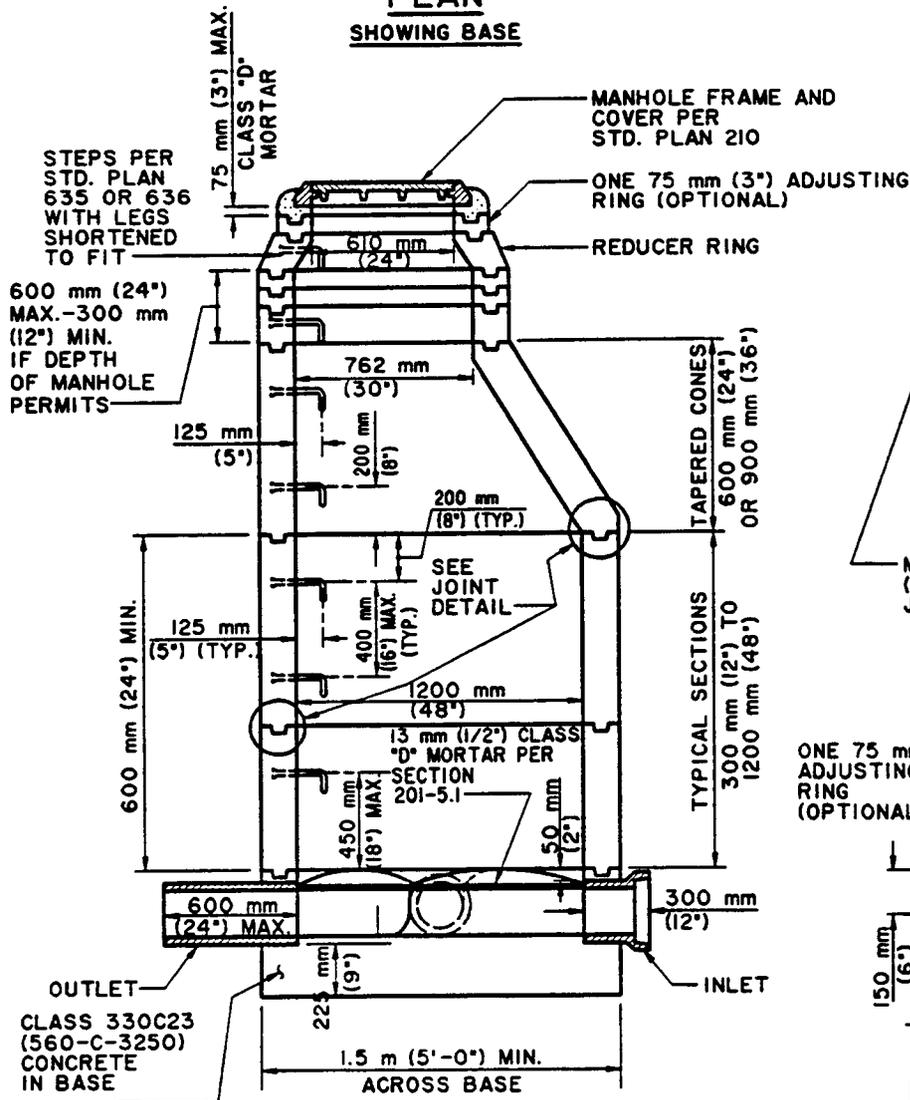
SHEET 1 OF 1



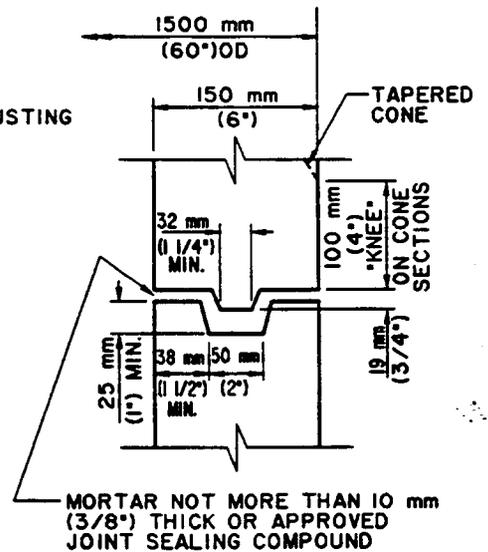
**PLAN**  
SHOWING BASE



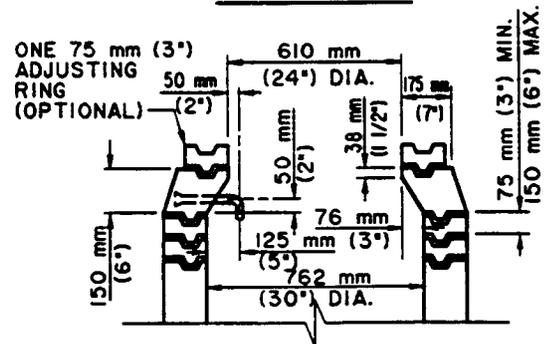
**ADJUSTING RING DETAIL**



**SECTION A-A**



**JOINT DETAIL**  
NON-REINFORCED



**REDUCER RING AND ADJUSTING RINGS**

AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER

PROMULGATED BY THE  
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1984  
REV. 1993, 1996

**PRECAST CONCRETE  
SEWER MANHOLE**

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN  
METRIC  
**200 - 2**  
SHEET 1 OF 2

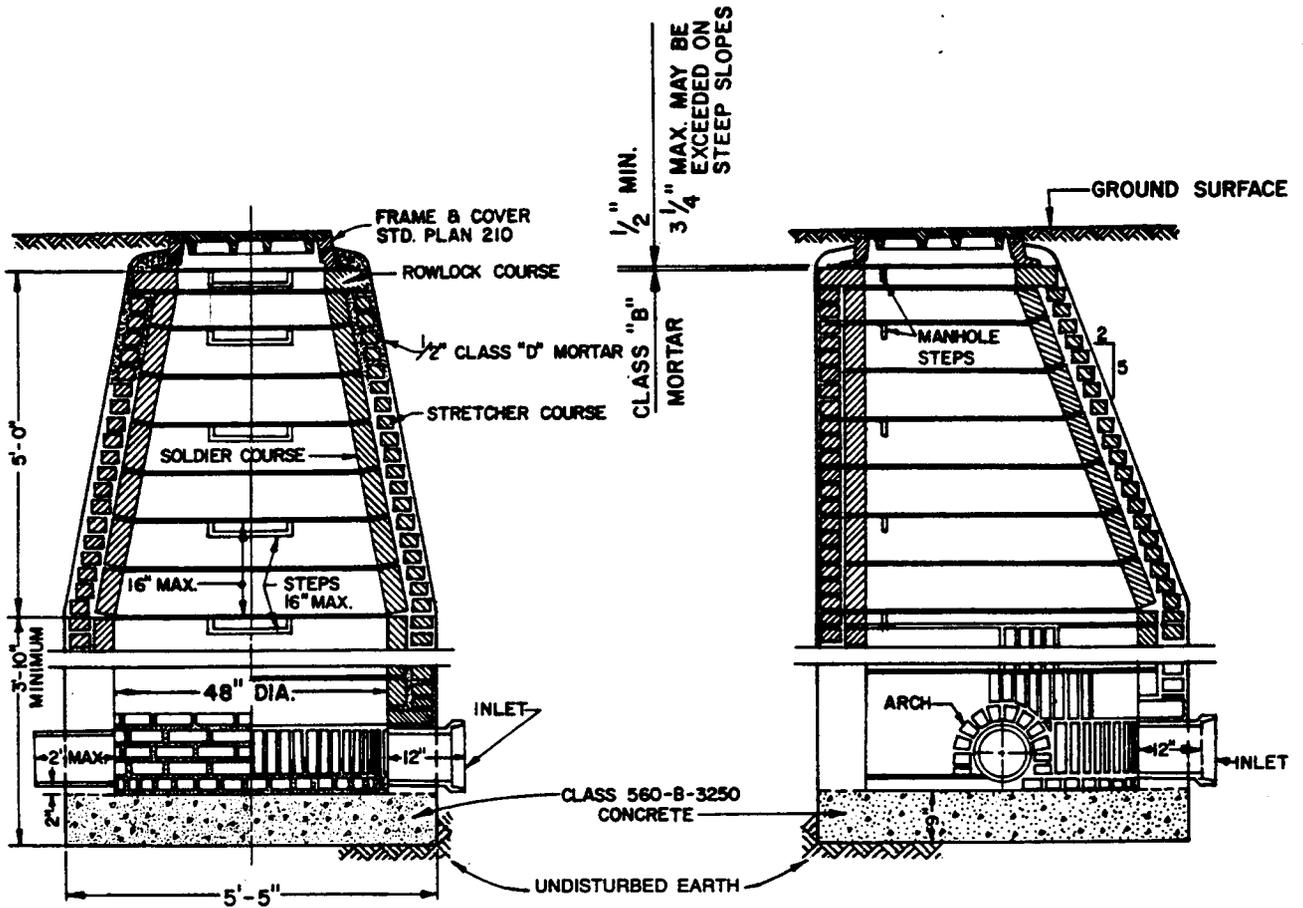
**NOTES:**

1. EXCEPT AS NOTED HEREON, THE PRECAST UNITS SHALL BE MANUFACTURED AND TESTED IN ACCORDANCE WITH ASTM C 478. AS AN ALTERNATE CURING METHOD, THE UNITS MAY BE CURED USING SATURATED STEAM FOR A MINIMUM OF 12 HOURS FOLLOWED BY 6 DAYS OF WATER CURING OR MEMBRANE CURING. IF THE UNITS ARE CURED BY THE ALTERNATE METHOD, THEY SHALL NOT BE SHIPPED PRIOR TO 8 DAYS AFTER CASTING NOR UNTIL THE CONCRETE HAS ATTAINED A STRENGTH OF 25 MPa (3500 PSI)
2. MAHOLE STEPS SHALL CONFORM WITH STANDARD PLAN 635 TYPE I OR 3 OR STANDARD PLAN 636. THE MANHOLE STEPS SHALL BE UNIFORMLY SPACED AT A MAXIMUM OF 400 mm (16"). THE LOWEST STEP SHALL BE PLACED NOT LESS THAN 200 mm (8") NOR MORE THAN 450 mm (18") ABOVE THE SHELF. THE STEPS SHALL PROJECT 125 mm (5") INSIDE THE MANHOLE.
3. RISER SECTIONS MAY BE REINFORCED OR UNREINFORCED. REINFORCED SECTIONS SHALL BE REINFORCED IN ACCORDANCE WITH ASTM C 478 AND SHALL HAVE A MINIMUM WALL THICKNESS OF 125 mm (5"). UNREINFORCED RISER SECTIONS SHALL HAVE A MINIMUM WALL THICKNESS OF 150 mm (6").
4. THE 600 mm x 1200 mm (24"x48") ECCENTRIC CONES MAY BE REINFORCED OR UNREINFORCED. IF REINFORCED, THE WALL THICKNESS SHALL BE NOT LESS THAN 125 mm (5"). IF UNREINFORCED, THE WALL THICKNESS SHALL NOT BE LESS THAN 150 mm (6").
5. JOINTS SHALL BE TONGUE AND GROOVE. JOINTS FOR REINFORCED STRUCTURES SHALL CONFORM WITH ASTM C 478 SECTION 14.
6. PRECAST UNITS SHALL BE ASSEMBLED USING CLASS "B" MORTAR.
7. IF 762 mm (30") DIAMETER MANHOLE FRAME AND COVER IS REQUIRED, IT SHALL BE INSTALLED WHERE THE REDUCER RING IS SHOWN IN THE SECTION.
8. FOR REINFORCED PRECAST STRUCTURES, ALL REINFORCEMENT SHALL HAVE A MINIMUM OF 50 mm (2") OF COVER OVER THE STEEL ON THE INSIDE FACE.
9. THE TOP OPENING OF THE MANHOLE AND THE STEPS SHALL BE PLACED DIRECTLY OVER THE OUTLET OF THE STRUCTURE EXCEPT AS OTHERWISE NOTED ON PLANS.
10. CONCRETE BASE AND STUB WALLS SHALL BE POURED IN ONE OPERATION TO A POINT 50 mm (2") ABOVE THE INLET AND OUTLET PIPES. ALL PIPES SHALL BE RIGIDLY SUPPORTED BY TEMPORARY PIERS OR OTHER METHODS DURING THE OPERATION. CONCRETE SHALL SET FOR 24 HOURS BEFORE PLACNG PRECAST UNITS.
- II. 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, EXCEPT REINFORCING BAR SIZES IN ENGLISH UNITS MAY BE SUBSTITUTED FOR METRIC BAR SIZES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.

AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER

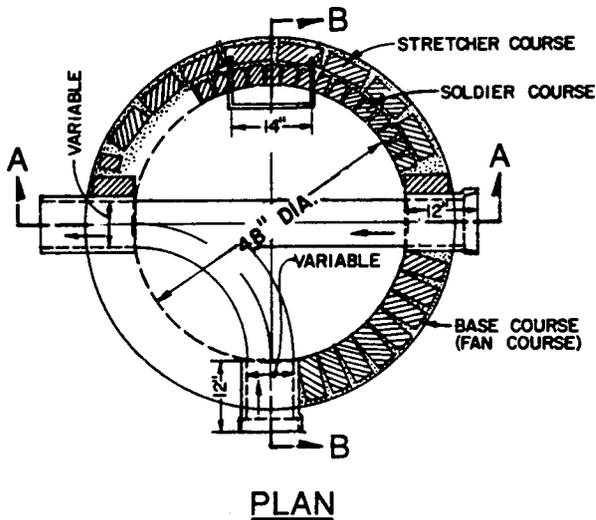
**PRECAST CONCRETE  
SEWER MANHOLE**

STANDARD PLAN  
METRIC  
**200 - 2**  
SHEET 2 OF 2

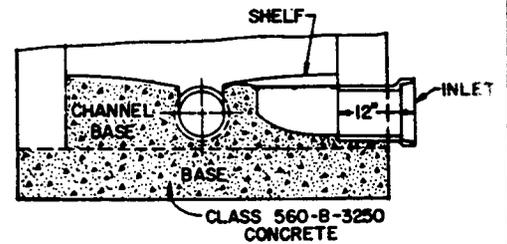


**SECTION A-A**

**SECTION B-B**



**PLAN**



**CHANNEL BASE DETAIL THROUGH SECTION B-B**

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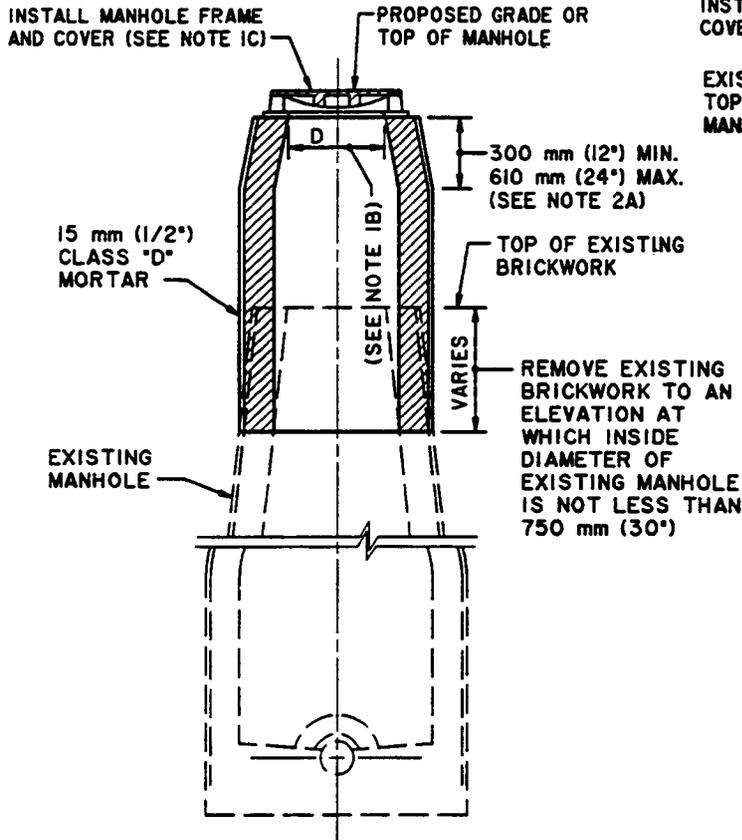
**BRICK SEWER MANHOLE**

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

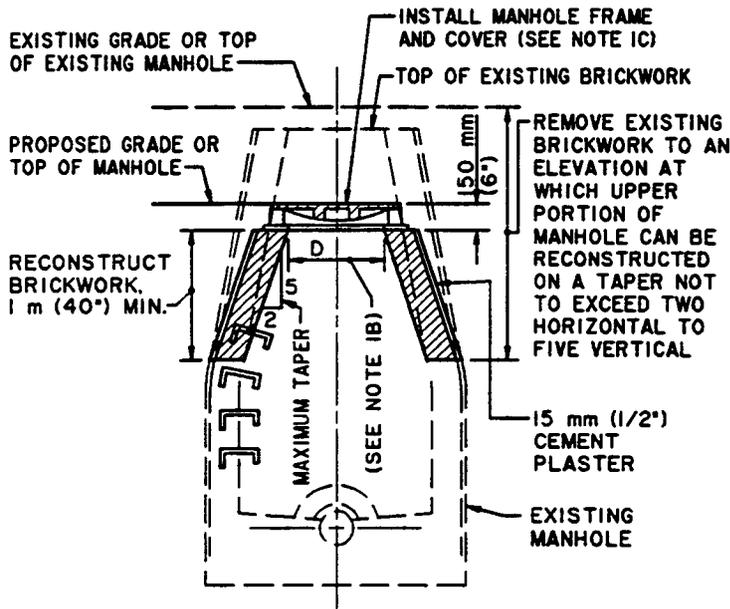
STANDARD PLAN  
**203 - 0**  
SHEET 1 OF 2

**NOTES:**

1. CONCRETE BASE: DURING CONSTRUCTION, ALL PIPES SHALL BE RIGIDLY SUPPORTED BY BRICK PIERS ONE FOOT DEEP, LOCATED JUST OUTSIDE THE STRUCTURE. CONSTRUCT TOP OF CONCRETE BASE 2" BELOW INVERT OF LOWEST PIPE. FILL SPACE BENEATH PIPE WITH MORTAR AND SHOVE FROM BOTH SIDES WITH BASE COURSE BRICK TO FORM A WATER TIGHT JOINT.
2. BASE OR FAN COURSE: LAY BRICK FLAT ON RADIAL LINES WITH TOPS TO SAME LEVEL.
3. 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 15" OR MORE IN DIAMETER.
4. SOLDIER COURSES: LAY INSIDE BRICK ON RADIAL LINES WITH FIRST FOUR COURSES VERTICAL. LAY SUCCEEDING COURSES WITH A UNIFORM BATTER TO OBTAIN AN INSIDE DIAMETER OF 8" AT TOP OF LAST OR FRACTIONAL SOLDIER COURSE. USE SPLIT BRICK TO CLOSE SOLDIER COURSE.
5. STRETCHER COURSES: LAY OUTSIDE BRICK FLAT IN A DEEP BED OF MORTAR. SHOVE BRICK TOGETHER AGAINST ADJACENT SOLDIER COURSE.
6. ROWLOCK COURSE: LAY LAST COURSE OF BRICK ON EDGE ACROSS SOLDIER AND STRETCHER COURSES ON RADIAL LINES, WITH TOPS PARALLEL AND 4½" BELOW FINISHED GRADE.
7. JOINTS: INSIDE JOINTS SHALL BE NEATLY STRUCK AND SHALL NOT EXCEED 3/8" IN THICKNESS.
8. STEPS: MANHOLE STEPS SHALL CONFORM WITH STANDARD PLAN 635 TYPE 3. THE MANHOLE STEPS SHALL BE UNIFORMLY SPACED AT A MAXIMUM OF 16" WITH THE TOP STEP PLACED JUST UNDER THE MANHOLE FRAME. THE LOWEST STEP SHALL BE PLACED NOT LESS THAN 8" NOR MORE THAN 24" ABOVE THE SHELF. THE TOP STEP AND THOSE IN THE 24" DIAMETER SECTION SHALL PROJECT 4" INSIDE THE MANHOLE AND ALL OTHERS 5".
9. MORTAR: MORTAR FOR LAYING BRICK OR PLASTERING SHALL BE CLASS "D".
10. WALL THICKNESS: BRICKWORK SHALL BE 8" THICK TO A DEPTH OF 22'. BRICKWORK BELOW 22' IN DEPTH SHALL BE 12" THICK.
11. A FLEXIBLE JOINT SHALL BE INSTALLED AT FIRST JOINT FROM MANHOLE ON ALL CONNECTIONS EXCEPT ON REINFORCED CONCRETE PIPE.

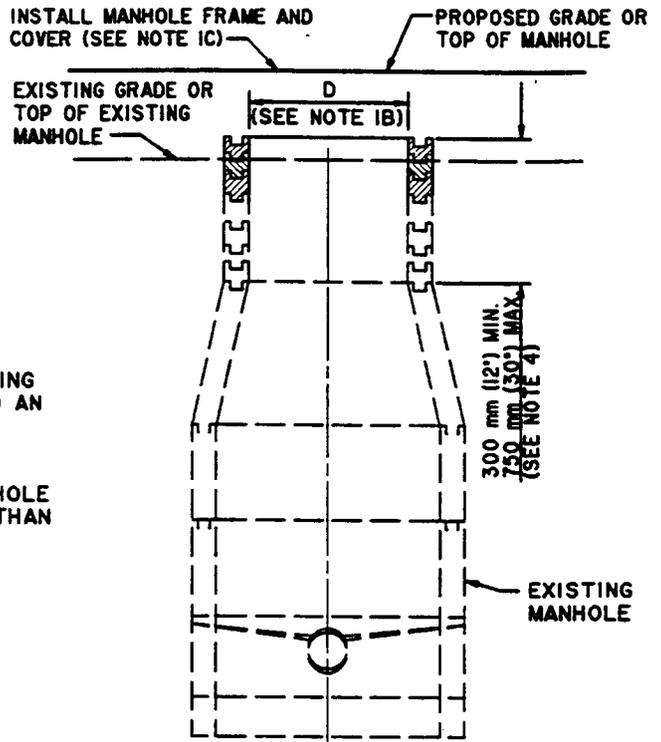


**RAISING EXISTING BRICK MANHOLES**

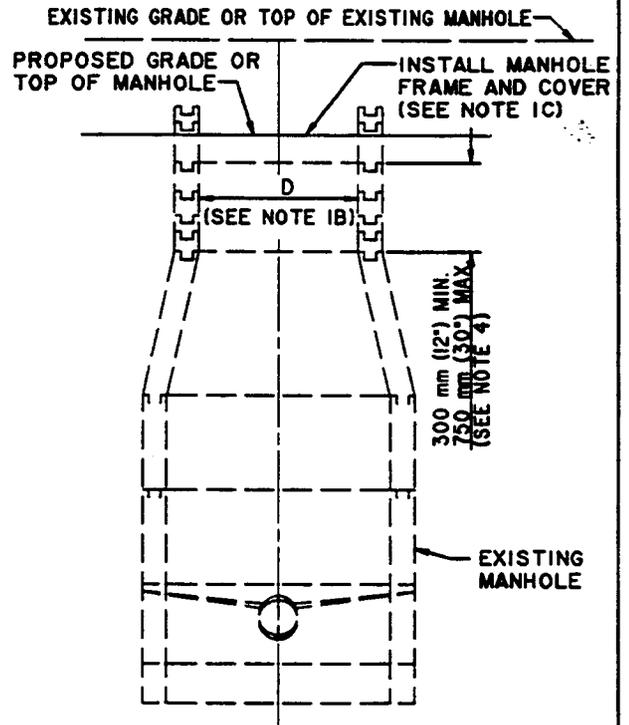


**LOWERING EXISTING BRICK MANHOLES**

**BRICK MANHOLES**



**RAISING EXISTING PRECAST CONCRETE SEWER MANHOLES**



**LOWERING EXISTING PRECAST CONCRETE SEWER MANHOLES**

**PRECAST CONCRETE SEWER MANHOLES**

AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER

PROMULGATED BY THE PUBLIC WORKS STANDARDS INC. GREENBOOK COMMITTEE 1984 REV. 1996

**SEWER MANHOLE ADJUSTMENT**

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN METRIC 205 - 1 SHEET 1 OF 3

**NOTES:**

**1. GENERAL**

- A. EXCEPT AS INDICATED HEREON OR ON THE PROJECT PLANS, MANHOLES SHALL CONFORM TO: STANDARD PLAN 200, PRECAST CONCRETE SEWER MANHOLE AND STANDARD PLAN 203, BRICK SEWER MANHOLE.
- B. DIMENSION "D" SHALL BE THE SAME AS THE SIZE OF MANHOLE FRAME AND COVER TO BE USED.
- C. THE CONTRACTOR MAY REUSE THE EXISTING MANHOLE FRAME AND COVER, UNLESS DAMAGED BY HIM DURING HIS CONSTRUCTION OPERATIONS OR WHEN OTHERWISE INDICATED ON THE PROJECT PLANS. ITEMS DAMAGED BY THE CONTRACTOR SHALL BE REPLACED WITH IDENTICAL NEW ITEMS AT NO EXPENSE TO THE AGENCY.
- D. EXISTING STEPS LOCATED WITHIN REMOVAL LIMITS SHALL BE REPLACED. WHEN REMOVAL OF EXISTING STEPS BEYOND THE MANHOLE REMOVAL LIMITS IS INDICATED ON THE PROJECT PLANS, THE STEPS SHALL BE REMOVED TO A DEPTH OF 50 mm (2 IN.) BEYOND THE INSIDE FACE OF THE BRICK MANHOLE AND THE HOLES SHALL BE FILLED WITH CLASS "D" MORTAR.

**2. RAISING EXISTING BRICK MANHOLES**

- A. BRICK MANHOLES TO BE RAISED LESS THAN 300 mm (1 FT.) MAY BE EXTENDED VERTICALLY, PROVIDED THAT AT A DEPTH OF 750 mm (2 1/2 FT.) BELOW THE TOP OF THE MANHOLE AT ITS NEW ELEVATION, THE INSIDE DIAMETER OF THE MANHOLE IS 750 mm (30 IN.) OR GREATER.
- B. BRICK MANHOLES TO BE RAISED LESS THAN 90 mm (3 1/2 IN.) MAY BE RAISED BY APPLYING CLASS "D" MORTAR TO THE TOP OF THE EXISTING BRICKWORK. IF THE BRICK MANHOLE IS TO BE RAISED 90 mm (3 1/2 IN.) OR MORE, A NEW COURSE OR COURSES OF BRICKWORK SHALL BE PLACED ON TOP OF THE EXISTING BRICKWORK.

**3. LOWERING EXISTING BRICK MANHOLES**

- A. WHERE A BRICK MANHOLE IS TO BE LOWERED LESS THAN 300 mm (1 FT.), THE FRAME MAY BE RESET ON THE EXISTING BRICKWORK AND THE ONE METER (40 IN.) MINIMUM BRICKWORK RECONSTRUCTION OMITTED, PROVIDED THAT THE BASE OF THE FRAME DOES NOT OVERHANG THE BRICKWORK ON THE INSIDE SURFACE OF THE MANHOLE MORE THAN AN AVERAGE OF 35 mm (1 1/2 IN.) IN ANY QUADRANT NOR MORE THAN 50 mm (2 IN.) AT ANY POINT.

**4. RAISING EXISTING PRECAST CONCRETE SEWER MANHOLES**

- A. PRECAST CONCRETE MANHOLES TO BE RAISED LESS THAN 75 mm (3 IN.) MAY BE RAISED BY APPLYING CLASS "D" MORTAR TO THE TOP OF THE EXISTING MANHOLE, PROVIDED THE TOTAL HEIGHT OF MORTAR, EXISTING AND NEWLY APPLIED, DOES NOT EXCEED 75 mm (3 IN.).
- B. WHERE THE PRECAST CONCRETE MANHOLE IS TO BE RAISED 75 mm (3 IN.) OR MORE, OR WHERE THE TOTAL HEIGHT OF MORTAR, EXISTING AND NEWLY APPLIED, WOULD EXCEED 75 mm (3 IN.), GRADE RINGS SHALL BE UTILIZED. CLASS "D" MORTAR MAY BE USED FOR FINAL ADJUSTMENT, BUT NOT MORE THAN 75 mm (3 IN.) IN HEIGHT. WHERE RAISING THE MANHOLE WOULD RESULT IN THE UPPER SEGMENT OF THE SHAFT BEING MORE THAN 750 mm (30 IN.) IN HEIGHT, REMOVE THE REDUCER AND THE UPPER SEGMENT OF THE SHAFT, INSTALL ADDITIONAL RINGS OR PIPE TO THE LOWER SEGMENT OF THE SHAFT, AND REINSTALL THE REDUCER AND GRADE RINGS AS REQUIRED.

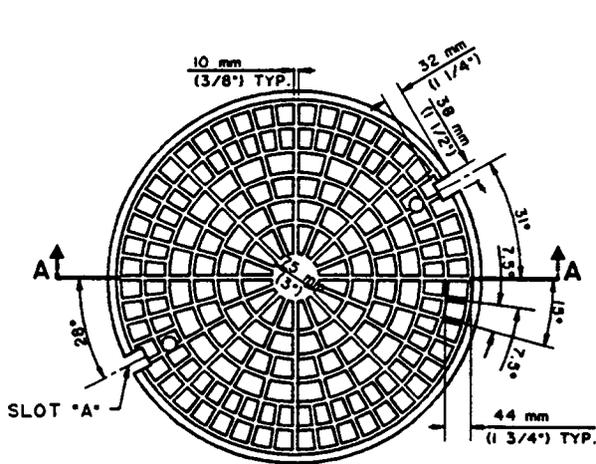
**5. LOWERING EXISTING PRECAST CONCRETE SEWER MANHOLES**

- A. REMOVE SUFFICIENT GRADE RINGS TO LOWER THE MANHOLES AS REQUIRED. APPLY CLASS "D" MORTAR TO A HEIGHT NOT EXCEEDING 75 mm (3 IN.) FOR ADJUSTMENT TO FINAL GRADE.
- B. WHERE REMOVAL OF GRADE RINGS WOULD RESULT IN THE UPPER SEGMENT OF THE SHAFT BEING LESS THAN 300 mm (12 IN.) IN HEIGHT, REMOVE THE REDUCER AND SUFFICIENT SECTIONS OF THE LOWER SEGMENT OF THE SHAFT AND REINSTALL ANY NECESSARY SEGMENT OF THE LOWER SHAFT, THE REDUCER, AND THE GRADE RINGS TO CONFORM TO THE REQUIREMENTS OF THIS PLAN.
- C. EXISTING GRADE RINGS NEED NOT BE REMOVED IF EXISTING MORTAR IS REMOVED, AND AT LEAST 35 mm (1 1/2 IN.) OF MORTAR MAY BE PLACED ON TOP OF THE EXISTING GRADE RINGS TO RESEAT THE FRAME.

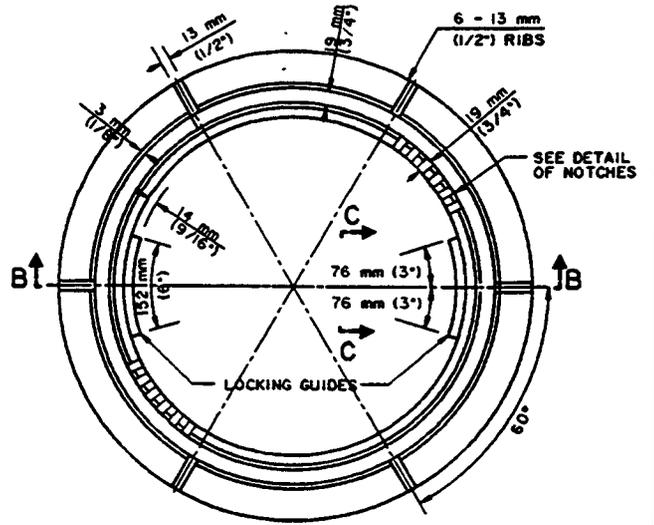
**6. REPLACEMENT OF BRICK REDUCER WITH PRECAST CONCRETE REDUCER AND SHAFT UNLESS OTHERWISE INDICATED ON THE PLANS, THE CONTRACTOR MAY INSTALL A PRECAST CONCENTRIC CONCRETE REDUCER, CONCRETE GRADE RINGS, AND CONCRETE PIPE IN LIEU OF RECONSTRUCTING A BRICK REDUCER, PROVIDED:**

- A. THE MAXIMUM I.D. OF SEWER PIPE CONNECTED TO THE MANHOLE DOES NOT EXCEED 200 mm (8 IN.).
- B. THE CONTRACTOR SECURES PRIOR APPROVAL FROM THE ENGINEER TO INSTALL THE CONCENTRIC REDUCER ONTO THE MANHOLE SHAFT. THE ENGINEER MAY, AS PART OF THE INSTALLATION REQUIREMENTS, REQUIRE THE CONTRACTOR TO COAT THE INSIDE OF THE REDUCER, RINGS, AND PIPE WITH AN APPROVED COATING.
- C. THE CONCRETE GRADE RINGS, THE CONCRETE REDUCER, AND ANY CONCRETE PIPE SHALL BE JOINED TOGETHER AND BEDDED ONTO THE EXISTING BRICK MANHOLE WITH CLASS "D" MORTAR. THE DEPTH, WIDTH, AND THICKNESS OF THE MORTAR SHALL BE OF SUFFICIENT DIMENSIONS TO PROPERLY AND ADEQUATELY JOIN AND BED THE COMPONENT PARTS.

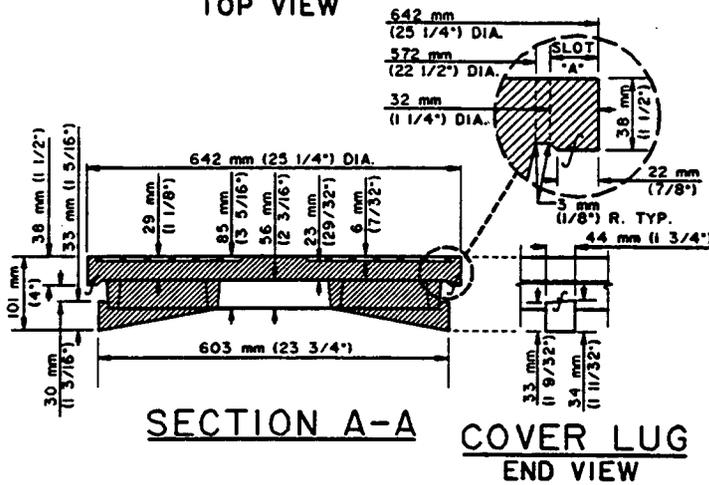
**7. DIMENSIONS SHOWN ON THIS PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACT EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES WITH THE EXCEPTION OF REINFORCING BAR SIZES FOR WHICH ENGLISH (IMPERIAL) BAR SIZES MAY BE SUBSTITUTED FOR METRIC BAR SIZES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.**



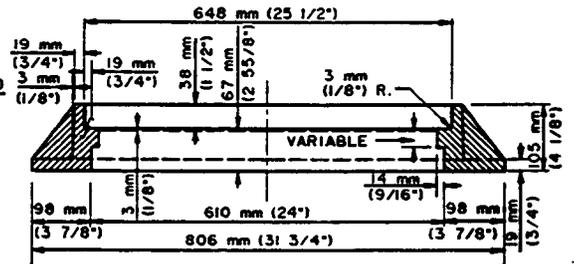
**PLAN OF COVER  
TOP VIEW**



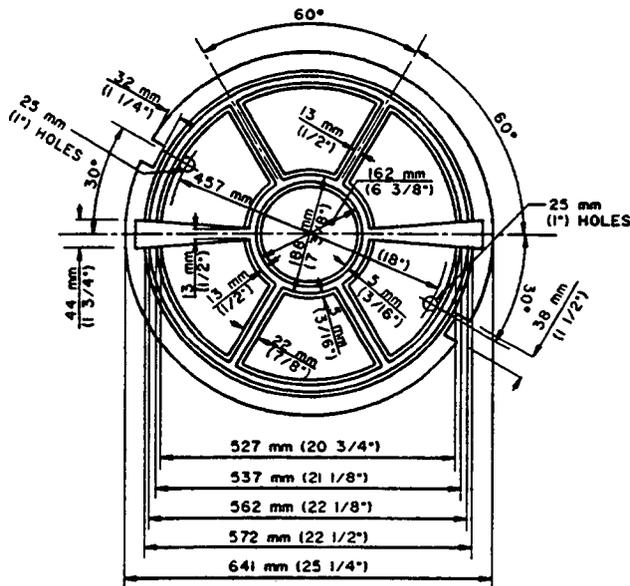
**PLAN OF FRAME**



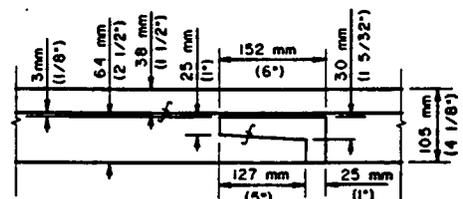
**SECTION A-A  
COVER LUG  
END VIEW**



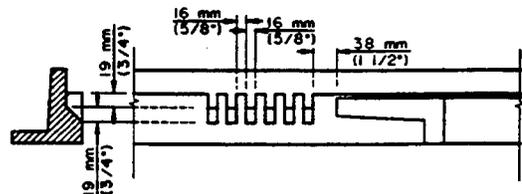
**SECTION B-B**



**PLAN OF COVER  
BOTTOM VIEW**



**LOCKING GUIDE  
SIDE VIEW C-C**



**DETAIL OF NOTCHES**

AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER

PROMULGATED BY THE  
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**610 mm (24") MANHOLE FRAME  
AND COVER LOCKING TYPE**

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN  
METRIC  
**210 - 2**  
SHEET 1 OF 2

NOTES:

1. THE CAST IRON USED SHALL CONFORM WITH ASTM A-48 CLASS 35B.
2. THE FRAME AND COVER SHALL BE COATED WITH ASPHALTUM OR BITUMINOUS PAINT AFTER TESTING AND INSPECTION.
3. COVERS SHALL BE CAST WITH THE LETTER "D" FOR STORM DRAINS AND "S" FOR SEWERS AND THE AGENCY IDENTIFICATION IN ACCORDANCE WITH INSTRUCTIONS FURNISHED BY THE AGENCY. THE LETTER "D" OR "S" SHALL BE APPROXIMATELY 65 mm (2 1/2") HIGH WITH 13 mm (1/2") LINE WIDTH AND PLACED IN THE CENTER OF THE COVER. ALL LETTERS SHALL BE FLUSH WITH THE FINISHED SURFACE OF THE COVER.
4. FOUNDRY IDENTIFYING MARK, HEAT AND DATE SHALL BE CAST ON THE BOTTOM OF THE COVER AND ON THE INSIDE OF THE FRAME.
5. IMPORTED COVERS AND FRAMES SHALL HAVE THE COUNTRY OF ORIGIN MARKING IN COMPLIANCE WITH FEDERAL REGULATIONS.
6. WEIGHT OF FRAME SHALL BE 73 kg (160 POUNDS) WEIGHT OF COVER SHALL BE 91 kg (200 POUNDS). ACTUAL WEIGHTS SHALL BE WITHIN A RANGE OF 95% TO 110%.
7. THE MANHOLE FRAME AND COVER SHALL BE INSPECTED BY THE ENGINEER PRIOR TO SHIPMENT TO THE JOB SITE. ACCEPTANCE WILL BE INDICATED BY THE AGENCY'S MARK.
8. THE PROOF-LOAD FOR TEST METHOD B OF THE STANDARD SPECIFICATIONS IS 25,100 kg (55,300 POUNDS).
9. COVERS FOR MANHOLES LOCATED IN EASEMENTS, ALLEYS, PARKWAYS AND ALL OTHER PLACES EXCEPT PAVED STREETS SHALL BE PROVIDED WITH SOCKET SET SCREW LOCKING DEVICES. DRILL AND TAP TWO HOLES TO A DEPTH OF 25 mm (1") AT 90 DEGREES TO PICK HOLE AND INSTALL 19 mm x 19 mm (3/4" x 3/4") STAINLESS STEEL SOCKET SET SCREWS WITH 10 mm (3/8") RECESSED HEX HEAD. ALL THREADS SHALL BE N.C.
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, EXCEPT REINFORCING BAR SIZES IN ENGLISH UNITS MAY BE SUBSTITUTED FOR METRIC BAR SIZES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.

AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER

**610 mm (24") MANHOLE FRAME  
AND COVER LOCKING TYPE**

STANDARD PLAN  
METRIC  
**210 - 2**  
SHEET 2 OF 2

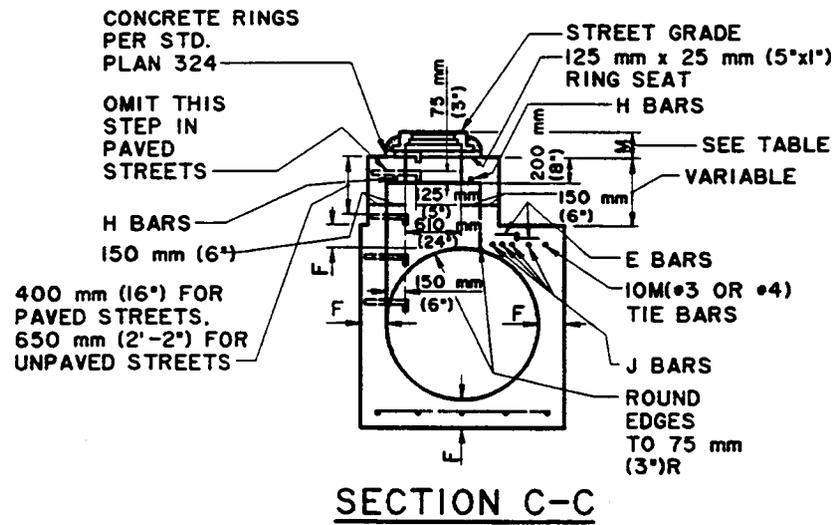
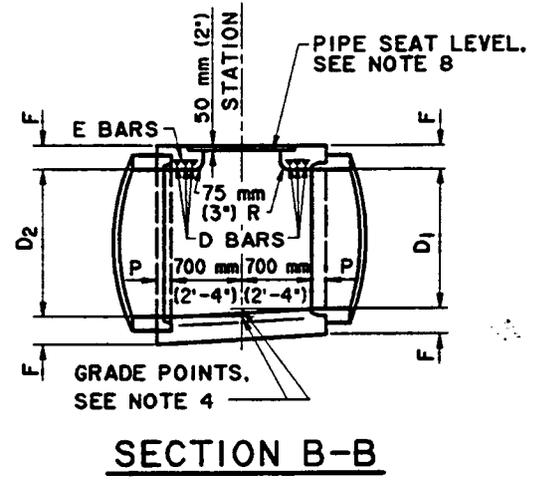
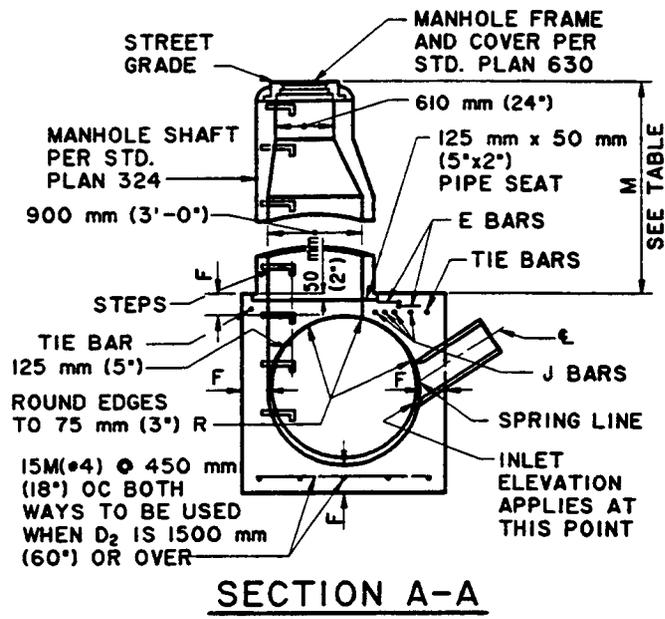
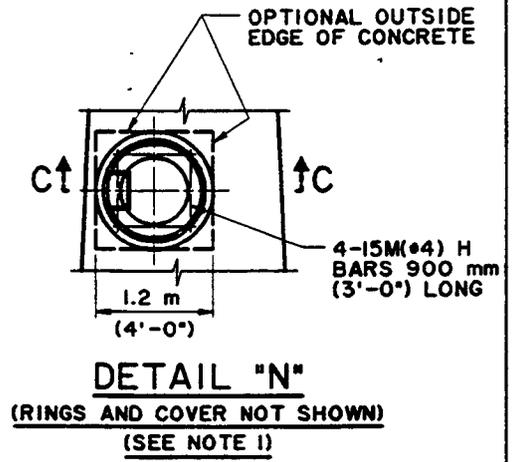
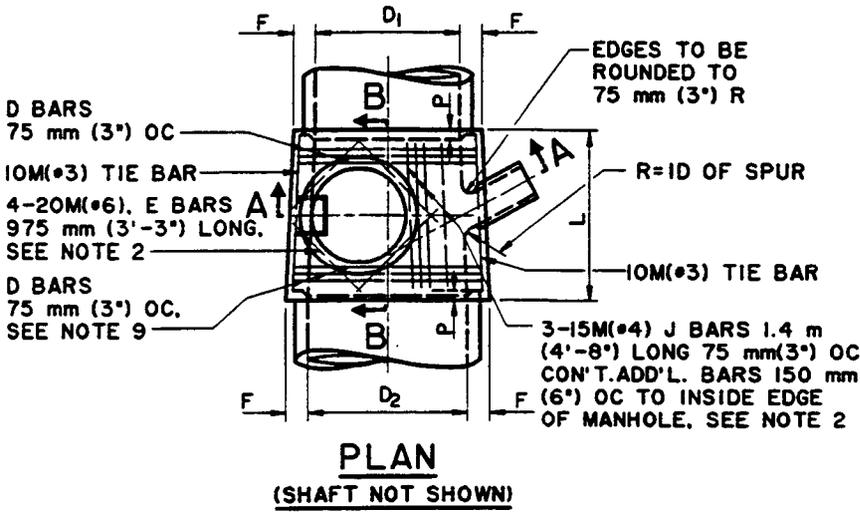


TABLE OF VALUES FOR F	
D <sub>2</sub>	F
900 mm (36")	165 mm (6 1/2")
975 mm (39")	180 mm (7")
1050 mm (42")	190 mm (7 1/2")
1125 mm (45")	195 mm (7 3/4")
1200 mm (48")	205 mm (8")
1275 mm (51")	215 mm (8 1/2")
1350 mm (54")	230 mm (9")
1425 mm (57")	235 mm (9 1/4")
1500 mm (60")	240 mm (9 1/2")
1575 mm (63")	255 mm (10")
1650 mm (66")	260 mm (10 1/4")
1725 mm (69")	275 mm (10 3/4")
1800 mm (72")	280 mm (11")
1950 mm (78")	300 mm (11 3/4")
2100 mm (84")	320 mm (12 1/2")
2250 mm (90")	335 mm (13 1/4")
2400 mm (96")	355 mm (14")
2550 mm (102")	395 mm (15 1/2")
2700 mm (108")	405 mm (16")
2850 mm (114")	420 mm (16 1/2")
3000 mm (120")	430 mm (17")
3150 mm (126")	430 mm (17")
3300 mm (132")	445 mm (17 1/2")
3450 mm (138")	445 mm (17 1/2")
3600 mm (144")	455 mm (18")

TABLE OF VALUES FOR M (SEE NOTE I)				
SECTION	PAVED STREET		UNPAVED STREET	
	MAX.	MIN.	MAX.	MIN.
A-A		867 mm (2'-10 1/2")		1060 mm (3'-6")
C-C	282 mm (11")	217 mm (8 1/2")	410 mm (16")	380 mm (15")

AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER

**MANHOLE PIPE TO PIPE MAIN LINE  
ID=900 mm (36") OR LARGER**

STANDARD PLAN  
METRIC  
**320 - 1**  
SHEET 2 OF 4

**NOTES**

1. WHEN DEPTH M FROM STREET GRADE TO THE TOP OF THE BOX IS LESS THAN 867 mm (2'-10 1/2") FOR PAVED STREETS OR 1060 mm (3'-6") FOR UNPAVED STREETS, CONSTRUCT MONOLITHIC SHAFT PER SECTION C-C AND DETAIL "N". SHAFT FOR ANY DEPTH OF MANHOLE MAY BE CONSTRUCTED PER SECTION C-C. WHEN DIAMETER  $D_1$  IS 1200 mm (48") OR LESS, CENTER OF SHAFT MAY BE LOCATED PER NOTE 2.
2. CENTER OF MANHOLE SHAFT SHALL BE LOCATED OVER CENTER LINE OF STORM DRAIN WHEN DIAMETER  $D_1$  IS 1200 mm (48") OR LESS. IN WHICH CASE PLACE E BARS SYMMETRICALLY AROUND SHAFT AT 45° WITH CENTER LINE AND OMIT J BARS.
3. L AND P SHALL HAVE THE FOLLOWING VALUES UNLESS OTHERWISE SHOWN ON THE PROJECT DRAWINGS:
  - A.  $D_2=2400$  mm (96") OR LESS,  $L=1.7$  m (5'-6"),  $P=130$  mm (5")
  - B.  $D_2$  OVER 2400 mm (96"),  $L=1.8$  m (6'-0"),  $P=210$  mm (8")L MAY BE INCREASED OR LOCATION OF MANHOLE SHIFTED TO MEET PIPE ENDS. WHEN L GREATER THAN THAT SHOWN ABOVE IS SPECIFIED, D BARS SHALL BE CONTINUED 150 mm (6") OC.
4. STATIONS OF MANHOLES SHOWN ON PROJECT DRAWINGS APPLY AT CENTER LINE OF SHAFT. ELEVATIONS ARE SHOWN AT CENTER LINE OF SHAFT AND REFER TO THE PROLONGED INVERT GRADE LINES.
5. REINFORCEMENT SHALL CONFORM TO ASTM A 615M, GRADE 300 (ASTM A 615, GRADE 40), AND SHALL TERMINATE 40 mm (1 1/2") CLEAR OF CONCRETE SURFACES UNLESS OTHERWISE SHOWN.
6. FLOOR OF MANHOLE SHALL BE STEEL TROWELED TO SPRING LINE.
7. BODY OF MANHOLE SHALL BE POURED IN ONE CONTINUOUS OPERATION EXCEPT THAT A CONSTRUCTION JOINT WITH A LONGITUDINAL KEYWAY MAY BE PLACED AT SPRING LINE.
8. THICKNESS OF THE DECK SHALL VARY WHEN NECESSARY TO PROVIDE A LEVEL SEAT BUT SHALL NOT BE LESS THAN THE TABULAR VALUES FOR F SHOWN ON TABLE SH. 2.
9. D BARS SHALL BE 15M(#4) FOR  $D_2=975$  mm(39") OR LESS, 15M(#5) FOR  $D_2 =1050$  mm (42") TO 2100 mm (84") INCLUSIVE AND 20M(#6) FOR  $D_2=2250$  mm (90") OR OVER.
10. CENTER LINE OF INLET PIPE SHALL INTERSECT INSIDE FACE OF CONE AT SPRING LINE UNLESS OTHERWISE SHOWN.
11. STEPS SHALL CONFORM TO STANDARD PLAN 635 OR 636 UNLESS OTHERWISE SHOWN, STEPS SHALL BE UNIFORMLY SPACED 350 mm (14") TO 375 mm (15") OC. THE LOWEST STEP SHALL NOT BE MORE THAN 600 mm (24") ABOVE THE INVERT.
12. THE FOLLOWING CRITERIA SHALL BE USED FOR THIS MANHOLE:
  - A. MAIN LINE = 900 mm (36") INSIDE DIAMETER OR LARGER. EXCEPT IF THE MAIN LINE RCP DOWNSTREAM OF MANHOLE IS 900 mm (36") TO 1050 mm (42") INSIDE DIAMETER AND THE MAIN LINE RCP UPSTREAM IS 825 mm (33") OR LESS STANDARD PLAN 321 SHALL BE USED.

AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER

**MANHOLE PIPE TO PIPE MAIN LINE  
ID=900 mm (36") OR LARGER**

STANDARD PLAN  
METRIC  
**320 - 1**  
SHEET 3 OF 4

- B. THE OUTSIDE DIAMETER OF THE LATERAL MUST BE LESS THAN OR EQUAL TO 1/2 THE INSIDE DIAMETER OF THE MAIN LINE. IF THE UPSTREAM AND DOWNSTREAM DIAMETERS OF THE MANHOLE ARE NOT THE SAME, THE GOVERNING INSIDE DIAMETER OF THE MAIN LINE SHALL BE CONSIDERED TO BE THAT WHERE THE EXTENDED CENTER LINE OF THE LATERAL ENTERS THE MANHOLE.
  - C. IN NO INSTANCE SHALL THE INSIDE DIAMETER OF THE LATERAL TO THE MANHOLE BE GREATER THAN 750 mm (30").
13. MANHOLE FRAME AND COVER SHALL CONFORM TO STANDARD PLAN 630 UNLESS OTHERWISE SHOWN.
  14. MANHOLE SHAFT SHALL CONFORM TO STANDARD PLAN 324 UNLESS OTHERWISE SHOWN.
  15. WHERE A MANHOLE SHAFT - 900 mm (36") WITHOUT REDUCER IS SPECIFIED REFER TO STANDARD PLAN 326.
  16. WHERE A PRESSURE MANHOLE SHAFT - WITH ECCENTRIC REDUCER IS SPECIFIED REFER TO STANDARD PLAN 328.
  17. WHERE A PRESSURE MANHOLE SHAFT - 914 mm (36") WITHOUT REDUCER IS SPECIFIED REFER TO STANDARD PLAN 329.
  18. 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, EXCEPT REINFORCING BAR SIZES IN ENGLISH UNITS MAY BE SUBSTITUTED FOR METRIC BAR SIZES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.

THE FOLLOWING STANDARD PLANS ARE INCORPORATED HEREIN:

- 324 MANHOLE SHAFT - WITH ECCENTRIC REDUCER
- 326 MANHOLE SHAFT - 900 mm (36") WITHOUT REDUCER
- 328 PRESSURE MANHOLE SHAFT - WITH ECCENTRIC
- 329 PRESSURE MANHOLE SHAFT 914 mm (36") WITHOUT REDUCER
- 630 610 mm (24") MANHOLE FRAME AND COVER
- 633 914 mm (36") MANHOLE FRAME AND COVER
- 635 STEEL STEP
- 636 POLYPROPYLENE PLASTIC STEP

AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER

**MANHOLE PIPE TO PIPE MAIN LINE  
ID=900 mm (36") OR LARGER**

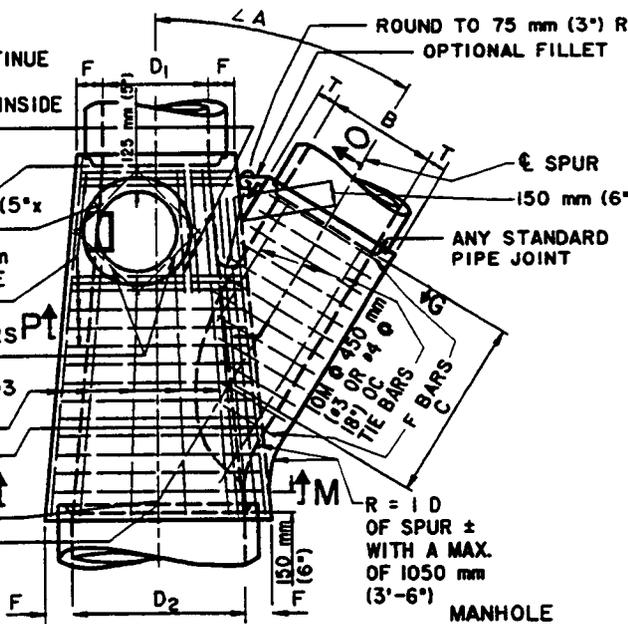
STANDARD PLAN  
METRIC  
**320 - 1**  
SHEET 4 OF 4

3 -15M(#4) J BARS.  
1.4 m (4'-8") LONG,  
75 mm (3") OC CONTINUE  
ADDITIONAL BARS  
150 mm (6") OC TO INSIDE  
EDGE OF MANHOLE

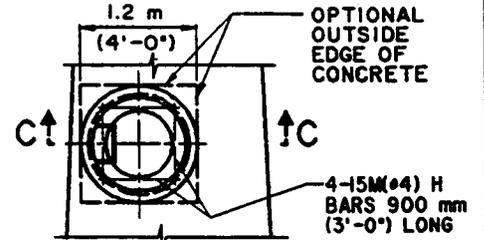
STATION  
125 mm x 50 mm (5"x  
2") PIPE SEAT  
3-D BARS, 75 mm  
(3") OC CONTINUE  
150 mm (6") OC  
4-20M(#6) E BARS  
SEE NOTE 3

10M # 450 mm (#3  
OR #4 # 18") OC  
TIE BARS  
A & B BARS

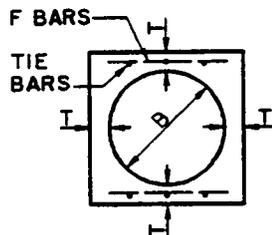
STATION PT. N  
STATION



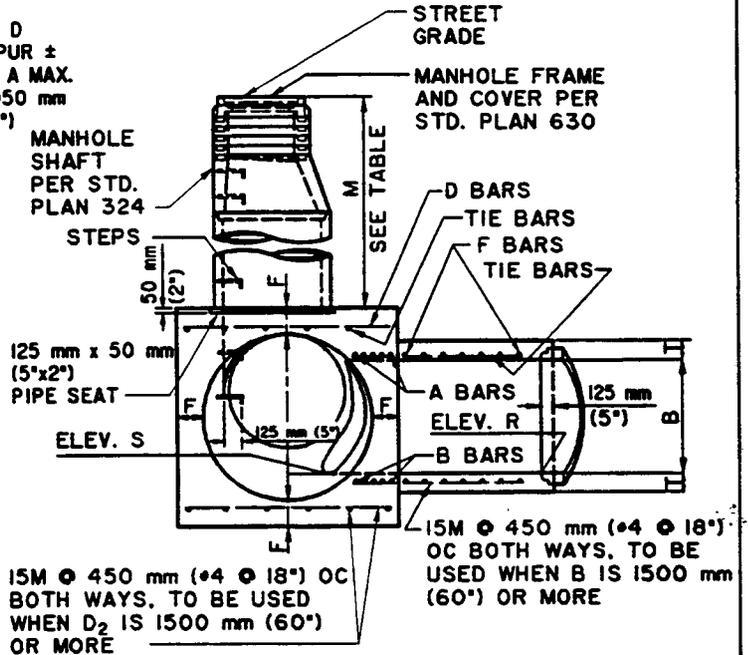
**PLAN**  
(SHAFT NOT SHOWN)



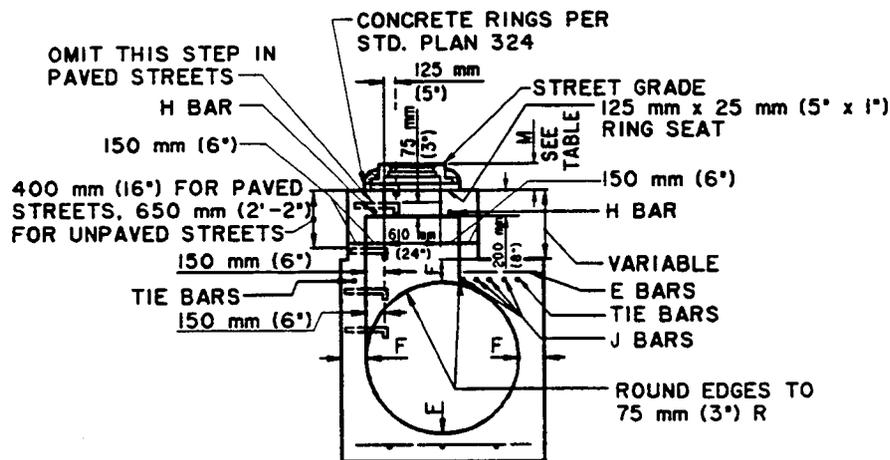
**DETAIL "N"**  
(RINGS AND COVER NOT SHOWN)  
SEE NOTE 2



**SECTION G-G**



**SECTION N-M-P-O**



**SECTION C-C**

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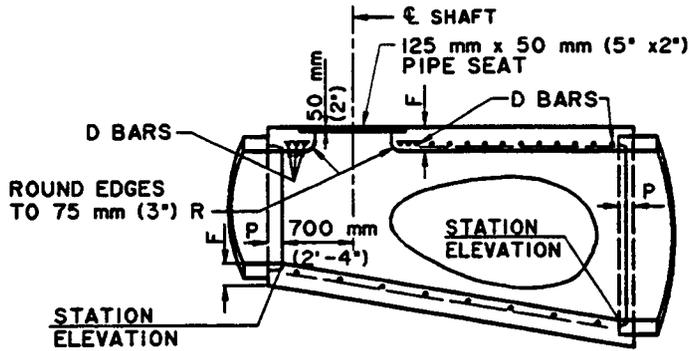
**MANHOLE PIPE TO PIPE  
(LARGE SIDE INLET)**

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN  
METRIC

**322 - 1**

SHEET 1 OF 4



### LONGITUDINAL SECTION

TABLE OF BARS SIZES		
D <sub>2</sub> OR B	A & B	D OR F
300 mm (12")-975 mm (39")	15M $\phi$ 75 mm ( $\phi$ 5 $\phi$ 3")	15M $\phi$ 150 mm ( $\phi$ 4 $\phi$ 6")
1050 mm (42")-2100 mm (84")	20M $\phi$ 75 mm ( $\phi$ 6 $\phi$ 3")	15M $\phi$ 150 mm ( $\phi$ 5 $\phi$ 6")
2250 mm (90")-3600 mm (144")	25M $\phi$ 75 mm ( $\phi$ 7 $\phi$ 3")	20M $\phi$ 150 mm ( $\phi$ 6 $\phi$ 6")

SECTION	PAVED STREET		UNPAVED STREET	
	MAX.	MIN.	MAX.	MIN.
N-M-P-O		867 mm (2'-10 1/2")		1060 mm (3'-6")
C-C	282 mm (11")	217 mm (8 1/2")	410 mm (16")	380 mm (15")

TABLE OF VALUES FOR F	
D <sub>2</sub>	F
900 mm (36")	165 mm (6 1/2")
975 mm (39")	180 mm (7")
1050 mm (42")	190 mm (7 1/2")
1125 mm (45")	195 mm (7 3/4")
1200 mm (48")	205 mm (8")
1275 mm (51")	215 mm (8 1/2")
1350 mm (54")	230 mm (9")
1425 mm (57")	235 mm (9 1/4")
1500 mm (60")	240 mm (9 1/2")
1575 mm (63")	255 mm (10")
1650 mm (66")	260 mm (10 1/4")
1725 mm (69")	275 mm (10 3/4")
1800 mm (72")	280 mm (11")
1950 mm (78")	300 mm (11 3/4")
2100 mm (84")	320 mm (12 1/2")
2250 mm (90")	335 mm (13 1/4")
2400 mm (96")	355 mm (14")
2550 mm (102")	395 mm (15 1/2")
2700 mm (108")	405 mm (16")
2850 mm (114")	420 mm (16 1/2")
3000 mm (120")	430 mm (17")
3150 mm (126")	430 mm (17")
3300 mm (132")	445 mm (17 1/2")
3450 mm (138")	445 mm (17 1/2")
3600 mm (144")	455 mm (18")

TABLE OF VALUES FOR T	
B	T
300 mm (12")	100 mm (4")
375 mm (15")	110 mm (4 1/4")
450 mm (18")	115 mm (4 1/2")
525 mm (21")	125 mm (5")
600 mm (24")	135 mm (5 1/4")
675 mm (27")	140 mm (5 1/2")
750 mm (30")	150 mm (6")
825 mm (33")	160 mm (6 1/4")
900 mm (36")	165 mm (6 1/2")
975 mm (39")	180 mm (7")
1050 mm (42")	190 mm (7 1/2")
1125 mm (45")	195 mm (7 3/4")
1200 mm (48")	205 mm (8")
1275 mm (51")	215 mm (8 1/2")
1350 mm (54")	230 mm (9")
1425 mm (57")	235 mm (9 1/4")
1500 mm (60")	240 mm (9 1/2")
1575 mm (63")	255 mm (10")
1650 mm (66")	260 mm (10 1/4")
1725 mm (69")	275 mm (10 3/4")
1800 mm (72")	280 mm (11")
1950 mm (78")	300 mm (11 3/4")
2100 mm (84")	320 mm (12 1/2")
2250 mm (90")	335 mm (13 1/4")
2400 mm (96")	355 mm (14")
2550 mm (102")	395 mm (15 1/2")
2700 mm (108")	405 mm (16")
2850 mm (114")	420 mm (16 1/2")
3000 mm (120")	430 mm (17")
3150 mm (126")	430 mm (17")
3300 mm (132")	445 mm (17 1/2")
3450 mm (138")	445 mm (17 1/2")
3600 mm (144")	455 mm (18")

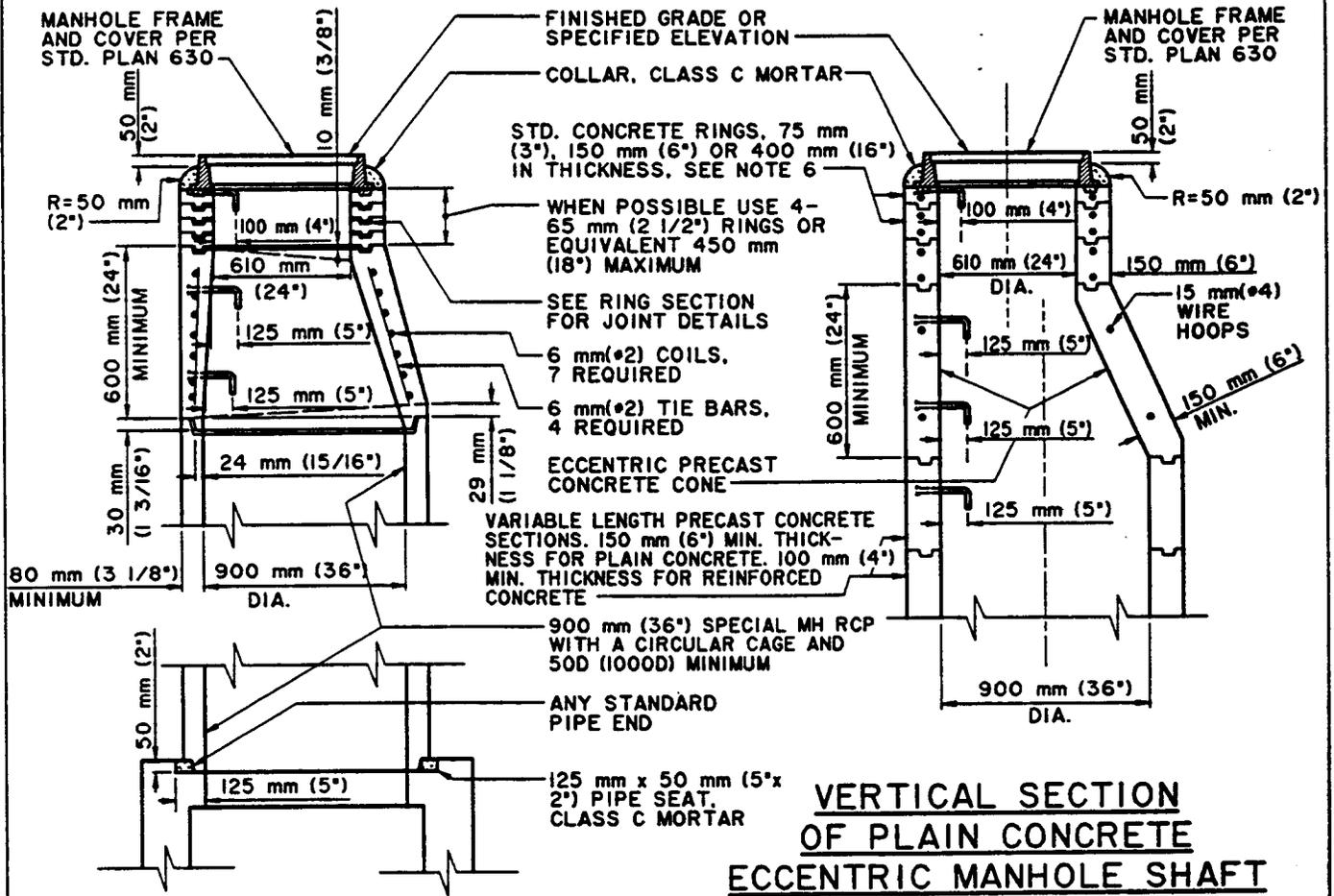
## NOTES

1. VALUES FOR A, B, C, D<sub>1</sub>, D<sub>2</sub>, ELEVATION R AND ELEVATION S ARE SHOWN ON THE PROJECT DRAWINGS. ELEVATION S APPLIES AT INSIDE WALL OF STRUCTURE.
2. WHEN DEPTH M FROM STREET GRADE TO THE TOP OF THE BOX IS LESS THAN 867 mm (2'-10 1/2") FOR PAVED STREETS OR 1060 mm (3'-6") FOR UNPAVED STREETS, CONSTRUCT MONOLITHIC SHAFT PER SECTION C-C AND DETAIL "N". SHAFT FOR ANY DEPTH OF MANHOLE MAY BE CONSTRUCTED PER SECTION C-C. WHEN DIAMETER D<sub>1</sub> IS 1200 mm (48") OR LESS, CENTER OF SHAFT MAY BE LOCATED PER NOTE 3.
3. CENTER OF MANHOLE SHAFT SHALL BE LOCATED OVER CENTER LINE OF STORM DRAIN WHEN DIAMETER D<sub>1</sub> IS 1200 mm(48") OR LESS, IN WHICH CASE PLACE E BARS SYMMETRICALLY AROUND SHAFT AT 45° WITH CENTER LINE.
4. LENGTH OF MANHOLE MAY BE INCREASED AT OPTION TO MEET PIPE ENDS, BUT ANY CHANGE IN LOCATION OF SPUR MUST BE APPROVED BY THE ENGINEER.
5. P SHALL BE 125 mm (5") FOR D<sub>2</sub>=2400 mm (96") OR LESS AND 200 mm (8") FOR D<sub>2</sub> OVER 2400 mm (96").
6. REINFORCEMENT SHALL CONFORM TO ASTM A 615M, GRADE 300(ASTM A 615, GRADE 40), AND SHALL TERMINATE 40 mm (1 1/2") CLEAR OF CONCRETE SURFACES UNLESS OTHERWISE SHOWN.
7. FLOOR OF MANHOLE SHALL BE STEEL TROWELED TO SPRING LINE.
8. BODY OF MANHOLE SHALL BE POURED IN ONE CONTINUOUS OPERATION EXCEPT THAT A CONSTRUCTION JOINT WITH A LONGITUDINAL KEYWAY MAY BE PLACED AT SPRING LINE.
9. THICKNESS OF THE DECK SHALL VARY WHEN NECESSARY TO PROVIDE A LEVEL SEAT BUT SHALL NOT BE LESS THAN THE TABULAR VALUES OF F SHOWN ON TABLE, SH. I.
10. IF LATERALS ENTER ON BOTH SIDES OF MANHOLE, SHAFT SHALL BE LOCATED ON SIDE RECEIVING THE SMALLER LATERAL.
11. STEPS SHALL CONFORM TO STANDARD PLAN 635 OR 636. UNLESS OTHERWISE SHOWN, STEPS SHALL BE UNIFORMLY SPACED 350 mm (14") TO 375 mm (15") OC. THE LOWEST STEP SHALL NOT BE MORE THAN 600 mm (24") ABOVE THE INVERT.
12. THE FOLLOWING CRITERIA SHALL BE USED FOR THIS MANHOLE:
  - A. THIS STANDARD PLAN IS USED WHEN STANDARD PLAN 320 IS INADEQUATE. MAIN LINE = 900 mm (36") INSIDE DIAMETER OR LARGER.
  - B. LATERAL = 300 mm (12") TO 3600 mm (144") INSIDE DIAMETER; HOWEVER, THE INSIDE DIAMETER SHALL NOT EXCEED THE INSIDE DIAMETER OF THE MAIN LINE.

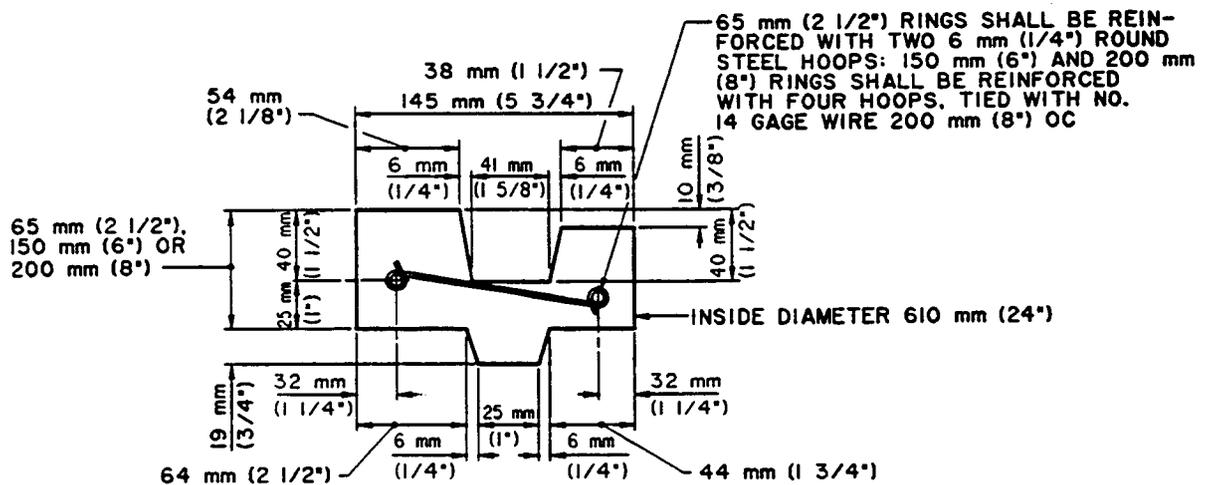
13. MANHOLE FRAME AND COVER SHALL CONFORM TO STANDARD PLAN 630 UNLESS OTHERWISE SHOWN.
14. MANHOLE SHAFT SHALL CONFORM TO STANDARD PLAN 324 UNLESS OTHERWISE SHOWN.
15. WHERE A MANHOLE SHAFT - 900 mm (36") WITHOUT REDUCER IS SPECIFIED REFER TO STANDARD PLAN 326.
16. WHERE A PRESSURE MANHOLE SHAFT - WITH ECCENTRIC REDUCER IS SPECIFIED REFER TO STANDARD PLAN 328.
17. WHERE A PRESSURE MANHOLE SHAFT - 914 mm (36") WITHOUT IS SPECIFIED REFER TO STANDARD PLAN 329.
18. 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, EXCEPT REINFORCING BAR SIZES IN ENGLISH UNITS MAY BE SUBSTITUTED FOR METRIC BAR SIZES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.

THE FOLLOWING STANDARD PLANS ARE INCORPORATED HEREIN:

- 324 MANHOLE SHAFT - WITH ECCENTRIC REDUCER
- 326 MANHOLE SHAFT - 900 mm (36") WITHOUT REDUCER
- 328 PRESSURE MANHOLE SHAFT - WITH ECCENTRIC REDUCER
- 329 PRESSURE MANHOLE SHAFT - 914 mm (36") WITHOUT REDUCER
- 630 610 mm (24") MANHOLE FRAME AND COVER
- 633 914 mm (36") MANHOLE FRAME AND COVER
- 635 STEEL STEP
- 636 POLYPROPYLENE PLASTIC STEP



**VERTICAL SECTION OF REINFORCED CONCRETE ECCENTRIC MANHOLE SHAFT**



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**MANHOLE SHAFT WITH  
ECCENTRIC REDUCER**

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN  
METRIC  
**324 - 1**  
SHEET 1 OF 2

**NOTES**

1. UNLESS OTHERWISE INDICATED THIS STRUCTURE SHALL CONFORM TO ASTM C 478M (ASTM C 478) AND ALL CONCRETE SHALL BE PER SSPWC.
2. MANHOLE FRAME AND COVER SHALL CONFORM TO STANDARD PLAN 630.
3. ALL JOINTS SHALL BE SEALED BY FILLING THE ANNULAR SPACES WITH CLASS C MORTAR. THE INSIDE OF THE SHAFT AT EACH JOINT SHALL BE WIPED CLEAN OF EXCESS MORTAR.
4. PROTECTIVE PLASTIC LINER (T LOCK) OR ENGINEER-APPROVED COATINGS WHERE REQUIRED BY THE PROJECT DRAWINGS SHALL BE IN ACCORDANCE WITH SSPWC AND THE MANUFACTURER'S DIRECTIONS.
5. STEPS SHALL CONFORM TO STANDARD PLAN 635 OR 636. THE TOP STEP SHALL BE PLACED DIRECTLY BENEATH THE MANHOLE FRAME. UNLESS OTHERWISE SHOWN, STEPS SHALL BE UNIFORMLY SPACED 350 mm (14") TO 375 mm (15") OC.
6. THE ECCENTRIC MANHOLE SHAFT REDUCER AND RINGS MAY BE PLAIN CONCRETE. FOR PLAIN CONCRETE SECTIONS THE MINIMUM THICKNESS SHALL BE 150 mm (6").
7. THE PRECAST CONCRETE MANHOLE STRUCTURES WILL BE INSPECTED BY THE ENGINEER WHO WILL INDICATE ACCEPTANCE FOR SHIPMENT TO THE JOB BY MARKING THE STRUCTURES WITH THE AGENCY'S STAMP.
8. THE VERTICAL SIDES OF THE MANHOLE SHAFT AND THE ECCENTRIC REDUCER SHALL BE LOCATED ABOVE AND IN LINE WITH THE SIDE OF THE STORM DRAIN CONDUIT.
9. CONSTRUCT MANHOLE SAFETY LEDGE PER STD. PLAN 330 IF DEPTH OF MANHOLE TO INVERT IS GREATER THAN 6 m(20') AND MANHOLE SHAFT IS GREATER THAN 3 m(10'). WHEN SAFETY LEDGE IS REQUIRED AND MANHOLE SHAFT IS LESS THAN 4 m(12') STD. PLAN 326 MUST BE USED.
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, EXCEPT REINFORCING BAR SIZES IN ENGLISH UNITS MAY BE SUBSTITUTED FOR METRIC BAR SIZES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.

THE FOLLOWING STANDARD PLANS ARE INCORPORATED HEREIN:

- 630 610 mm (24") MANHOLE FRAME AND COVER
- 635 STEEL STEP
- 636 POLYPROPYLENE PLASTIC STEP

914 mm (36") MANHOLE  
FRAME AND COVER  
PER STD. PLAN 633

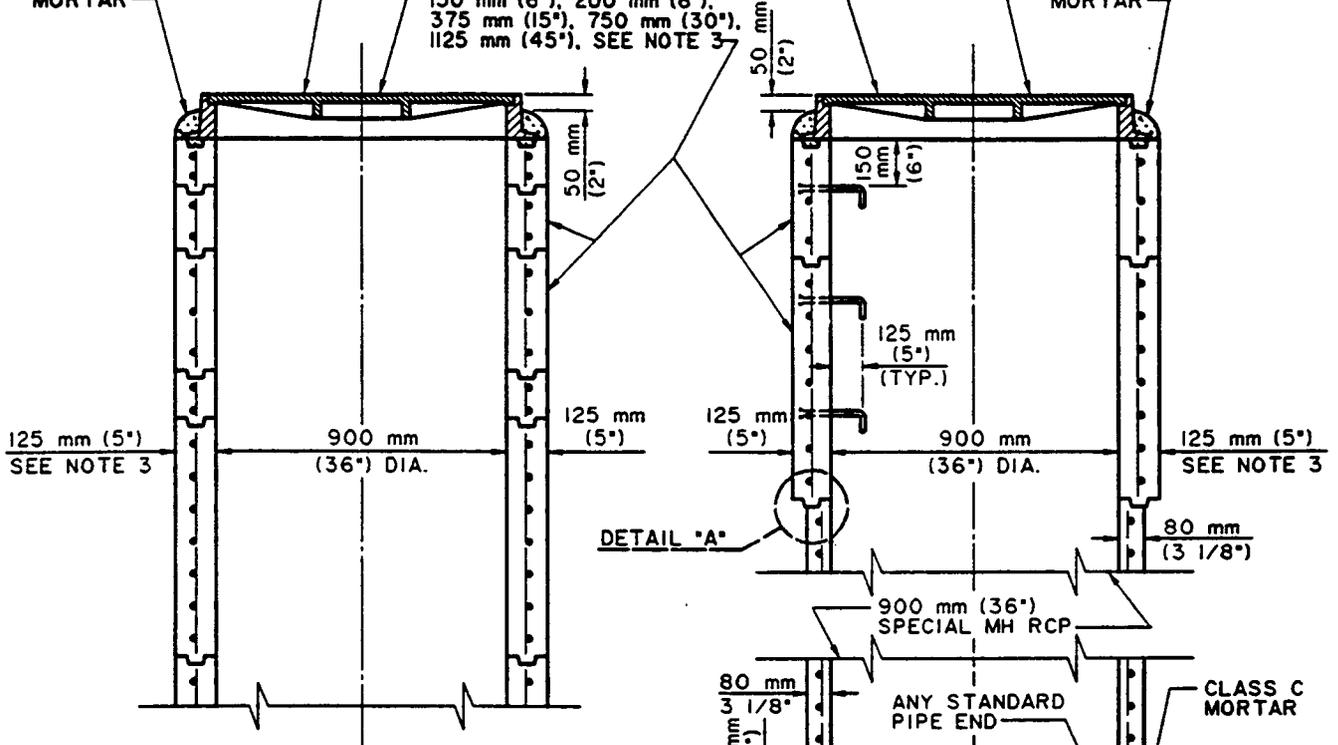
COLLAR, CLASS C  
MORTAR

FINISHED GRADE OR  
SPECIFIED ELEVATION

VARIABLE LENGTH PRE-  
CAST CONCRETE SECTIONS:  
150 mm (6"), 200 mm (8"),  
375 mm (15"), 750 mm (30"),  
1125 mm (45"). SEE NOTE 3

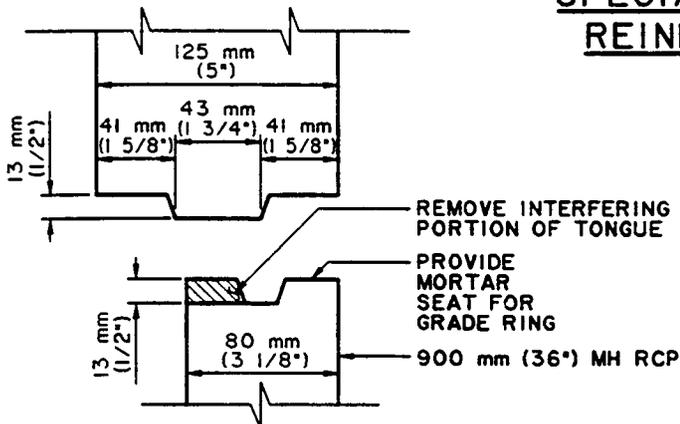
914 mm (36") MANHOLE  
FRAME AND COVER  
PER STD. PLAN 633

COLLAR, CLASS C  
MORTAR



**VERTICAL SECTION  
OF SPECIAL MANHOLE SHAFT  
WITH GRADE RING RISERS**

**VERTICAL SECTION OF  
SPECIAL MANHOLE SHAFT WITH  
REINFORCED CONCRETE PIPE**



**DETAIL "A"**

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**MANHOLE SHAFT  
900 mm (36") WITHOUT REDUCER**

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN  
METRIC

**326 - 1**

SHEET 1 OF 2

NOTES

1. UNLESS OTHERWISE INDICATED THIS STRUCTURE SHALL CONFORM TO ASTM C 478M (ASTM C 478). ALL STEEL SHALL TERMINATE 40 mm (1 1/2") CLEAR OF CONCRETE SURFACES AND ALL CONCRETE SHALL BE PER SSPWC.
2. WHERE A 900 mm (36") MANHOLE IS CONSTRUCTED WITH 900 mm(36") MANHOLE RCP, THE RCP SECTION SHALL CONTAIN A CIRCULAR CAGE AND HAVE A LOAD CARRYING CAPACITY OF AT LEAST 50D(1000D). SPECIAL MANHOLE SHAFT SHALL BE PER THIS STANDARD AND 900 mm (36") MANHOLE FRAME AND COVER SHALL BE PER STANDARD PLAN 633.
3. THE MANHOLE SHAFT AND RINGS MAY BE PLAIN CONCRETE. FOR PLAIN CONCRETE SECTIONS THE MINIMUM THICKNESS SHALL BE 150 mm (6").
4. ALL JOINTS SHALL BE SEALED BY FILLING THE ANNULAR SPACES WITH CLASS C MORTAR. THE INSIDE OF THE SHAFT AT EACH JOINT SHALL BE WIPED CLEAN OF EXCESS MORTAR.
5. PROTECTIVE PLASTIC LINER (T LOCK) OR ENGINEER-APPROVED COATINGS WHERE REQUIRED BY THE PROJECT DRAWINGS SHALL BE IN ACCORDANCE WITH SSPWC AND THE MANUFACTURER'S DIRECTIONS.
6. STEPS SHALL CONFORM TO STANDARD PLAN 635 OR 636. THE TOP STEP SHALL BE PLACED 150 mm(6") BENEATH THE MANHOLE COVER FRAME. UNLESS OTHERWISE SHOWN, STEPS SHALL BE UNIFORMLY SPACED 350 mm (14") TO 375 mm (15") OC.
7. THE PRECAST CONCRETE MANHOLE STRUCTURES WILL BE INSPECTED BY THE ENGINEER WHO WILL INDICATE ACCEPTANCE FOR SHIPMENT TO THE JOB BY MARKING THE STRUCTURES WITH THE AGENCY'S STAMP.
8. THE VERTICAL SIDES OF THE MANHOLE SHAFT SHALL BE LOCATED ABOVE AND IN LINE WITH THE SIDE OF THE STORM DRAIN CONDUIT.
9. CONSTRUCT MANHOLE SAFETY LEDGE PER STD. PLAN 330 IF DEPTH OF MANHOLE TO INVERT IS GREATER THAN 6 m(20') AND MANHOLE SHAFT IS GREATER THAN 3 m(10').
10. DIMENSIONS SHOWN ON THIS PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACT EQUAL VALUES. IF METRIC VALUES ARE USED, EXCEPT ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. REINFORCING BAR SIZES IN ENGLISH UNITS MAY BE SUBSTITUTED FOR METRIC BAR SIZES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.

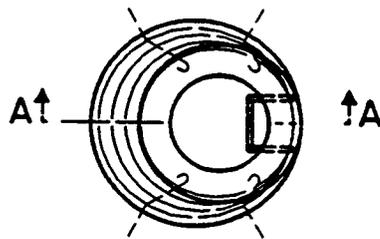
THE FOLLOWING STANDARD PLANS ARE INCORPORATED HEREIN:

- 633 914 mm (36") MANHOLE FRAME AND COVER
- 635 STEEL STEP
- 636 POLYPROPYLENE PLASTIC STEP

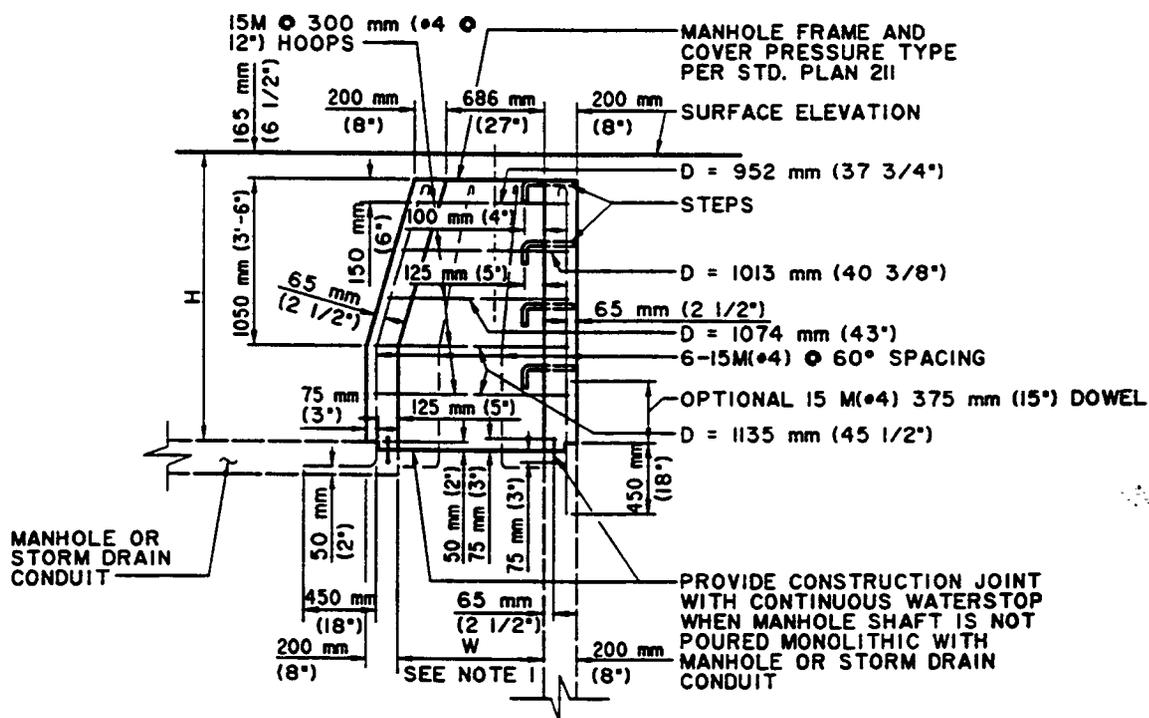
AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER

**MANHOLE SHAFT**  
**900 mm (36") WITHOUT REDUCER**

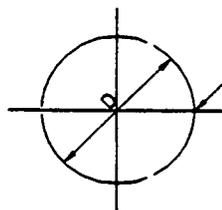
STANDARD PLAN  
METRIC  
**326 - 1**  
SHEET 2 OF 2



**PLAN**



**SECTION A-A**



**15M( $\phi$ 4) HOOP BARS**

ELECTRICALLY BUTT WELD ENDS OR LAP ENDS OF BAR 450 mm (18")

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1992  
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**PRESSURE MANHOLE SHAFT WITH  
ECCENTRIC REDUCER**

STANDARD PLAN  
METRIC

**328 - 1**

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SHEET 1 OF 2

**NOTES**

1. IF H IS LESS THAN 450 mm (18"), W=675 mm (27")  
IF H IS BETWEEN 450 mm (18") AND 750 mm (2'-6"), W=750 mm (2'-6").  
IF H IS 750 mm (2'-6") OR MORE, W=900 mm (3'-0").  
IF H IS MORE THAN 1215 mm (4'-0 1/2"), BRING WALL VERTICALLY TO  
1215 mm (4'-0 1/2") BELOW SURFACE AND TAPER FROM 900 mm (3'-0")  
TO 675 mm (27") AS SHOWN.
2. THIS STRUCTURE SHALL BE USED WITH MANHOLE FRAME AND COVER  
PRESSURE TYPE, STANDARD PLAN 211. IT MAY BE USED FOR HYDRO-  
STATIC HEADS UP TO 7.5 m (25') ABOVE THE STEEL PLATE.
3. THE VERTICAL SIDE OF THE MANHOLE SHAFT AND THE ECCENTRIC  
REDUCER SHALL BE LOCATED ABOVE AND IN LINE WITH THE SIDE  
OF THE STORM DRAIN CONDUIT.
4. REINFORCEMENT SHALL CONFORM TO ASTM A 615M, GRADE 300(ASTM  
A 615, GRADE 40), AND SHALL TERMINATE 40 mm (1 1/2") CLEAR OF  
CONCRETE SURFACES UNLESS OTHERWISE SHOWN.
5. STEPS SHALL CONFORM TO STANDARD PLAN 635 OR 636. THE TOP  
STEP SHALL BE PLACED DIRECTLY BENEATH THE MANHOLE FRAME.  
UNLESS OTHERWISE SHOWN, STEPS SHALL BE UNIFORMLY SPACED  
350 mm (14") TO 375 mm (15") OC.
6. SEE CONTRACT SPECIFICATIONS FOR PHYSICAL REQUIREMENTS OF  
WATERSTOP.
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, EXCEPT REINFORCING  
BAR SIZES IN ENGLISH UNITS MAY BE SUBSTITUTED FOR METRIC BAR SIZES.  
IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION  
SHALL BE ENGLISH UNITS.

THE FOLLOWING STANDARD PLANS ARE INCORPORATED HEREIN:

- 2 1 1 MANHOLE FRAME AND COVER PRESSURE TYPE
- 6 3 5 STEEL STEP
- 6 3 6 POLYPROPYLENE PLASTIC STEP



## NOTES

1. THIS STRUCTURE MAY BE USED FOR HYDROSTATIC HEADS UP TO 7.5 m (25') ABOVE THE PRESSURE PLATE.
2. 914 mm (36") MANHOLE FRAME AND COVER PER STANDARD PLAN 633 SHALL BE USED.
3. REINFORCEMENT SHALL BE PER ASTM A 615, GRADE 40 AND SHALL TERMINATE 40 mm (1 1/2") CLEAR OF CONCRETE SURFACES UNLESS OTHERWISE SHOWN. HOOPS MAY BE ELECTRICALLY BUTT WELDED OR THE ENDS LAPPED 450 mm (18").
4. THE MANHOLE SHAFT SHALL BE LOCATED ABOVE AND IN LINE WITH THE SIDE OF THE CONDUIT BELOW.
5. STEPS SHALL CONFORM TO STANDARD PLAN 635 OR 636. UNLESS OTHERWISE SHOWN, STEPS SHALL BE UNIFORMLY SPACED 350 mm (14") TO 375 mm (15") OC.
6. GASKET MATERIAL SHALL BE NEOPRENE (OR EQUAL) 2 mm (1/16") THICK BY 32 mm (1 1/4") WIDE.
7. BOLTS SHALL BE STAINLESS STEEL CONFORMING TO ASTM A 320M (ASTM A 320), GRADE B8.
8. PRESSURE PLATE AND PRESSURE PLATE RING SHALL BE STEEL CONFORMING TO ASTM A 36M (ASTM A 36) AND SHALL BE GALVANIZED. PLATES SHALL BE MARKED IN SETS AND A CHISELED ARROW STAMPED ON BOTH PLATES, AFTER DRILLING AND TAPPING, TO FACILITATE FIELD ASSEMBLY.
9. SEE CONTRACT SPECIFICATIONS FOR PHYSICAL REQUIREMENTS OF WATERSTOP.
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, EXCEPT REINFORCING BAR SIZES IN ENGLISH UNITS MAY BE SUBSTITUTED FOR METRIC BAR SIZES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.

THE FOLLOWING STANDARD PLANS ARE INCORPORATED HEREIN:

633	914 mm (36") MANHOLE FRAME AND COVER
635	STEEL STEP
636	POLYPROPYLENE PLASTIC STEP

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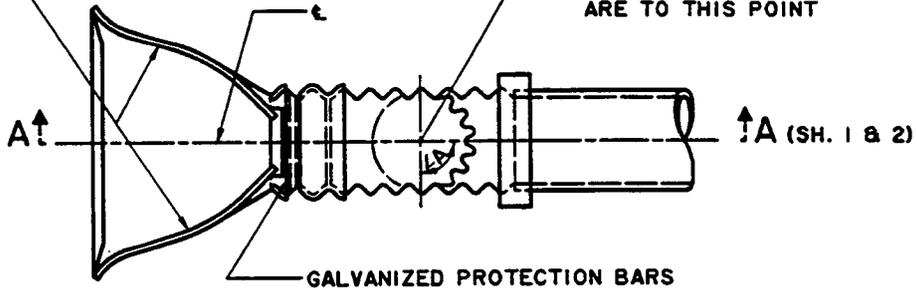
**PRESSURE MANHOLE SHAFT AND PRESSURE  
PLATE DETAIL 914 mm (36") WITHOUT REDUCER**

STANDARD PLAN  
METRIC

**329 - 1**  
SHEET 2 OF 2

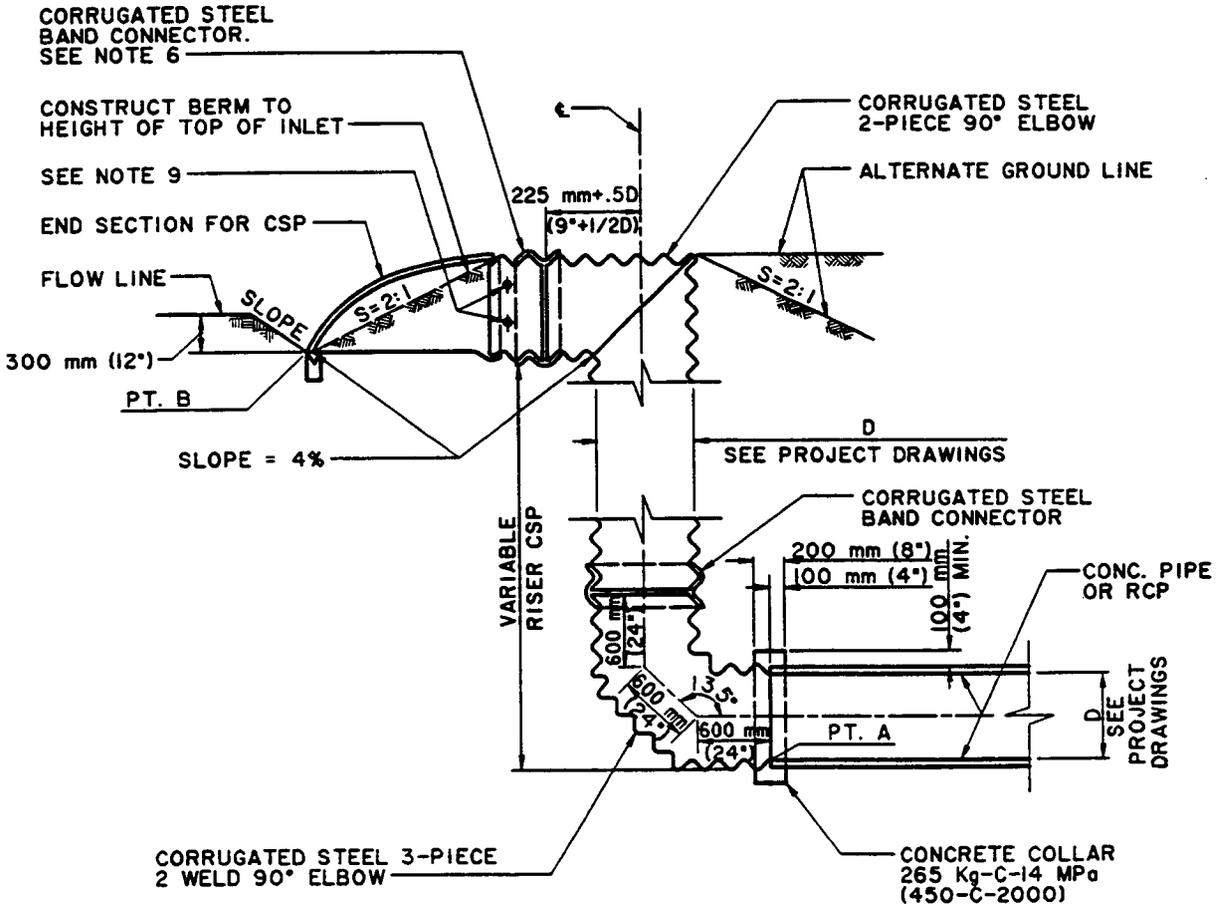
END SECTION FOR CSP

STATION PT. ALL TIE DIMENSIONS SHOWN ON THE PROJECT DRAWINGS ARE TO THIS POINT



GALVANIZED PROTECTION BARS

**PLAN**



**CASE 1  
SECTION A-A**

**NOTE:**  
FOR CASE 2 & 3, SEE SH. 2.

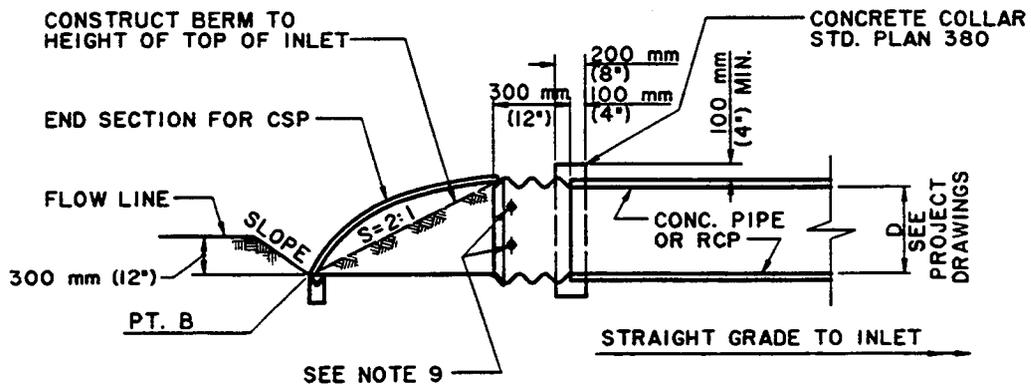
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1984  
REV. 1996

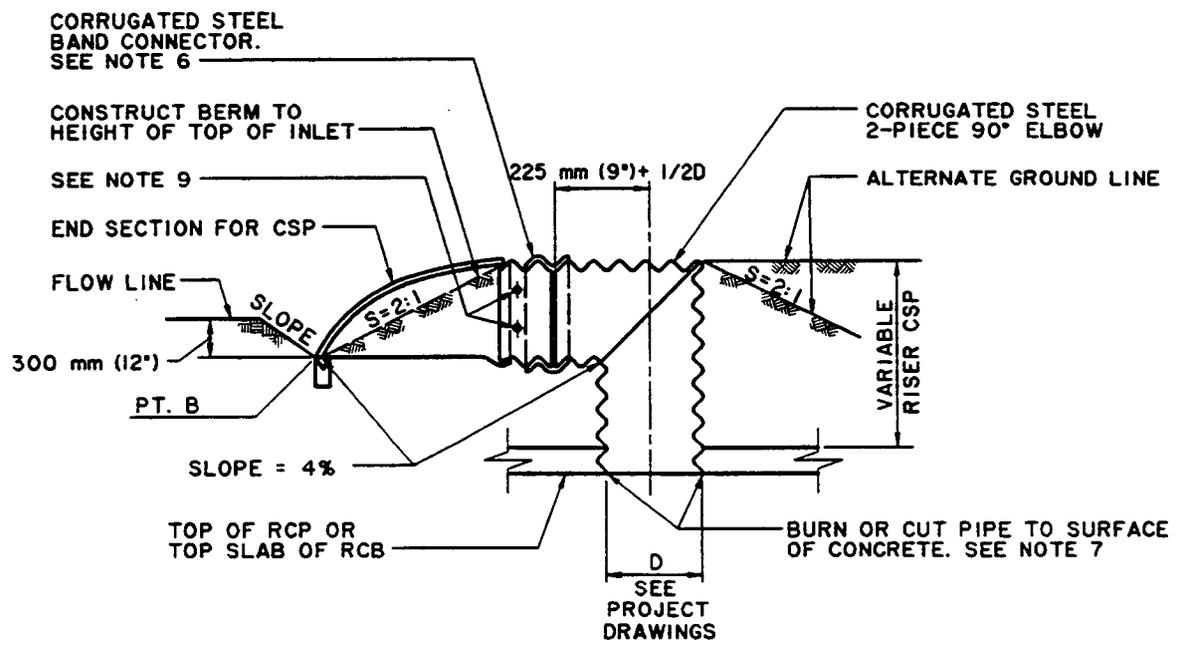
**CSP FLARED INLET**

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN  
METRIC  
**351 - 1**  
SHEET 1 OF 3



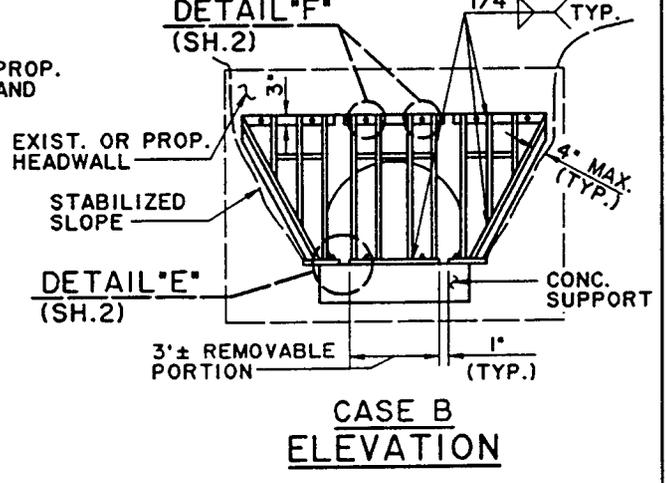
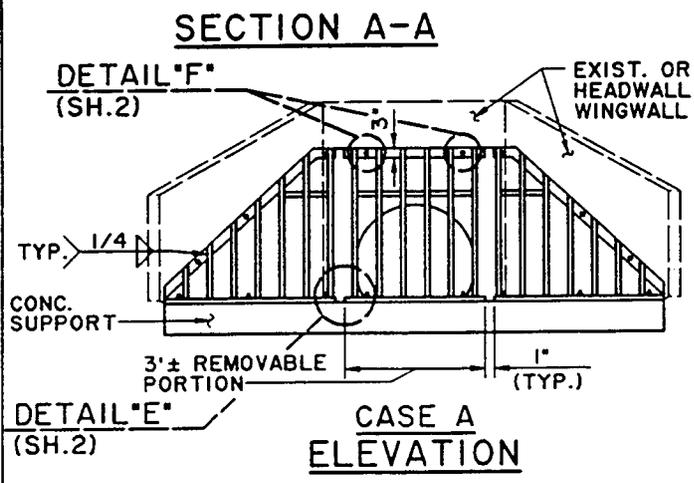
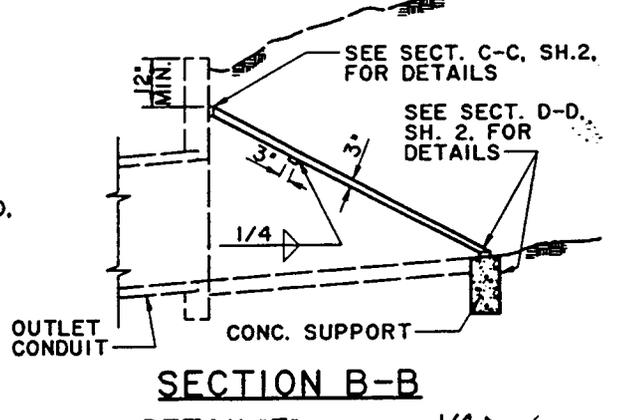
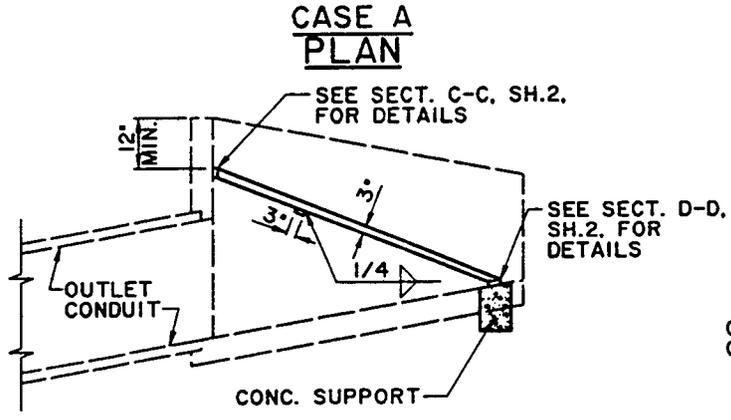
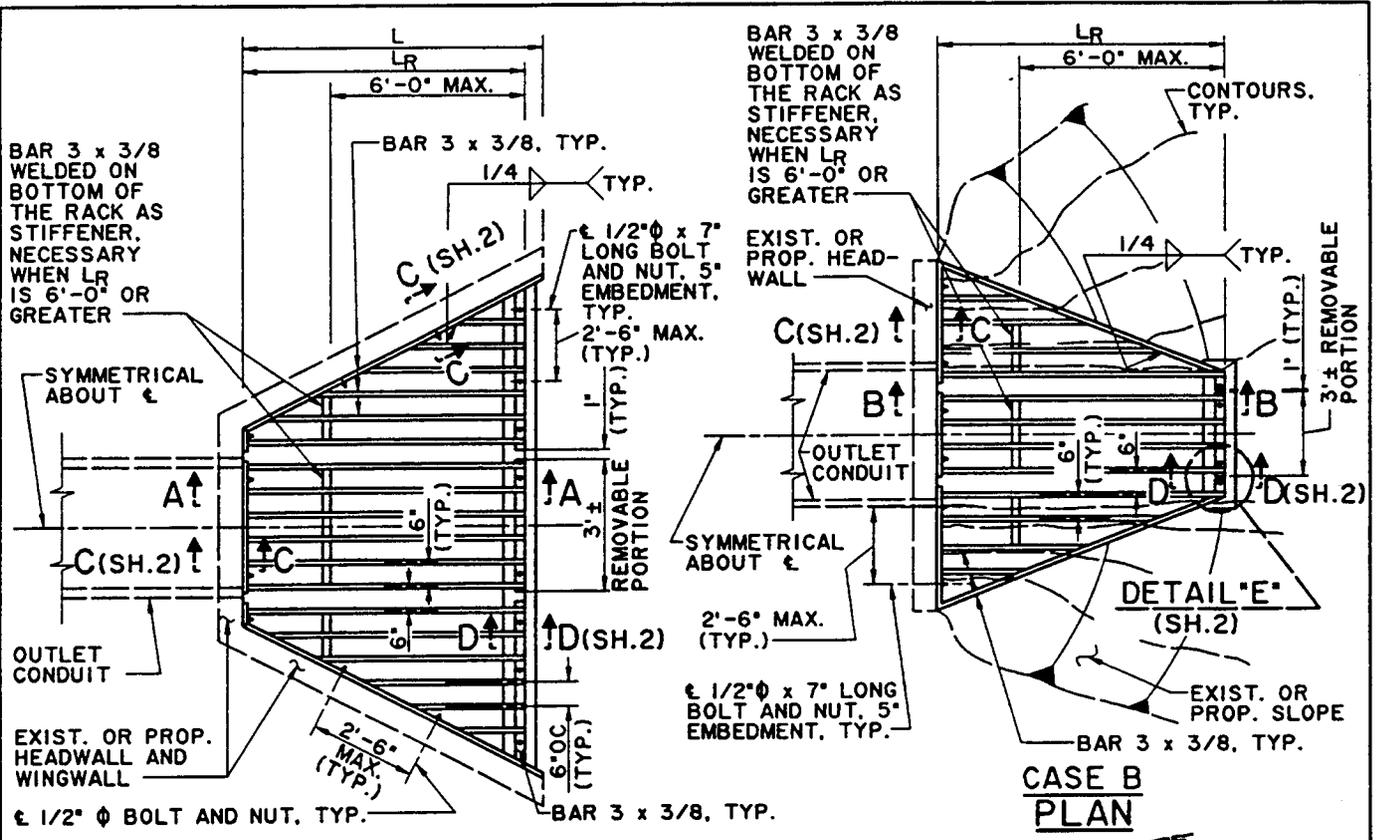
**CASE 2**  
**SECTION A-A (SH. 1)**

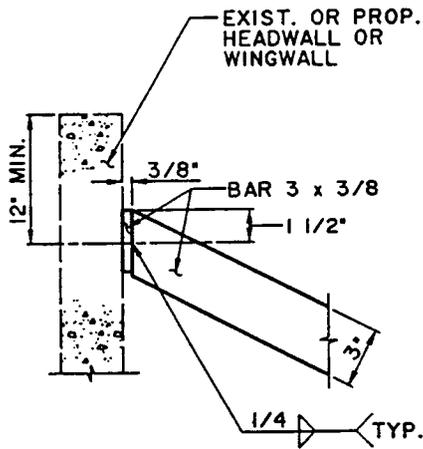


**CASE 3**  
**SECTION A-A (SH. 1)**

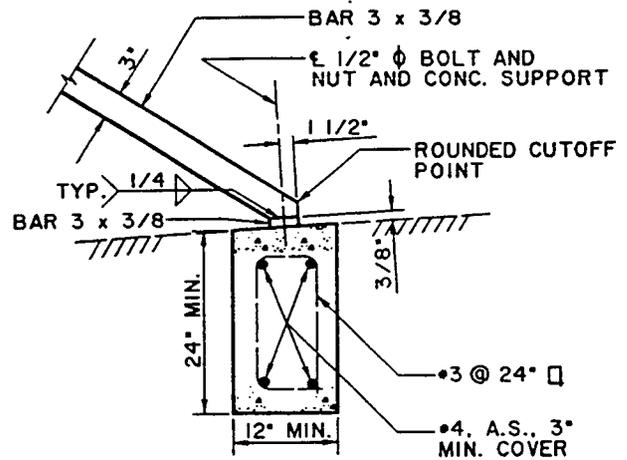
**NOTES**

1. ANGLE A MAY BE ANY ANGLE AS REQUIRED.
2. ELEVATION OF POINT A SHOWN ON PROJECT DRAWINGS.
3. POINT B SHALL BE PLACED 300 mm (12") BELOW THE FLOW LINE OF EXISTING DITCH UNLESS OTHERWISE SPECIFIED ON PROJECT DRAWINGS. SLOPE SHALL BE SET IN FIELD BY THE ENGINEER.
4. THE HEIGHT OF THE RISER FOR CASE 1 & 3 SHALL VARY AS DETERMINED BY THE ELEVATION OF POINTS A & B, OR BY THE TOP OF STORM DRAIN CONDUIT AND ELEVATION OF POINT B.
5. CORRUGATED STEEL BAND CONNECTOR IS NOT REQUIRED FOR INLET SIZES 600 mm (24") DIAMETER OR LESS.
6. IN ALL CASES, CONNECTION TO THE STORM DRAIN CONDUIT SHALL BE IN ACCORDANCE WITH THE APPLICABLE JUNCTION STRUCTURE, TRANSITION STRUCTURE, OR MANHOLE.
7. ALL CSP AND FITTINGS SHALL BE GALVANIZED.
8. PUNCH HOLES IN CSP AND WELD 20 mm (3/4") GALVANIZED BARS HORIZONTALLY IN PLACE ACROSS OPENING.
9. COAT WELDED, CUT AND ABRADED SURFACES AS SPECIFIED IN SUB-SECTION 210-3.5 OF THE SPPWC.
10. INLET SHALL NOT BE USED IN WATER COURSES SUBJECT TO DEBRIS FLOWS. A STRUCTURE HAVING A PROTECTION BARRIER SHOULD BE USED.
11. END SECTION MAY BE ARMCO STANDARD END SECTION, BETHLEHEM STEEL CO. FLARED END SECTION FOR CSP, OR AN AGENCY APPROVED EQUAL.
12. 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.



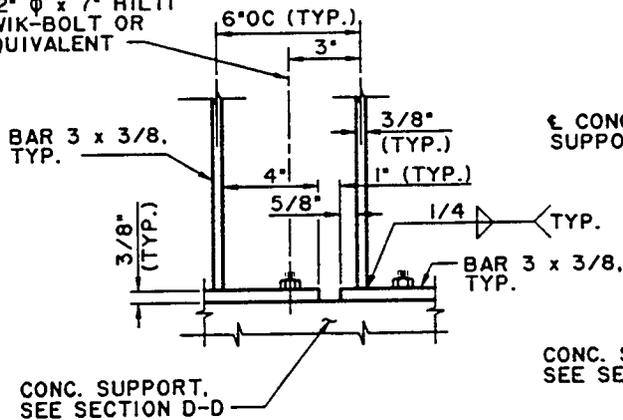


**SECTION C-C (SH. 1)**

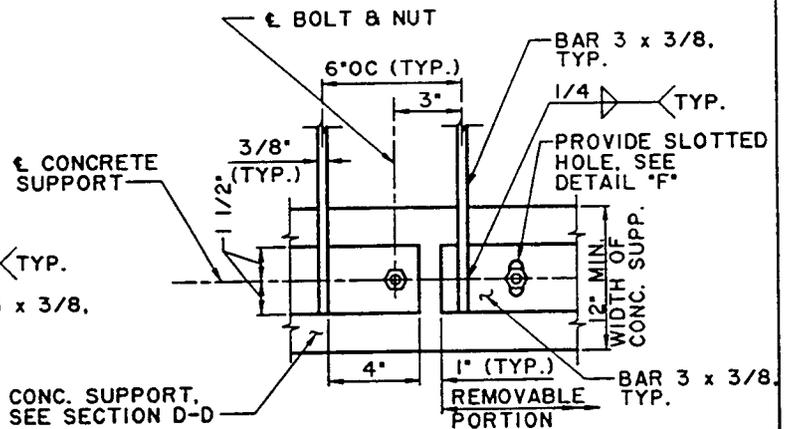


**SECTION D-D (SH. 1)**

⊕ STAINLESS STEEL  
1/2" ⌀ x 7" HILTI  
KWIK-BOLT OR  
EQUIVALENT

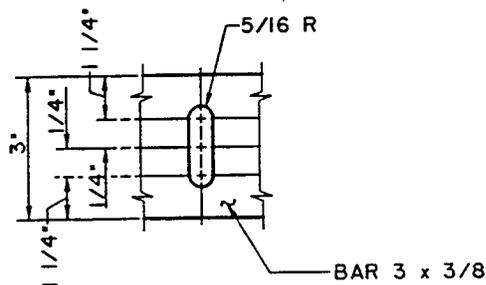


**ELEVATION**



**PLAN**

**DETAIL "E" (SH. 1)**

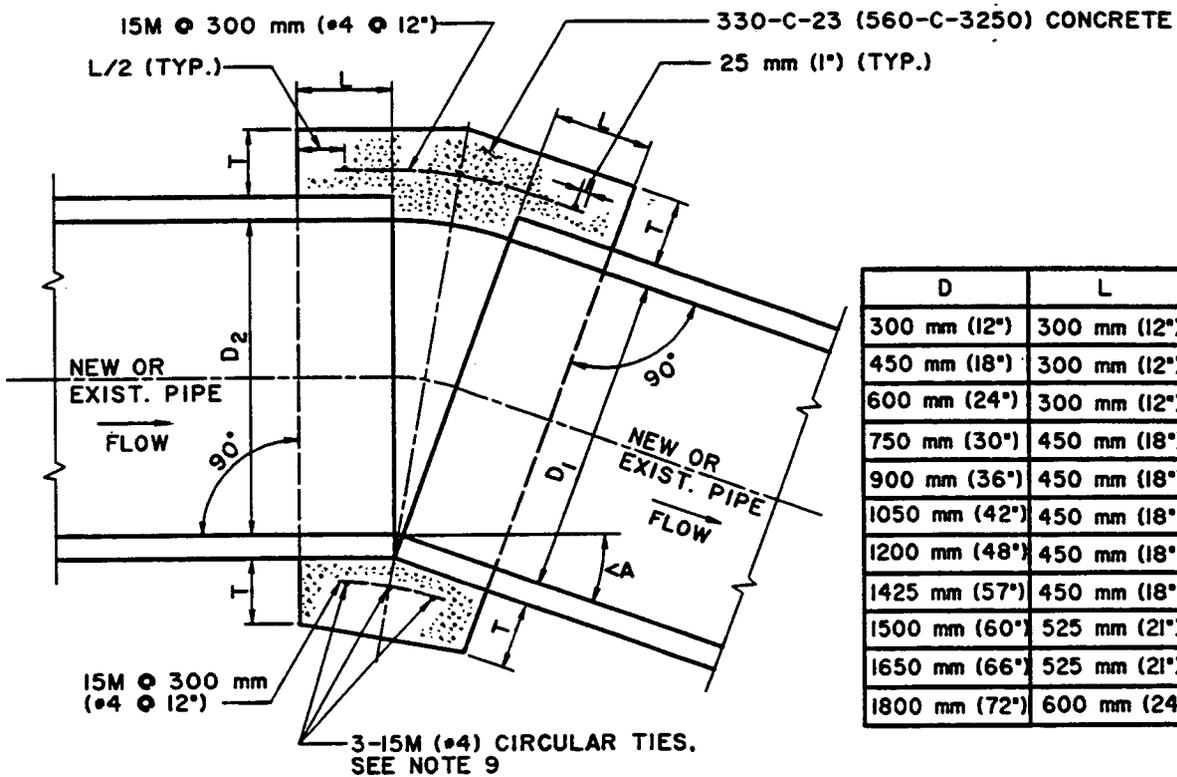


**DETAIL "F" (SH. 1)**

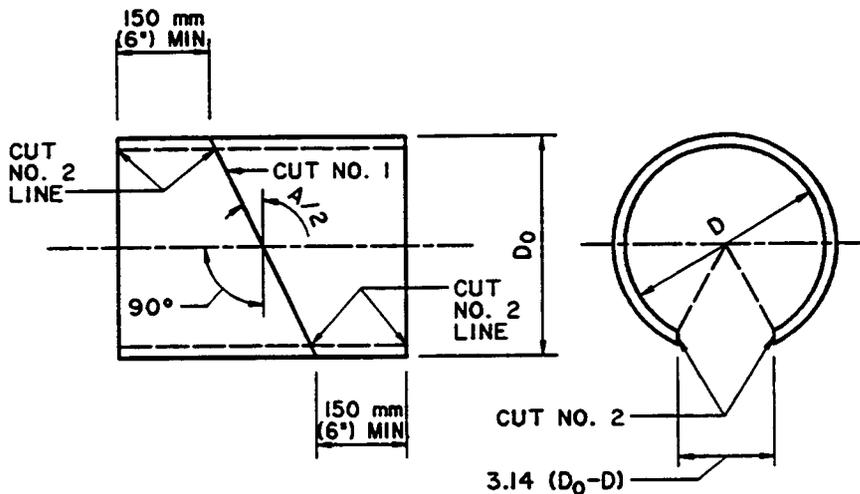
APPLIES TO THE TOP AND BOTTOM  
BARS OF THE REMOVABLE PORTION ONLY

NOTES

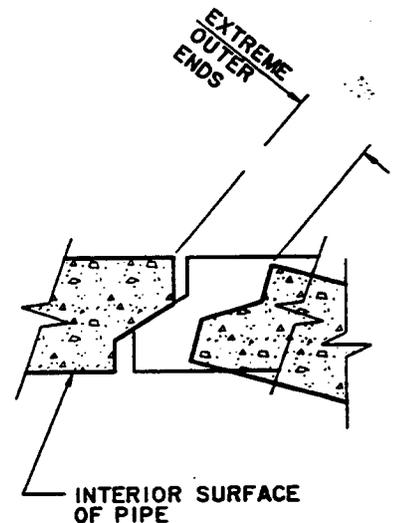
1. MAXIMUM SIZE OF OUTLET TO BE USED WITH THIS RACK IS 48" PIPE OR 48" WIDE RCB. MAXIMUM LENGTH OF RACK  $L_R$  IS 10'-0".
2.  $L_R$  CAN BE ADJUSTED SO THAT THE SLOPE OF THE RACK IS APPROXIMATELY 2 HORIZONTAL TO 1 VERTICAL.
3. THE CONCRETE SUPPORT IS NOT NECESSARY IF EXISTING OR PROPOSED INLET STRUCTURE HAS ADEQUATE SUPPORT CUTOFF WALL. IT DOES NOT ELIMINATE THE NEED FOR A CUTOFF WALL BUT CAN BE INTEGRATED WITH ONE WHEN REQUIRED AT A PARTICULAR INSTALLATION.
4. GALVANIZE ALL EXPOSED FERROUS PARTS AFTER FABRICATION.
5. IF FIELD WELDS ARE NECESSARY, USE GALVICON, GALVALLOY OR AGENCY APPROVED EQUAL FOR COATING.
6. ALL BOLTS SHALL BE 1/2" IN DIAMETER AND 7" IN LENGTH. ON REMOVABLE PORTION OF THE RACK, USE 300 SERIES STAINLESS STEEL BOLTS AND NUTS. FOR WINGWALL BOLTS FOR CASE A, AND WHERE HEADWALL AND WINGWALL ARE EXISTING, HILTI KWIK-BOLT OR EQUIVALENT CAN BE USED.



D	L	T
300 mm (12")	300 mm (12")	100 mm (4")
450 mm (18")	300 mm (12")	125 mm (5")
600 mm (24")	300 mm (12")	150 mm (6")
750 mm (30")	450 mm (18")	175 mm (7")
900 mm (36")	450 mm (18")	225 mm (9")
1050 mm (42")	450 mm (18")	225 mm (9")
1200 mm (48")	450 mm (18")	250 mm (10")
1425 mm (57")	450 mm (18")	250 mm (10")
1500 mm (60")	525 mm (21")	275 mm (11")
1650 mm (66")	525 mm (21")	275 mm (11")
1800 mm (72")	600 mm (24")	300 mm (12")



**DETAIL "A" (SEE NOTE 10)**  
**SONO-TUBE, OR EQUAL, INTERIOR FORM**



**DETAIL "B"**  
**TYPICAL JOINT FOR REINFORCED CONCRETE PIPE**

CUT NO. 1: SAW THE TUBE AT AN ANGLE OF A/2 WITH THE TRANSVERSE PLANE. REVERSE ONE SECTION AND TAPE BOTH SECTIONS TOGETHER FORMING THE DEFLECTION ANGLE A.

CUT NO. 2: SAW THE TUBE LONGITUDINALLY REMOVING A STRIP 3.14 (D<sub>0</sub>-D) WIDE ON THE SIDE OPPOSITE THE OPEN JOINT. BEND THE ENDS OF THE CUT TOGETHER AND INSERT THE TUBE IN THE PIPE.

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**CONCRETE COLLAR FOR RCP**  
**300 mm (12") THROUGH 1800 mm (72")**

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN  
METRIC

380 - 2

SHEET 1 OF 2

**NOTES**

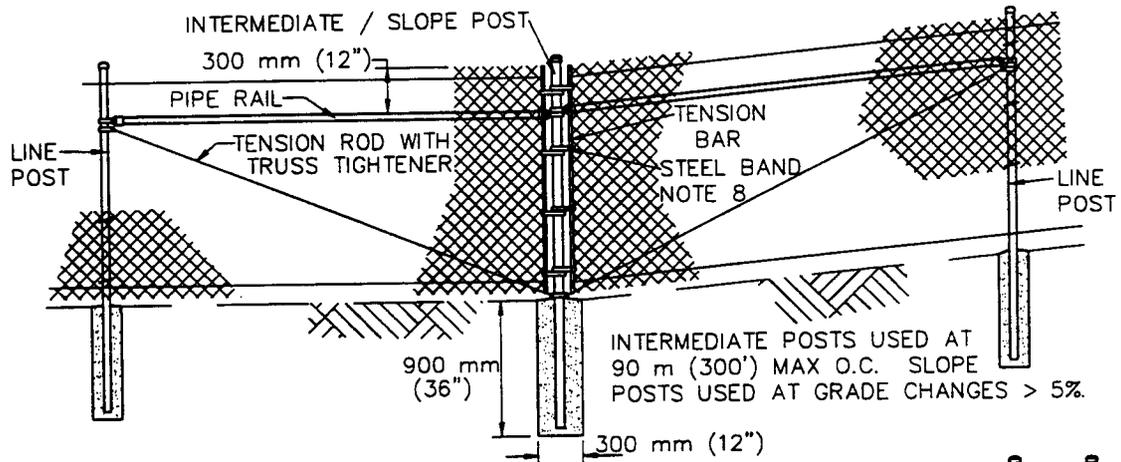
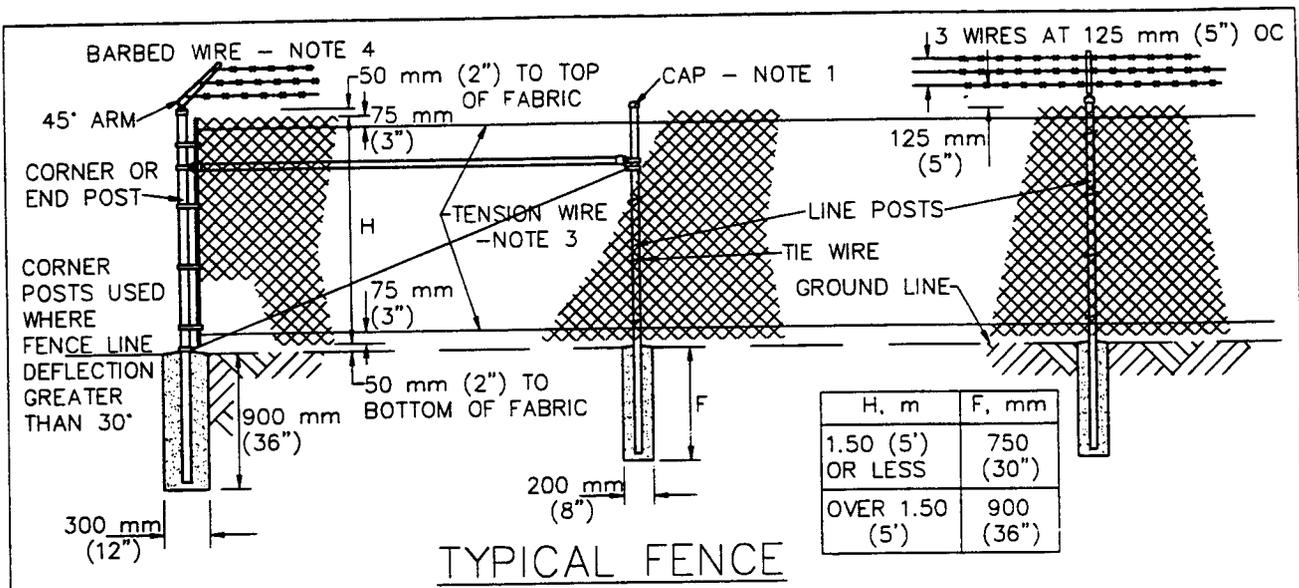
1. A CONCRETE COLLAR IS REQUIRED WHERE THE CHANGE IN GRADE EXCEEDS 10 PERCENT.
2. FOR CURVE JOINTS (SEE DETAIL B. SHEET 1)  
 IF THE EXTREME ENDS OF THE PIPE LEAVE A CLEAR SPACE THAT IS GREATER THAN 25 mm (1"), BUT IS LESS THAN 75 mm (3") A CONCRETE COVER IS REQUIRED IN ACCORDANCE WITH SUBSECTION 306-1.2.4 OF THE SSPWC.  
 IF THE EXTREME ENDS OF THE PIPE LEAVE A CLEAR SPACE THAT IS EQUAL TO OR GREATER THAN 75 mm (3"), BUT LESS THAN 150 mm (6"), A CONCRETE COLLAR IS REQUIRED. IF THE CLEAR SPACE IS 150 mm (6") OR GREATER, A TRANSITION STRUCTURE IS REQUIRED.
3. CONCRETE COLLAR SHALL NOT BE USED FOR A SIZE CHANGE ON THE MAIN LINE.
4. CONNECTOR PIPES
  - A. WHERE PIPES OF DIFFERENT DIAMETERS ARE JOINED WITH A CONCRETE COLLAR, L AND T SHALL BE THOSE OF THE LARGER PIPE.  $D = D_1$  OR  $D_2$ , WHICHEVER IS GREATER.
  - B. WHEN  $D_1$  IS EQUAL TO OR LESS THAN  $D_2$ , JOIN INVERTS AND WHEN  $D_1$  IS GREATER THAN  $D_2$ , JOIN SOFFITS.
5. FOR PIPE LARGER THAN 1800 mm (72") SPECIAL COLLAR DETAILS ARE REQUIRED.
6. FOR PIPE SIZE NOT LISTED USE NEXT SIZE LARGER.
7. REINFORCEMENT SHALL CONFORM TO ASTM A 615 M (A 615) GRADE 300(40).
8. WHERE REINFORCING IS REQUIRED THE DIAMETER OF THE CIRCULAR TIES SHALL BE  $D + (2X \text{ WALL THICKNESS}) + T$ .
9. REINFORCING SHALL BE USED WHERE THE PIPE DIAMETER IS GREATER THAN 525 mm (21") AND ON ALL PIPES WHERE THE SPACES BETWEEN THE EXTREME OUTER ENDS IS 75 mm (3") OR LARGER.

CIRCULAR TIES:

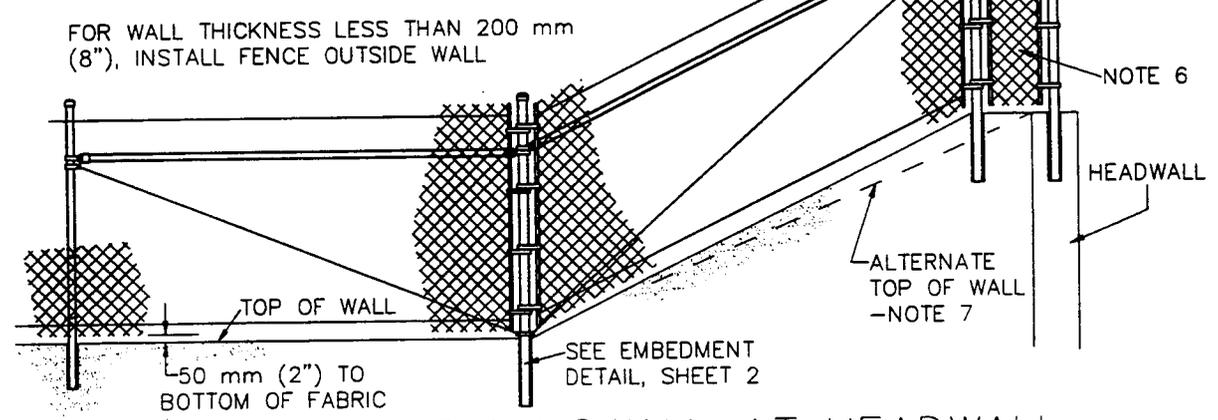
PIPE DIAMETER	NO. OF CIRCULAR TIES
525 mm (21") OR LESS	3
600 mm (24") TO 750 mm (30")	3
825 mm (33") TO 1425 mm (57")	4
1500 mm (60") TO 1800 mm (72")	5

WHERE THE SPACE BETWEEN PIPE ENDS EXCEEDS 75 mm (3"). THE NUMBER OF CIRCULAR TIES SHALL BE INCREASED TO MAINTAIN AN APPROXIMATE SPACING OF 150 mm (6") O.C.

10. WHERE THE PIPE IS 525 mm (21") OR LESS IN DIAMETER AN INTERIOR FORM OF UNSEALED SONO-TUBE OR EQUAL SHALL BE USED TO PROVIDE A SMOOTH INTERIOR JOINT. THE PAPER FORM MAY BE LEFT IN PLACE (SEE DETAIL A). WHEN THE PIPE IS 600 mm (24") OR LARGER A REMOVABLE INTERIOR FORM SHALL BE USED OR THE INTERIOR JOINT SHALL BE COMPLETELY FILLED WITH MORTAR AND NEATLY POINTED.
- II. 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, EXCEPT REINFORCING BAR SIZES IN ENGLISH UNITS MAY BE SUBSTITUTED FOR METRIC BAR SIZES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH UNITS.



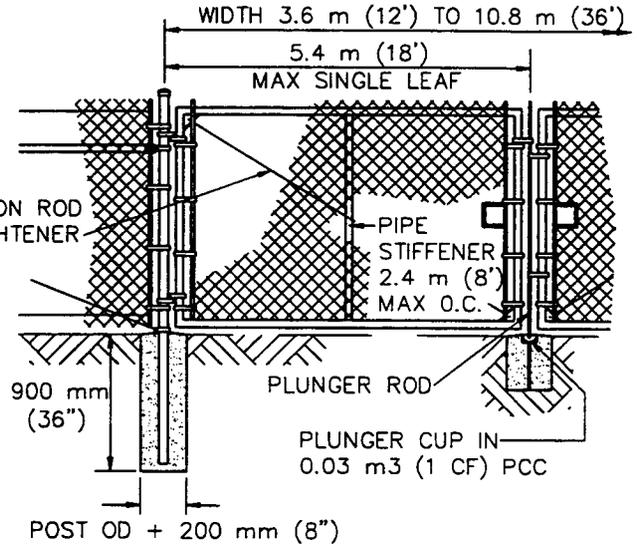
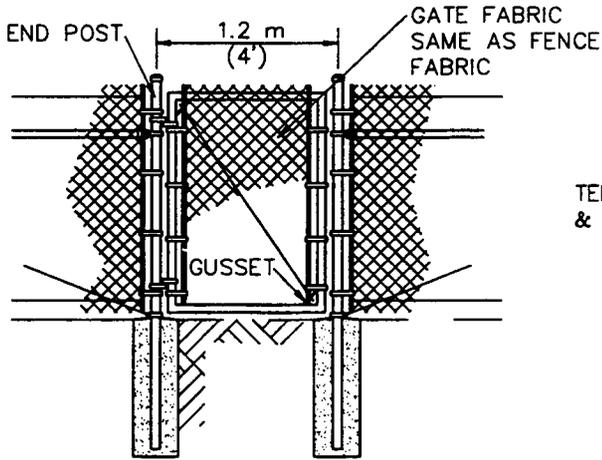
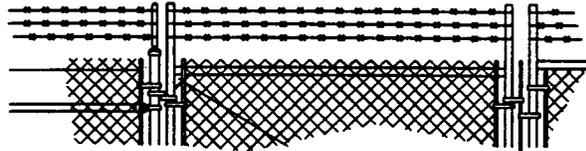
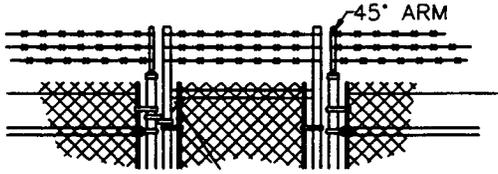
**INTERMEDIATE / SLOPE POST**



**CHANNEL WALL AND WINGWALL AT HEADWALL**

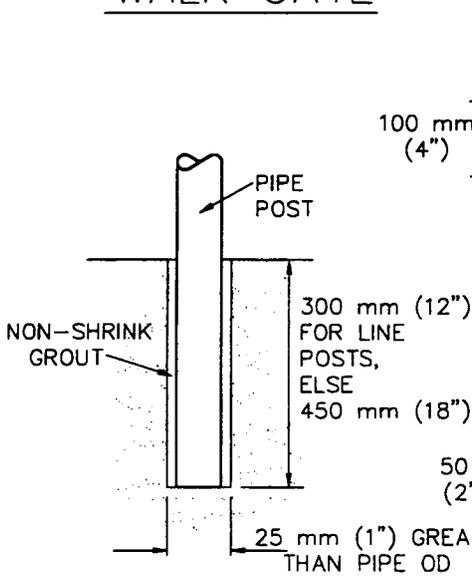
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PROMULGATED BY THE PUBLIC WORKS STANDARDS INC., GREENBOOK COMMITTEE 1984 REV. 1996	<h1 style="margin: 0;">CHAIN LINK FENCE AND GATES</h1>	STANDARD PLAN METRIC <h2 style="margin: 0;">600 - 1</h2> SHEET 1 OF 3
<b>USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION</b>		

BARBED WIRE - NOTE 4

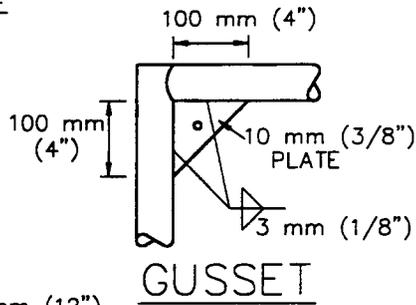


WALK GATE

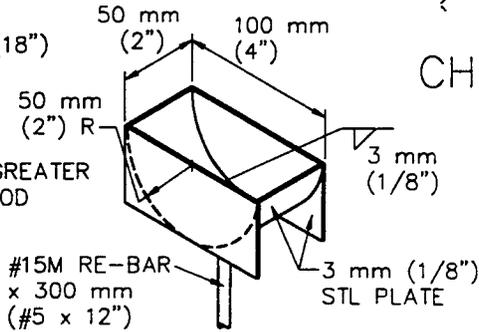
DRIVE GATE



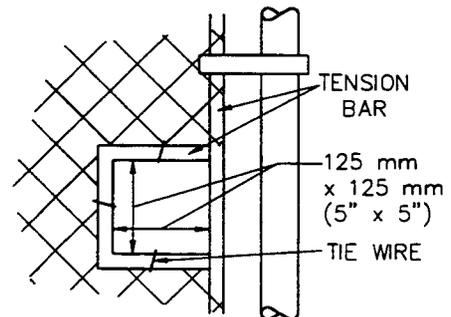
POST EMBEDMENT



GUSSET



PLUNGER CUP ISOMETRIC



CHAIN AND LOCK CUT-OUT

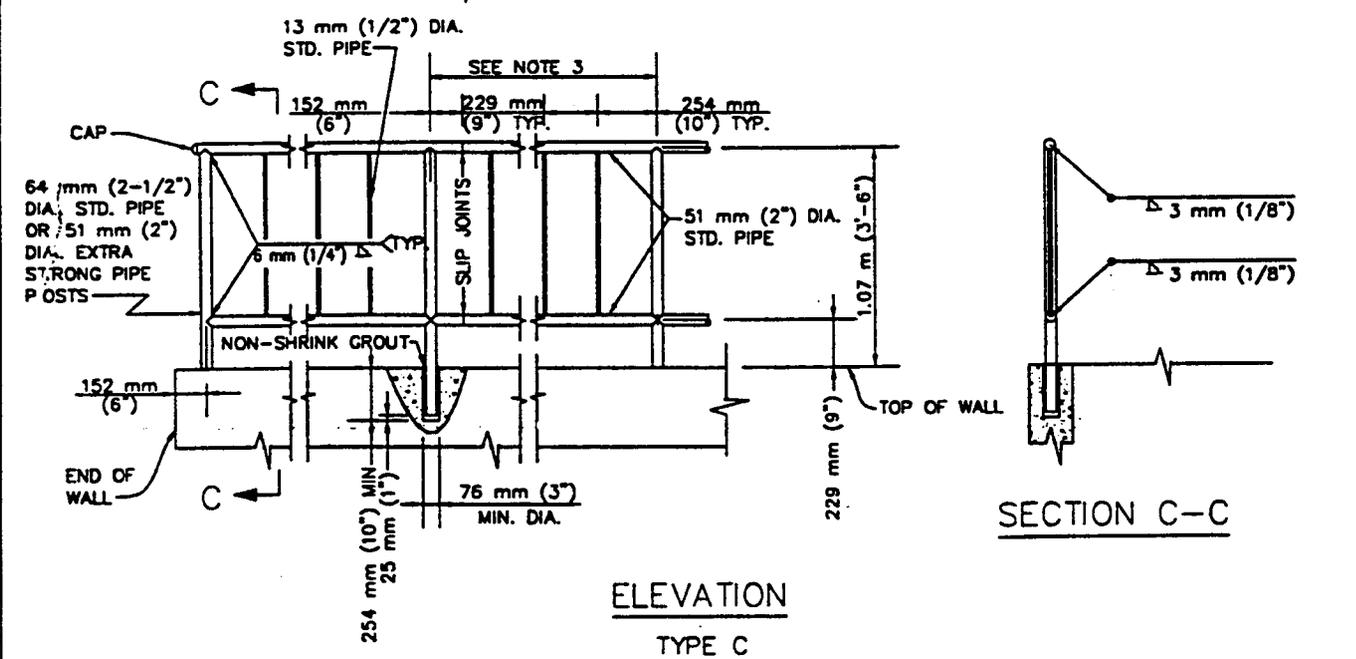
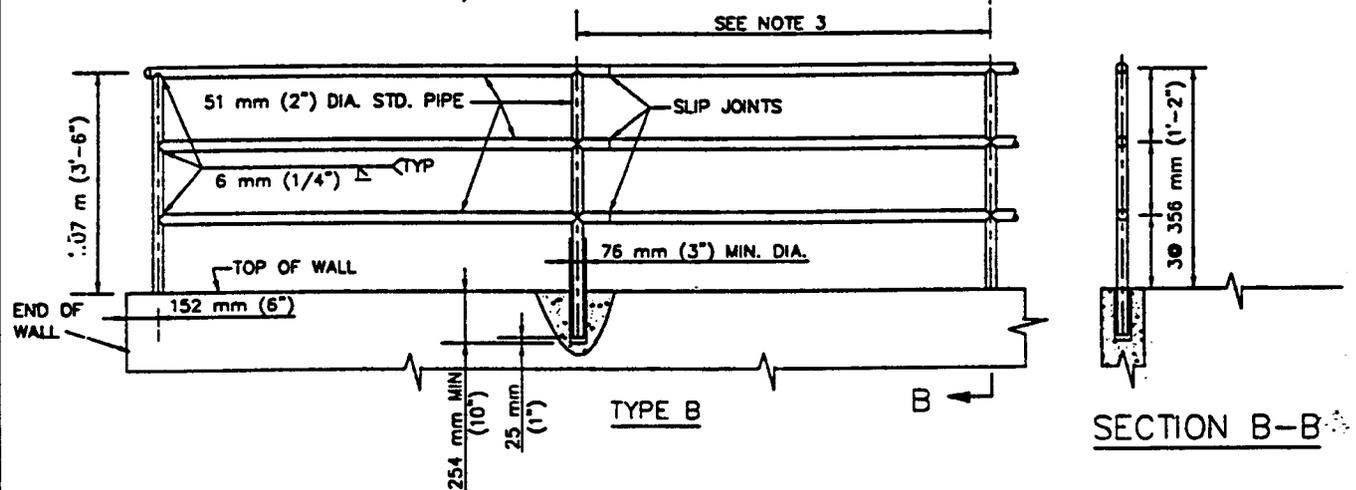
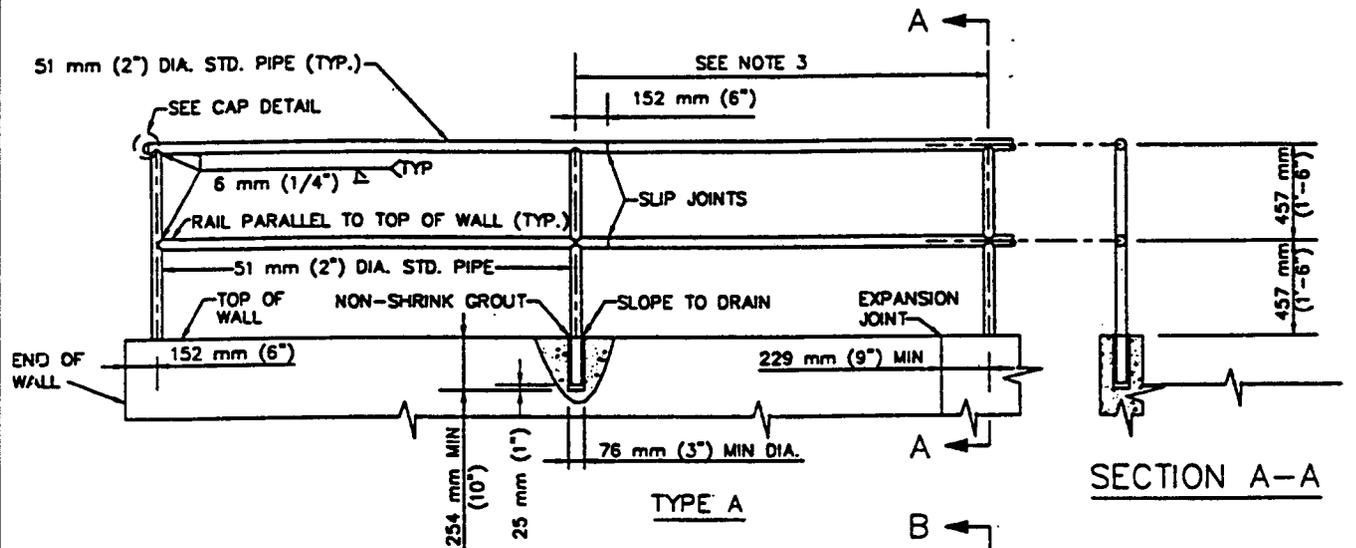
NOTES:

1. SECURE DRIVE-FIT GALVANIZED CAP TO POST WITH 6 mm (1/4") ROUND-HEAD RIVET.
2. H DENOTES FABRIC WIDTH AND NOMINAL FENCE HEIGHT. H = 1.5 m (5') UNLESS OTHERWISE NOTED.
3. IF FENCE WITH TOP RAIL IS SPECIFIED, DELETE STEEL TENSION WIRE AT TOP, AND PIPE RAILS AT INTERMEDIATE, SLOPE, END AND CORNER POSTS. EXTEND TENSION ROD TO TOP RAIL.
4. BARBED WIRE SHALL BE USED ONLY WHEN SPECIFIED.
5. POST SPACING IS MAXIMUM 3.0 m (10').
6. FILL CLEAR OPENINGS GREATER THAN 75 mm (3") WITH FABRIC. FOR OPENINGS LESS THAN 450 mm (18"), TIE FABRIC TO POSTS.
7. USE ONE POST FOR COMBINED SLOPE AND CORNER POST IF TOP OF CHANNEL WALL IS CONSTRUCTED AS SHOWN FOR "ALTERNATE".
8. STEEL BANDS AT TENSION BARS SHALL BE 3 mm X 25 mm (1/8" x 1"), MINIMUM, SPACED AT MAXIMUM 400 mm (16").
9. DIMENSIONS SHOWN ON THIS 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. HOWEVER, ASTM 615 REINFORCING STEEL MAY BE SUBSTITUTED FOR ASTM 615M STEEL.

AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER

**CHAIN LINK FENCE AND GATES**

STANDARD PLAN  
METRIC  
**600 - 1**  
SHEET 3 OF 3



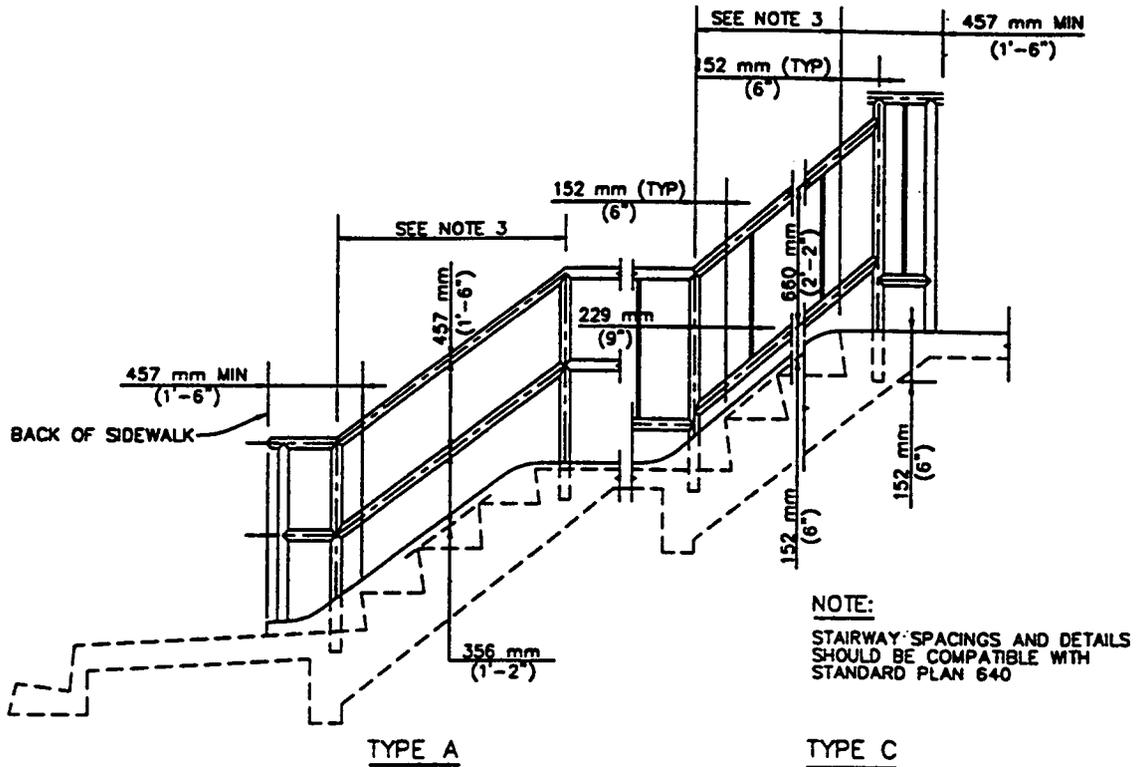
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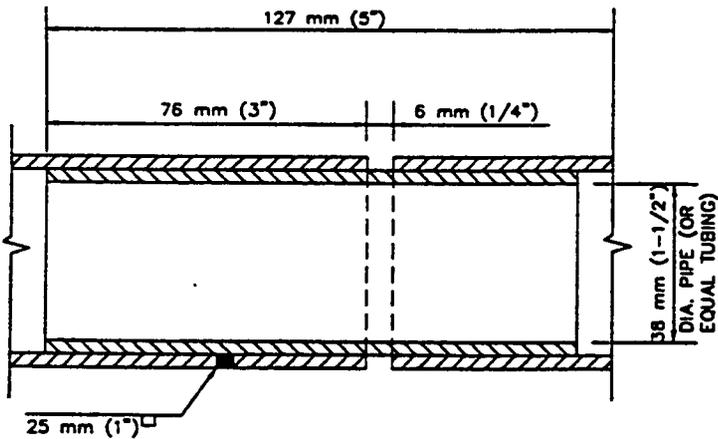
METAL HAND RAILINGS

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

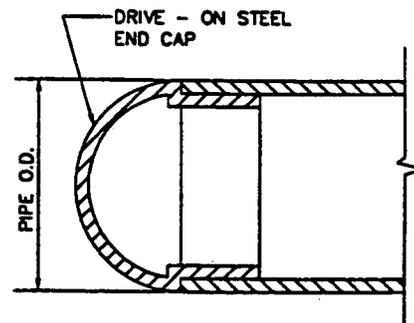
STANDARD PLAN  
 METRIC  
 606 - 1  
 SHEET 1 OF 2



## HANDRAIL INSTALLATION ON STAIRWAYS



SLIP JOINT DETAIL



CAP DETAIL FOR RAIL-END

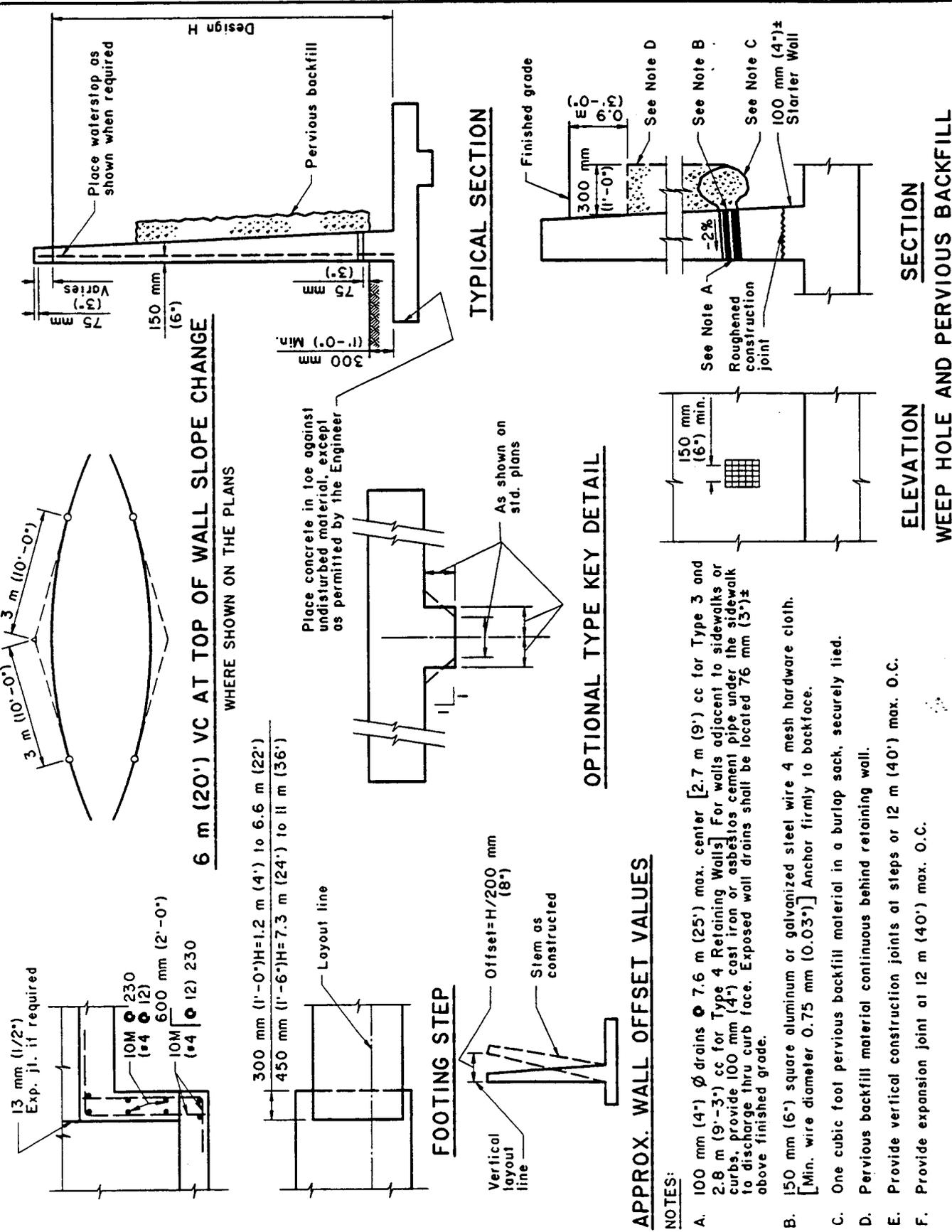
### NOTES:

1. TYPE B OR TYPE C SHALL BE USED WHERE ADJACENT GRADE IS MORE THAN 762 mm (2'-6") BELOW LANDING OR SIDEWALK FINISHED SURFACE.
2. PROVIDE SLIP JOINTS AT STAIRWAY EXPANSION JOINTS AND AT EVERY 7.31 m (24 FEET) ON CENTER MAXIMUM.
3. MAXIMUM SPACING OF POST SHALL BE 2.44 m (8 FEET) ON STRAIGHT ALIGNMENT 1.83 m (6 FEET) ON CURVED ALIGNMENT LESS THAN 9.14 m (30 FEET) RADIUS. SPACING SHALL BE UNIFORM BETWEEN CHANGES IN ALIGNMENT.

AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER

**METAL HAND RAILINGS**

STANDARD PLAN  
METRIC  
**606 - 1**  
SHEET 2 OF 2



**6 m (20') VC AT TOP OF WALL SLOPE CHANGE**

WHERE SHOWN ON THE PLANS

**TYPICAL SECTION**

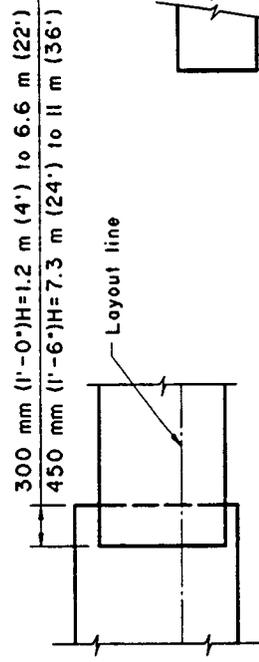
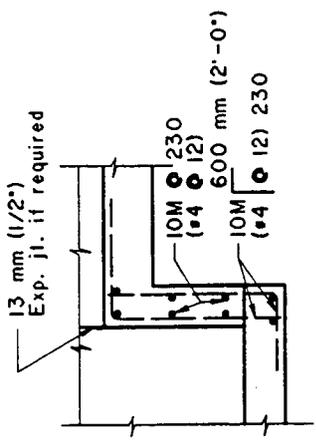
**OPTIONAL TYPE KEY DETAIL**

**ELEVATION  
WEEP HOLE AND PERVIOUS BACKFILL**

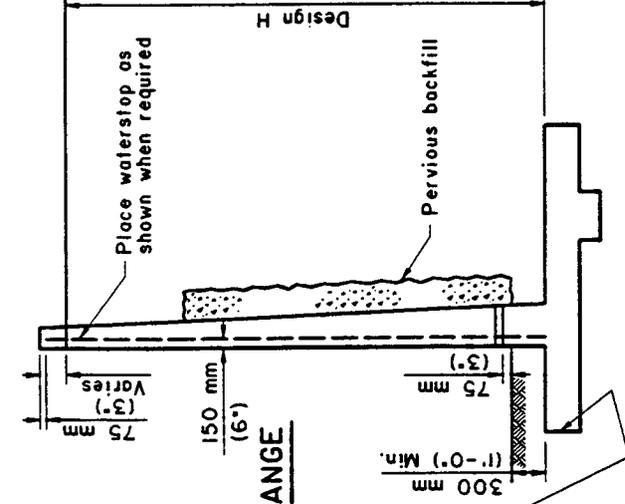
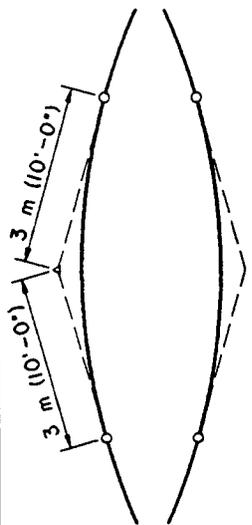
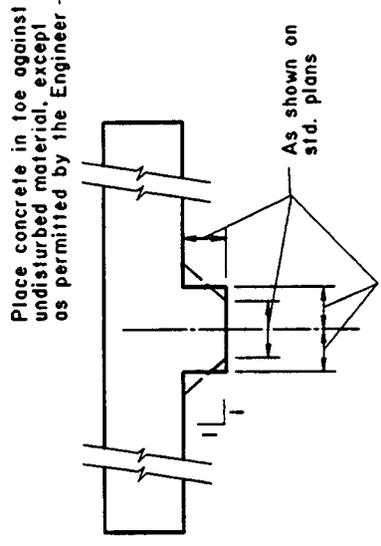
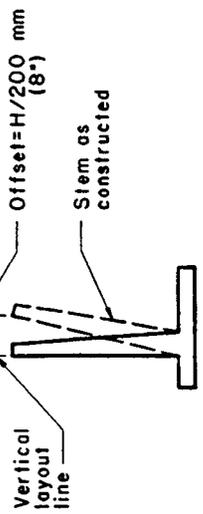
**APPROX. WALL OFFSET VALUES**

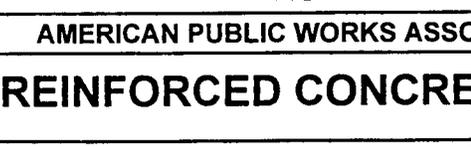
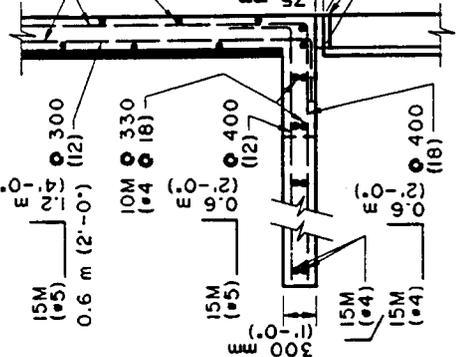
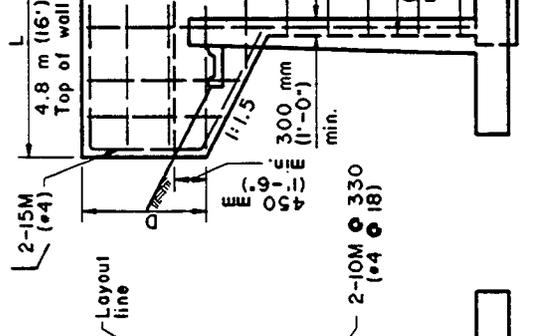
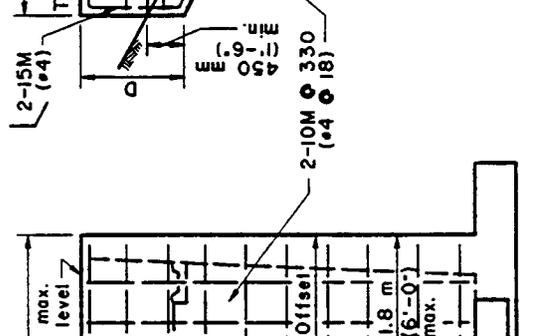
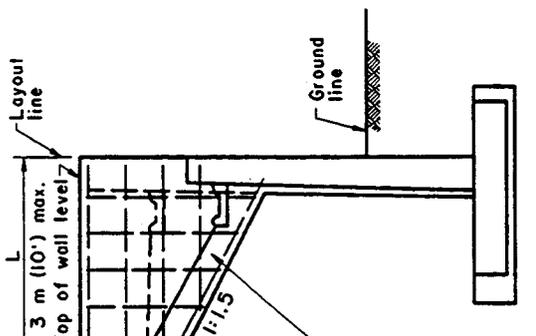
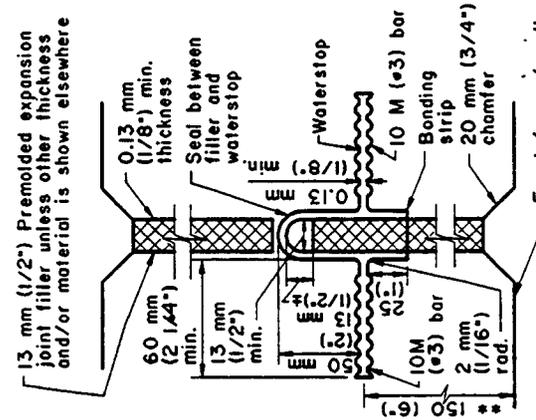
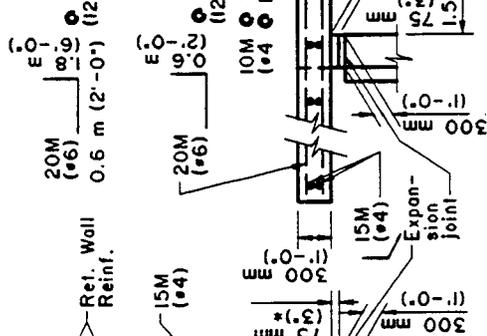
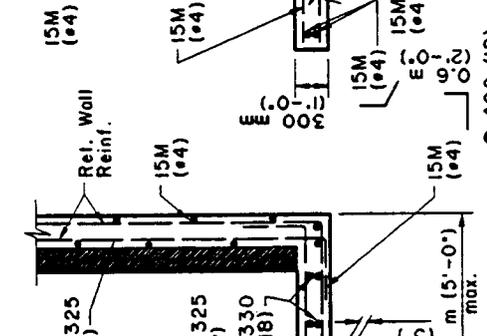
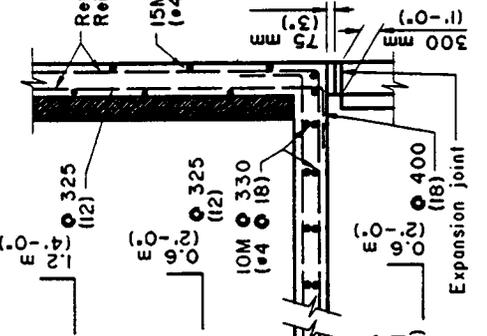
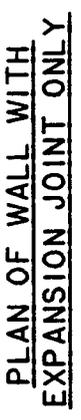
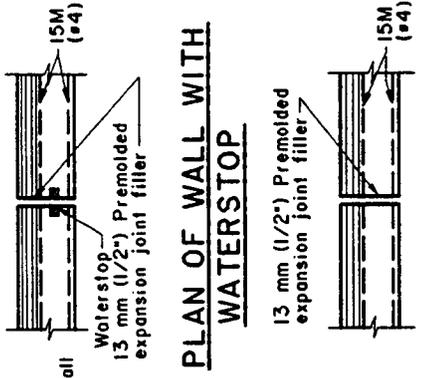
NOTES:

- A. 100 mm (4")  $\phi$  drains  $\phi$  7.6 m (25') max. center [2.7 m (9') cc for Type 3 and 2.8 m (9'-3") cc for Type 4 Retaining Walls] For walls adjacent to sidewalks or curbs, provide 100 mm (4") cast iron or asbestos cement pipe under the sidewalk to discharge thru curb face. Exposed wall drains shall be located 76 mm (3")± above finished grade.
- B. 150 mm (6") square aluminum or galvanized steel wire 4 mesh hardware cloth. [Min. wire diameter 0.75 mm (0.03")] Anchor firmly to backface.
- C. One cubic foot pervious backfill material in a burlap sack, securely tied.
- D. Pervious backfill material continuous behind retaining wall.
- E. Provide vertical construction joints at steps or 12 m (40') max. O.C.
- F. Provide expansion joint at 12 m (40') max. O.C.



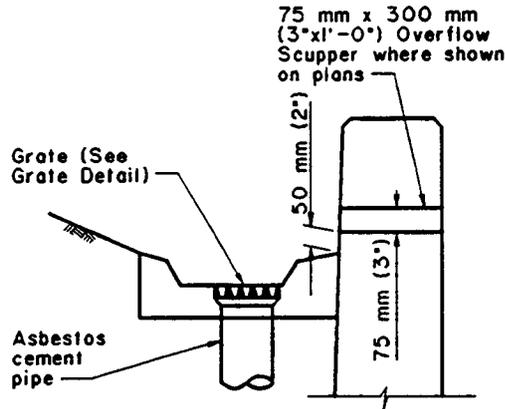
**FOOTING STEP**





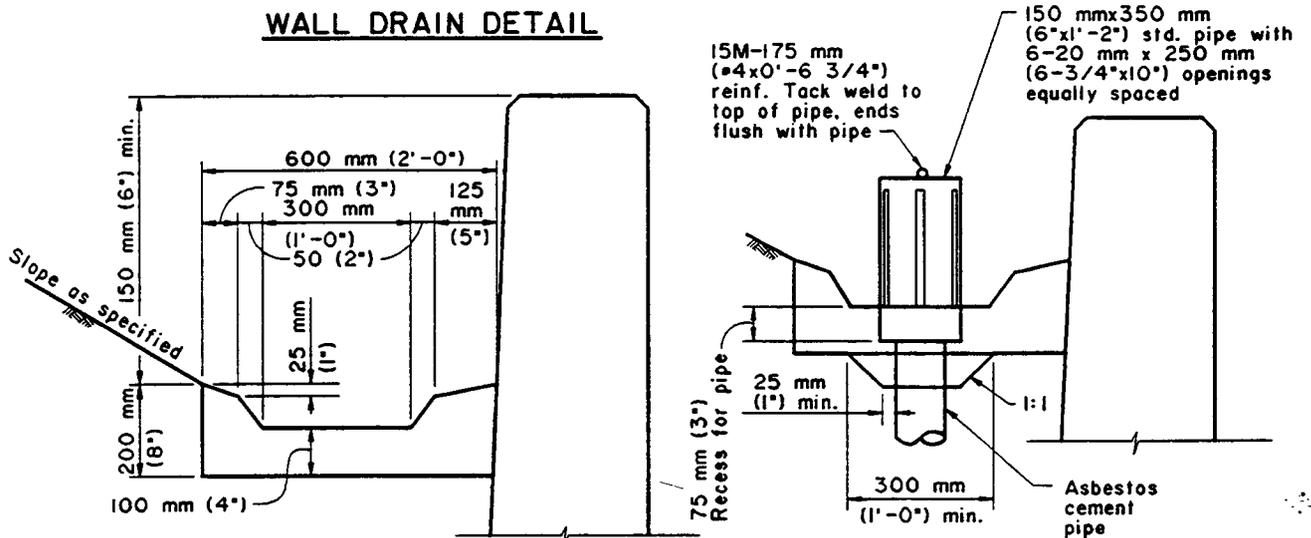
\* Holes will be permitted in the outer 13 mm (1/2") of the web for wire, rings, etc. Tie web to 10M (#3) reinforcing bars @ 300 mm (12") max. intervals to support the waterstop in proper position during concrete placement. Alternative detail may be submitted for approval of the Engineer.

\*\* For wall thickness less than 300 mm (12"), use 1/2 the wall thickness



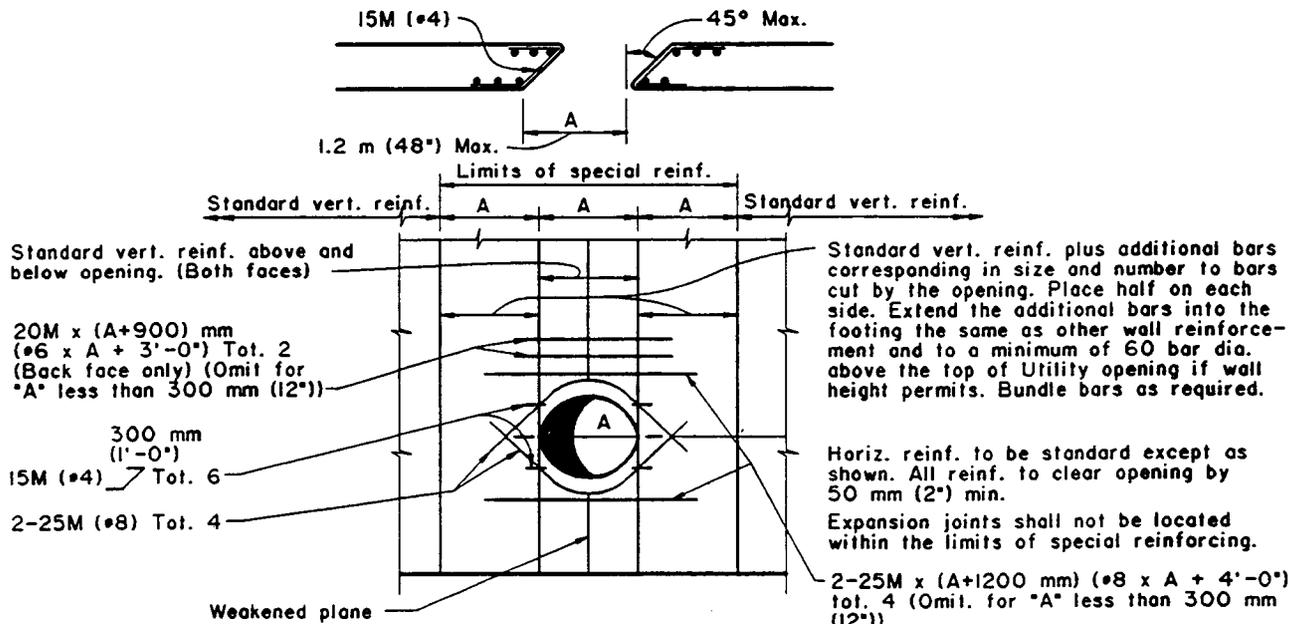
**GRATE DETAIL**  
 Sizes to fit Standard Hubs

**WALL DRAIN DETAIL**



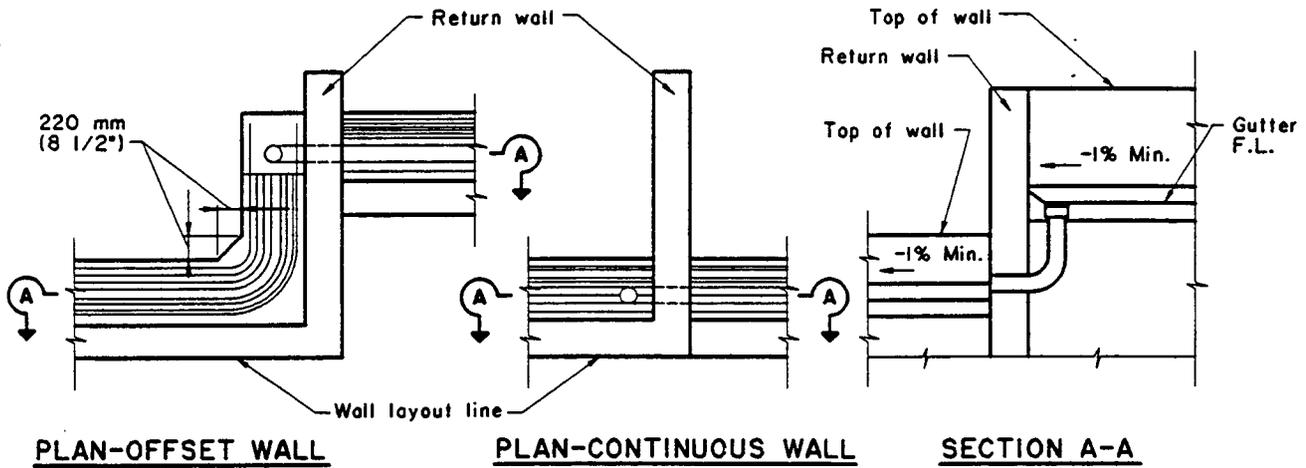
**TYPICAL GUTTER DETAIL**

**WALL DRAIN WITH PIPE DOME**

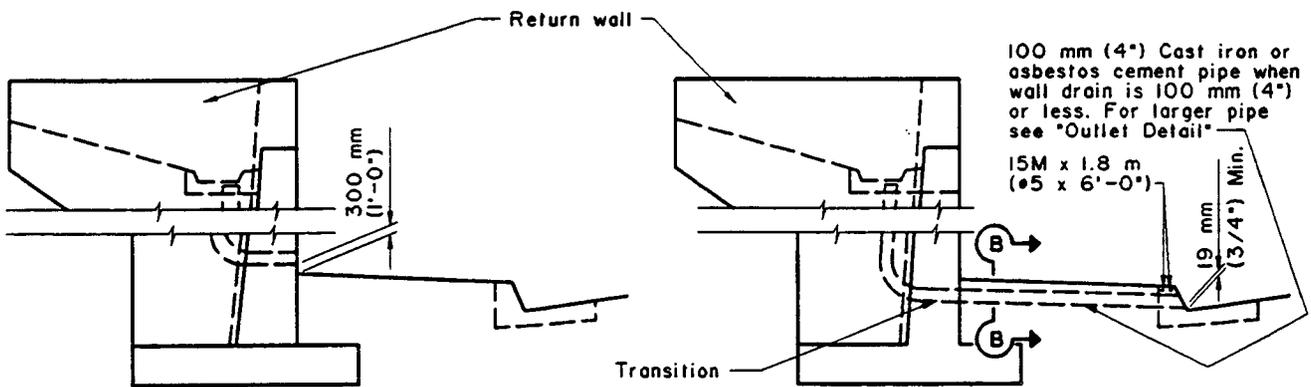


**RETAINING WALL UTILITY OPENING**

Max. size of Opening (A)=1.2 m (48")

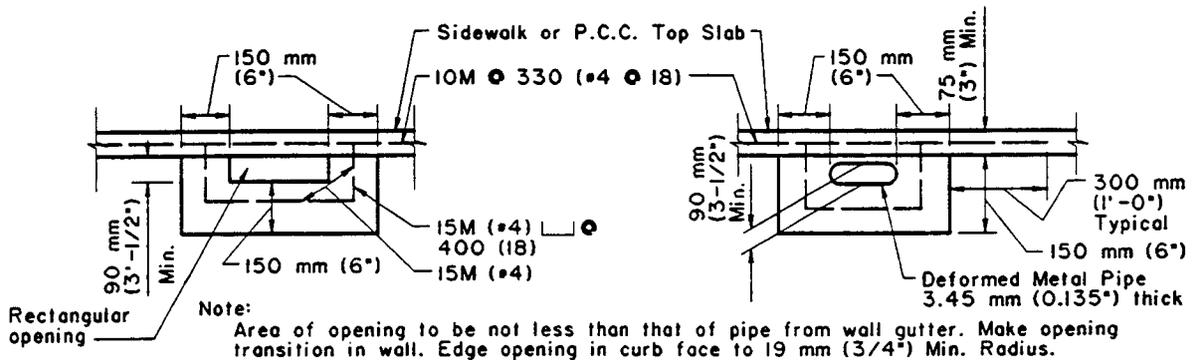


**DRAIN THROUGH RETURN WALL**

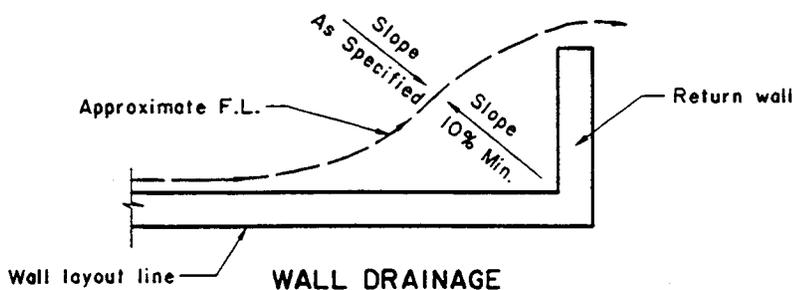


**RETAINING WALL, FACE OF WALL OUTLET**

**RETAINING WALL, GUTTER OUTLET**



**OUTLET DETAIL-SECTION B-B**



**WALL DRAINAGE**  
**WHERE GUTTER NOT REQUIRED**

### DESIGN CONDITIONS:

Design H may be exceeded by 150 mm (6") before going to the next size. Footing key is required except when found unnecessary by the Engineer. Special footing design is required where foundation material is incapable of supporting toe pressure loads listed in table.

### DESIGN DATA:

$f_c = 9\text{MPa}$  (1300 psi)  $f'_c = 22\text{MPa}$  (3250 psi)  $f_s = 166\text{MPa}$  (24,000 psi)  $n = 10$  earth =  $19\text{KN/m}$  ( $120^3\text{pcf}$ )  
Case I Equivalent fluid pressure =  $5.6\text{ kPa/m}$  (36 psf) max. for determination of toe pressure.  $1.3\text{ kPa/m}$  (27 psf) min. for determination of heel pressure.  
Case II, III, IV. Wall design is based on Rankine's formula  $\phi = 33^\circ - 42^\circ$ .

### QUANTITIES:

Quantities do not include the wall portion above "Gutter Elevation" and are for design purposes only.

### LOADING CONDITIONS:

Case I 0.6 m (2') surcharge  
Case II 1:2 (2:1) unlimited surcharge  
Case III 1:1.5 (1 1/2:1) 2.1 m (7') limited surcharge  
Case IV 1:1.5 (1 1/2:1) unlimited surcharge

### LAPPED SPLICES:

Where A 615 Grade 400MPa (60 ksi) or A 706 reinforcing bars are used, the length of lapped splices shall be at least  $45 \times$  diameters of the smaller bar joined.

### NOTE:

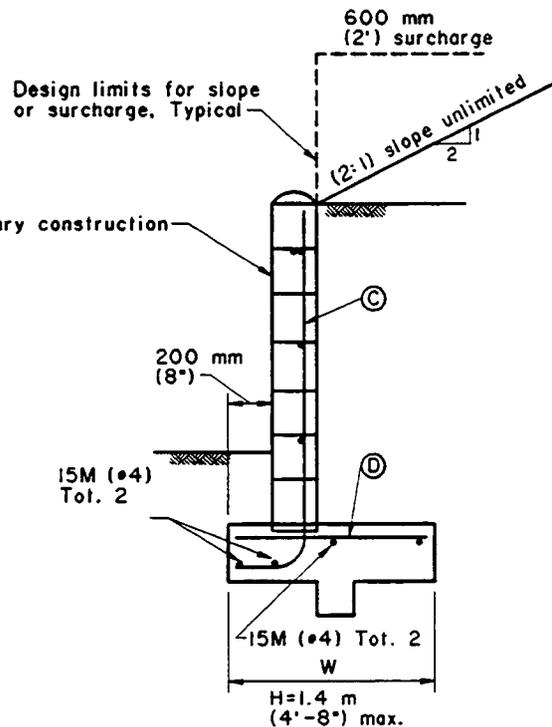
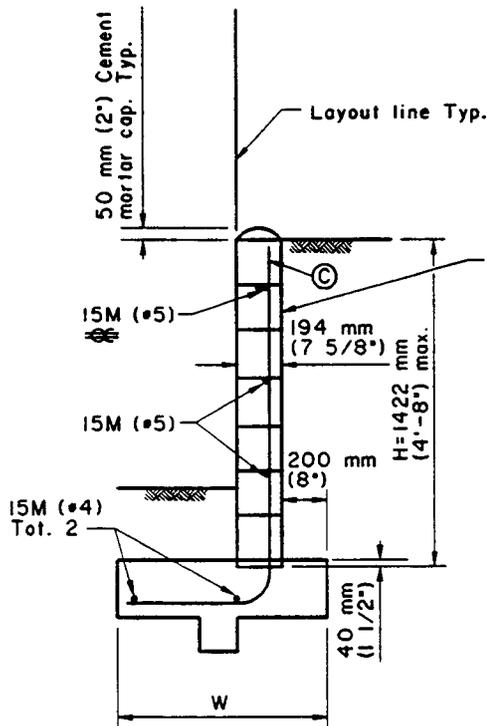
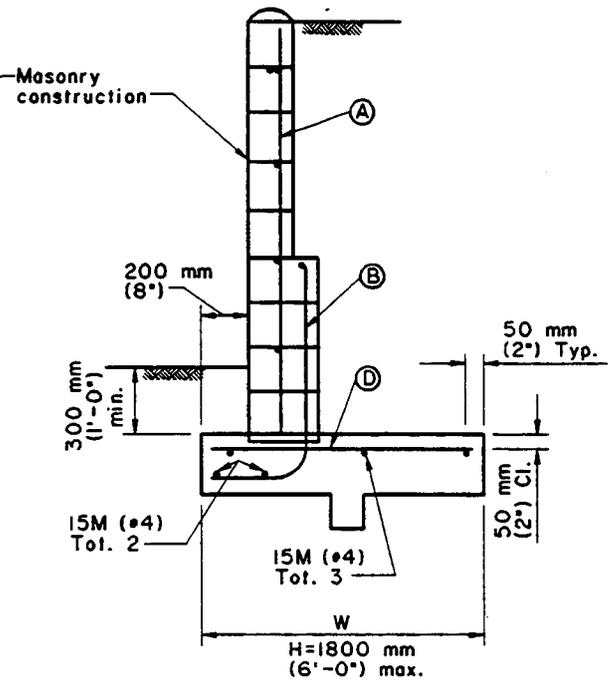
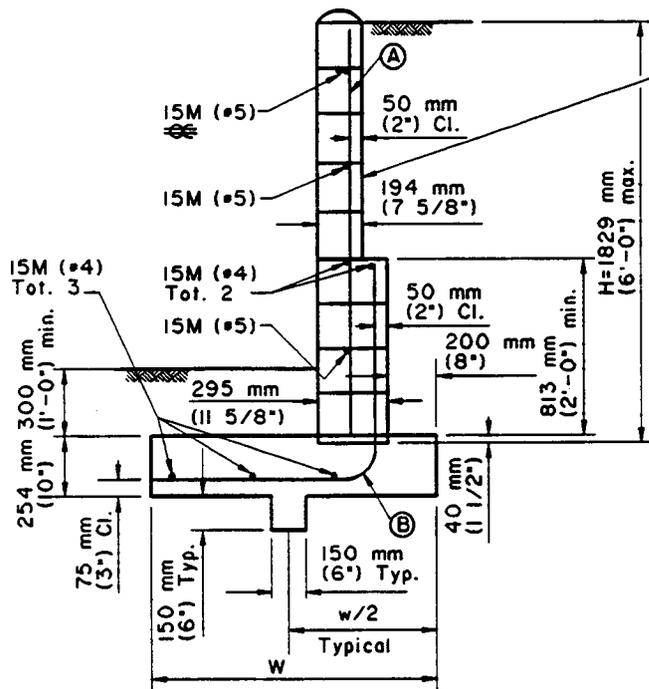
DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.

AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER

**REINFORCED CONCRETE RETAINING WALL DETAILS**

STANDARD PLAN  
METRIC

**617 - 1**  
SHEET 5 OF 5



**TYPE A WALL**

**TYPE B WALL**

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1984  
REV. 1996

**MASONRY RETAINING WALL**

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

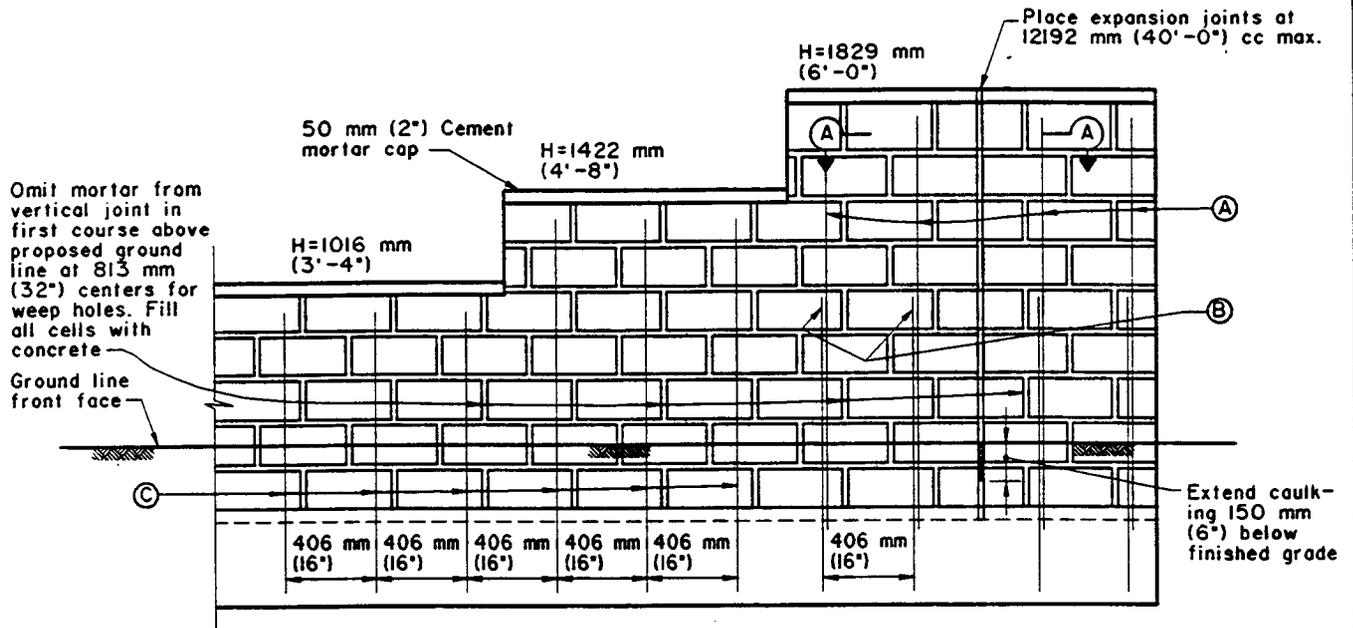
STANDARD PLAN  
METRIC  
**618 - 1**  
SHEET 1 OF 3

Type	Design H	1016 (3'-4")	1219 (4'-0")	1422 (4'-8")	1626 (5'-4")	1829 (6'-0")
A	W	1000 (3'-2")	1100 (3'-6")	1200 (3'-10")	1300 (4'-2")	1400 (4'-6")
A	Ⓐ				15M ⌀ 406 (#4 ⌀ 16)	15M ⌀ 406 (#4 ⌀ 16)
A	Ⓑ				15M ⌀ 406 (#4 ⌀ 16)	15M ⌀ 406 (#5 ⌀ 16)
A	Ⓒ	15M ⌀ 406 (#4 ⌀ 16)	15M ⌀ 406 (#4 ⌀ 16)	15M ⌀ 406 (#5 ⌀ 16)		
Footing Conc.	m <sup>3</sup> /m CF/LF	0.27 (2.9)	0.30 (3.2)	0.31 (3.4)	0.34 (3.7)	0.37 (4.0)
Reinf.	kg/m lbs/LF	13 (8.5)	13.5 (8.9)	17.5 (11.6)	19 (12.8)	22.5 (15.0)

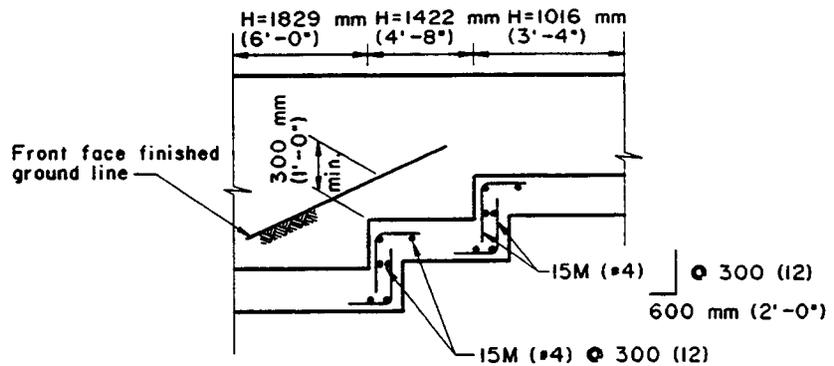
Type	Design H	1016 (3'-4")	1219 (4'-0")	1422 (4'-8")	1626 (5'-4")	1829 (6'-0")
B	W	850 (2'-8")	950 (3'-0")	1050 (3'-4")	1150 (3'-8")	1250 (4'-0")
B	Ⓐ				15M ⌀ 406 (#4 ⌀ 16)	15M ⌀ 406 (#4 ⌀ 16)
B	Ⓑ				15M ⌀ 406 (#4 ⌀ 16)	15M ⌀ 406 (#5 ⌀ 16)
B	Ⓒ	15M ⌀ 406 (#4 ⌀ 16)	15M ⌀ 406 (#4 ⌀ 16)	15M ⌀ 406 (#5 ⌀ 16)		
B	Ⓓ	15M ⌀ 375 (#4 ⌀ 16)	15M ⌀ 300 (#5 ⌀ 16)			
Footing Conc.	m <sup>3</sup> /m CF/LF	0.23 (2.5)	0.26 (2.8)	0.28 (3.0)	0.31 (3.3)	0.33 (3.6)
Reinf.	kg/m lbs/LF	13.5 (9.1)	14.5 (9.6)	17.5 (11.8)	19 (12.9)	23 (15.4)

**NOTE:**

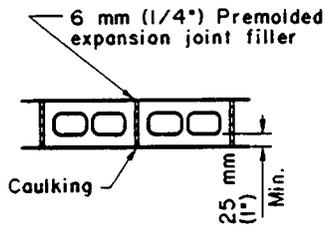
DIMENSIONS SHOWN ON THE PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.



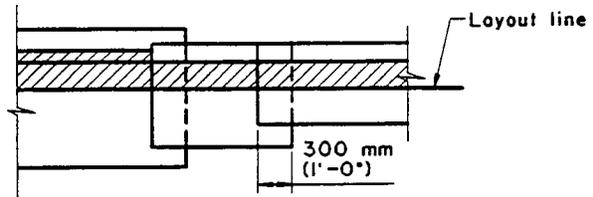
**ELEVATION-MASONRY CONSTRUCTION**



**ELEVATION**



**SECTION A-A**



**PLAN**

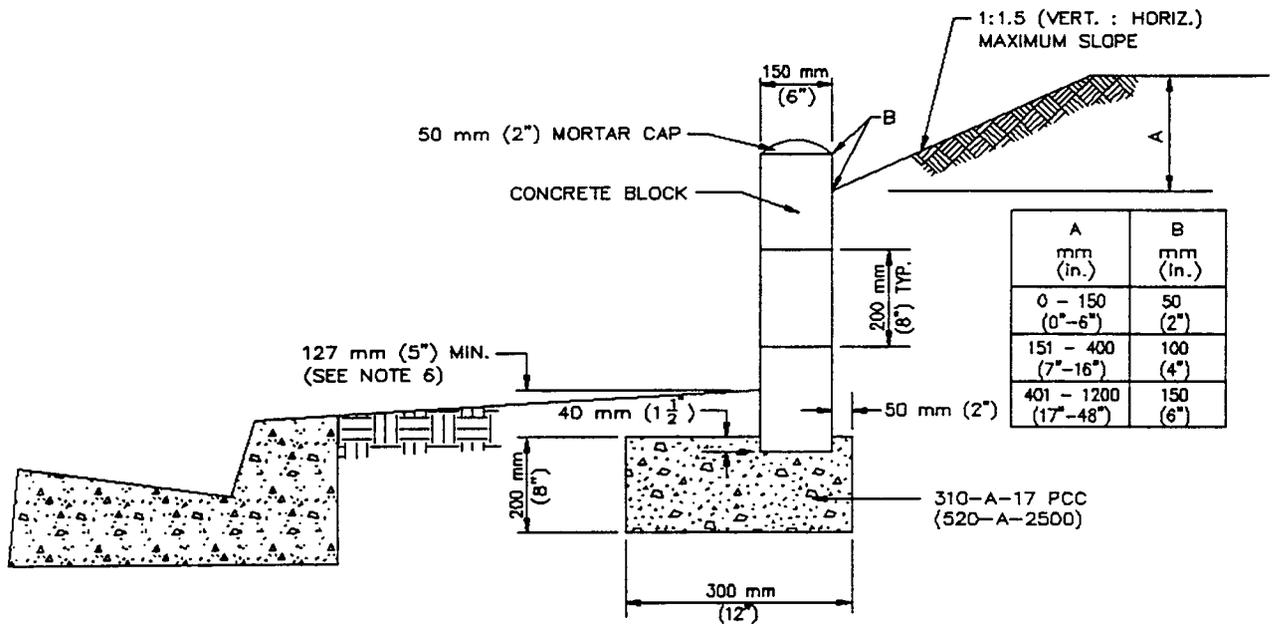
**FOOTING STEP DETAILS**

**DESIGN CRITERIA:**

Masonry:  $f_m = 3.5\text{MPa}$  (500 psi)  $f'_m = 10.3\text{MPa}$  (1500 psi)  $f_s = 165\text{MPa}$  (24,000 psi)  $n = 20$   
 Reinf. Conc.:  $f_c = 9\text{MPa}$  (1300 psi)  $f'_c = 22\text{MPa}$  (3250 psi)  $f_s = 165\text{MPa}$  (24,000 psi)  $n = 10$   
 Earth =  $19\text{KN/m}^3$  (120 pcf.)  
 .6 m (2') Surcharge

Equivalent fluid pressure = 5.6 kPa/m (36 pcf) for determination of toe pressure.  
 4.2 kPa/m (27 pcf) for determination of heel pressure.

1:2 (2:1) Unlimited Surcharge: Earth pressure determined from Rankine's formula  $\phi = 33^\circ-42^\circ$ .  
 Minimum allowable soil bearing capacity of foundation material = 96kPa (2000 psf.)



3 COURSE MAXIMUM

NOTES:

1. CONCRETE AND CONCRETE BLOCK SHALL BE PER SSPWC.
2. CONCRETE BLOCKS SHALL BE PLACED WHILE THE FOOTING IS STILL FRESH. ALL CELLS TO BE FILLED SOLID WITH GROUT AND RODDED SO GROUT IS MONOLITHIC WITH FRESH FOOTING.
3. OMIT MORTAR FROM VERTICAL JOINTS IN FIRST COURSE ABOVE FINISHED GRADE ON 812 mm (32") CENTERS FOR WEEP HOLES.
4. POUR FOOTING AGAINST UNDISTURBED NATURAL SOIL.
5. NO LIVE LOAD SURCHARGE ALLOWED ON RETAINED SOIL.
6. TOP OF FOOTING MAY BE PLACED PARALLEL TO PARKWAY GRADE IF STREET GRADE IS RELATIVELY FLAT AND UNIFORM. (MAX. 5%).
7. DIMENSIONS SHOWN ON THIS PLAN FOR METRIC AND ENGLISH UNITS ARE NOT EXACTLY EQUAL VALUES. IF METRIC UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE METRIC VALUES. IF ENGLISH UNITS ARE USED, ALL VALUES USED FOR CONSTRUCTION SHALL BE ENGLISH VALUES.

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1993  
REV. 1995

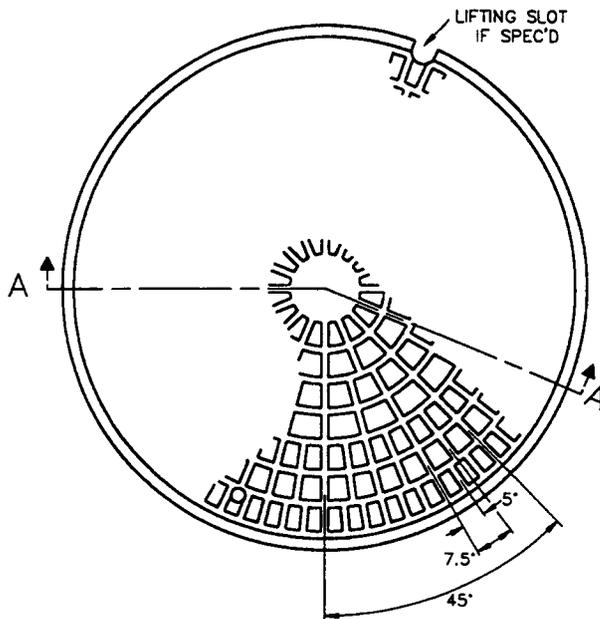
**CONCRETE BLOCK SLOUGH WALL**

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

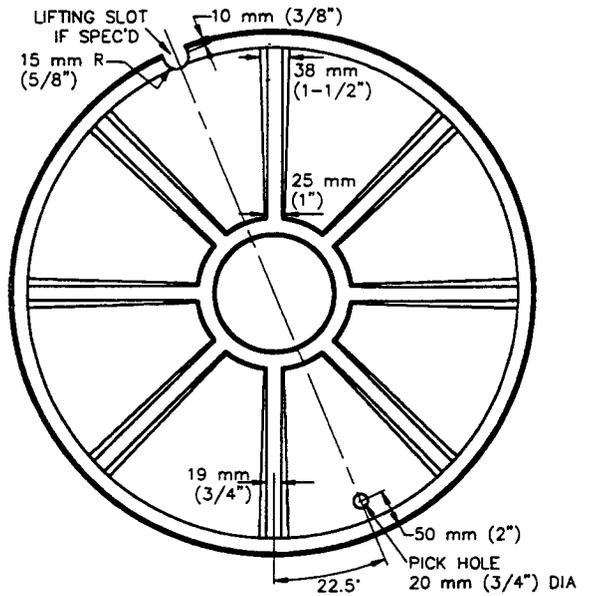
STANDARD PLAN  
METRIC

**622 - 1**

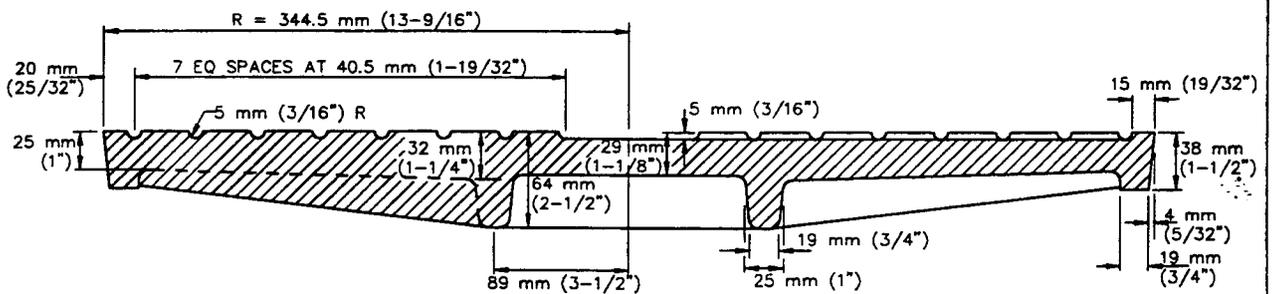
SHEET 1 OF 1



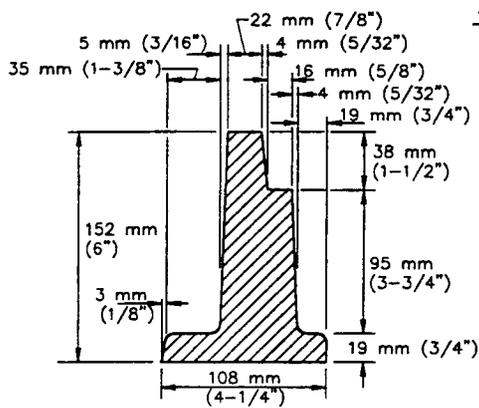
TOP OF COVER



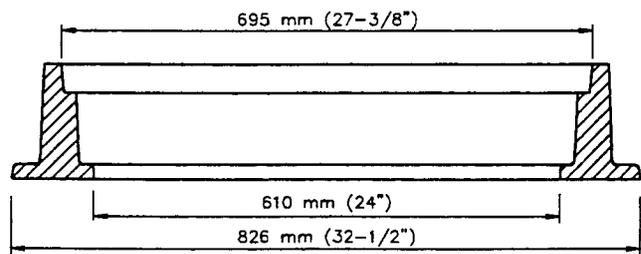
BOTTOM OF COVER



SECTION A-A



FRAME DETAIL



SECTION THRU FRAME

**AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER**

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1984  
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**610 mm (24") MANHOLE FRAME  
AND COVER**

STANDARD PLAN  
METRIC

**630 - 2**

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SHEET 1 OF 2

NOTES:

1. THE CAST IRON USED SHALL CONFORM TO ASTM A-48 CLASS 35B.
2. COVERS SHALL BE CAST WITH THE LETTER "D" FOR STORM DRAINS AND "S" FOR SEWERS, AND THE AGENCY'S IDENTIFICATION IN ACCORDANCE WITH INSTRUCTIONS FURNISHED BY THE AGENCY. THE LETTER "D" OR "S" SHALL BE APPROXIMATELY 65 mm (2-1/2") HIGH WITH 15 mm (1/2") LINE WIDTH, AND PLACED IN THE CENTER OF THE COVER. ALL LETTERS SHALL BE FLUSH WITH THE FINISHED SURFACE OF THE COVER.
3. FOUNDRY IDENTIFYING MARK, HEAT AND DATE SHALL BE CAST ON THE BOTTOM OF THE COVER AND ON THE INSIDE OF THE FRAME.
4. IMPORTED COVERS AND FRAMES SHALL HAVE THE COUNTRY OF ORIGIN MARKING IN COMPLIANCE WITH FEDERAL REGULATIONS.
5. WEIGHT OF FRAME SHALL BE 118 kg (260 LBS). WEIGHT OF COVER SHALL BE 79 kg (175 LBS). ACTUAL WEIGHTS SHALL BE WITHIN A RANGE OF 95% TO 110%.
6. THE MANHOLE FRAME AND COVER SHALL BE INSPECTED BY THE ENGINEER PRIOR TO SHIPMENT TO THE JOB SITE. ACCEPTANCE WILL BE INDICATED BY THE AGENCY'S MARK.
7. THE PROOF-LOAD FOR TEST METHOD B OF THE STANDARD SPECIFICATIONS IS 180 kN (40,700 LBS).
8. COVERS FOR MANHOLES LOCATED IN EASEMENTS, ALLEYS, PARKWAYS AND ALL PLACES OTHER THAN PAVED STREETS SHALL BE PROVIDED WITH SOCKET-SET SCREW LOCKING DEVICES. DRILL AND TAP TWO HOLES TO A DEPTH OF ONE INCH AT 90 DEGREES TO PICK HOLE AND INSTALL 20 mm x 20 mm (3/4" x 3/4") STAINLESS STEEL SOCKET-SET SCREWS WITH 10 mm (3/8") RECESSED HEX HEAD. ALL THREADS SHALL BE N.C.
9. DIMENSIONS SHOWN ON THIS 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.

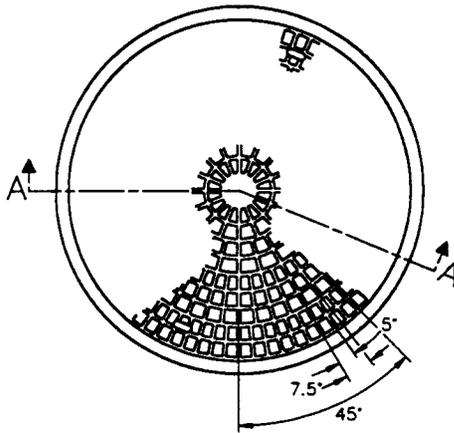
AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER

**610 mm (24") MANHOLE FRAME & COVER**

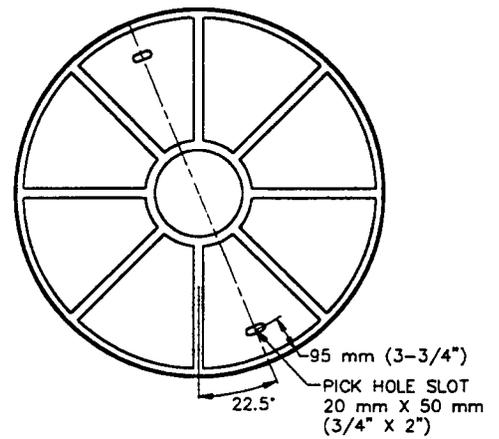
STANDARD PLAN  
METRIC

**630 - 2**

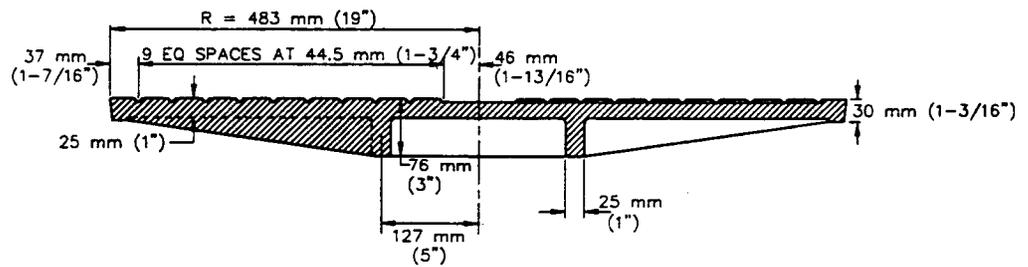
SHEET 2 OF 2



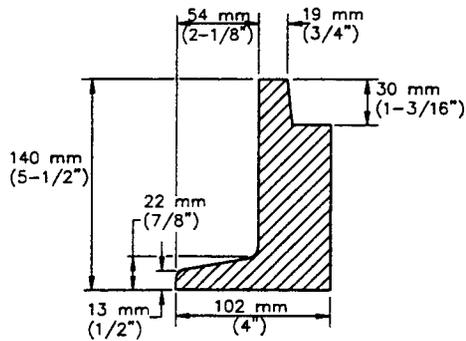
TOP OF COVER



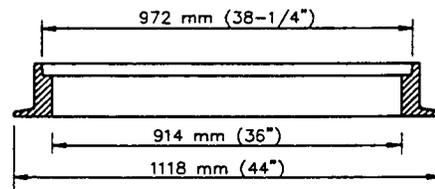
BOTTOM OF COVER



SECTION A-A



FRAME DETAIL



SECTION THRU FRAME

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1984  
REV. 1992, 1996

**914 mm (36") MANHOLE FRAME  
AND COVER**

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN  
METRIC  
**633 - 3**  
SHEET 1 OF 2

NOTES:

1. THE CAST IRON USED SHALL CONFORM TO ASTM A-48 CLASS 35B.
2. COVERS SHALL BE CAST WITH THE LETTER "D" FOR STORM DRAINS AND "S" FOR SEWERS, AND THE AGENCY'S IDENTIFICATION IN ACCORDANCE WITH INSTRUCTIONS FURNISHED BY THE AGENCY. THE LETTER "D" OR "S" SHALL BE APPROXIMATELY 65 mm (2-1/2") HIGH WITH 15 mm (1/2") LINE WIDTH, AND PLACED IN THE CENTER OF THE COVER. ALL LETTERS SHALL BE FLUSH WITH THE FINISHED SURFACE OF THE COVER.
3. FOUNDRY IDENTIFYING MARK, HEAT AND DATE SHALL BE CAST ON THE BOTTOM OF THE COVER AND ON THE INSIDE OF THE FRAME.
4. IMPORTED COVERS AND FRAMES SHALL HAVE THE COUNTRY OF ORIGIN MARKING IN COMPLIANCE WITH FEDERAL REGULATIONS.
5. WEIGHT OF FRAME SHALL BE 152 kg (335 LBS). WEIGHT OF COVER SHALL BE 154 kg (340 LBS). ACTUAL WEIGHTS SHALL BE WITHIN A RANGE OF 95% TO 110%.
6. THE MANHOLE FRAME AND COVER SHALL BE INSPECTED BY THE ENGINEER PRIOR TO SHIPMENT TO THE JOB SITE. ACCEPTANCE WILL BE INDICATED BY THE AGENCY'S MARK.
7. THE PROOF-LOAD FOR TEST METHOD B OF THE STANDARD SPECIFICATIONS IS 183 kN (41,300 LBS).
8. COVERS FOR MANHOLES LOCATED IN EASEMENTS, ALLEYS, PARKWAYS AND ALL PLACES OTHER THAN PAVED STREETS SHALL BE PROVIDED WITH SOCKET-SET SCREW LOCKING DEVICES. DRILL AND TAP TWO HOLES TO A DEPTH OF ONE INCH AT 90 DEGREES TO PICK HOLE AND INSTALL 20 mm x 20 mm (3/4" x 3/4") STAINLESS STEEL SOCKET-SET SCREWS WITH 10 mm (3/8") RECESSED HEX HEAD. ALL THREADS SHALL BE N.C.
9. DIMENSIONS SHOWN ON THIS 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.

AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER

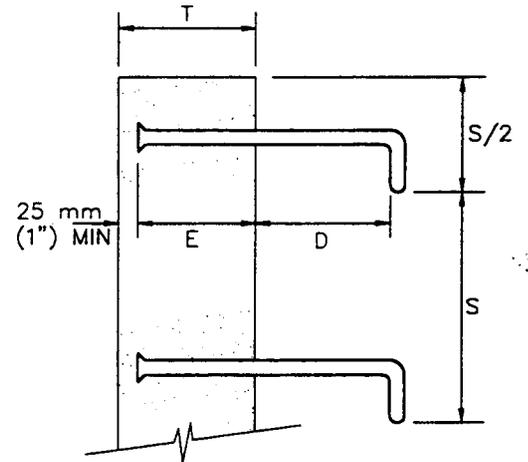
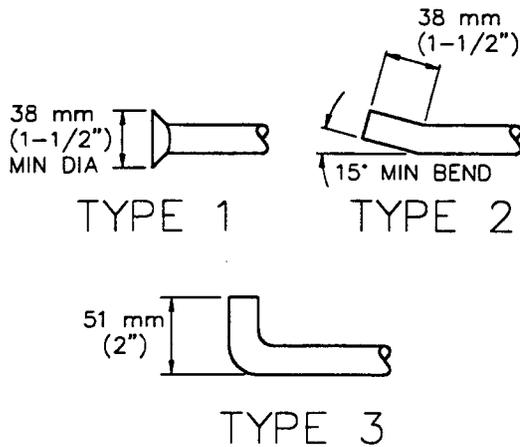
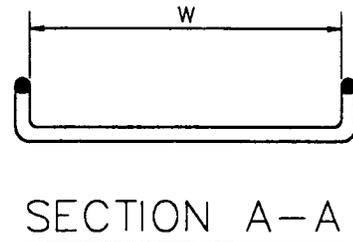
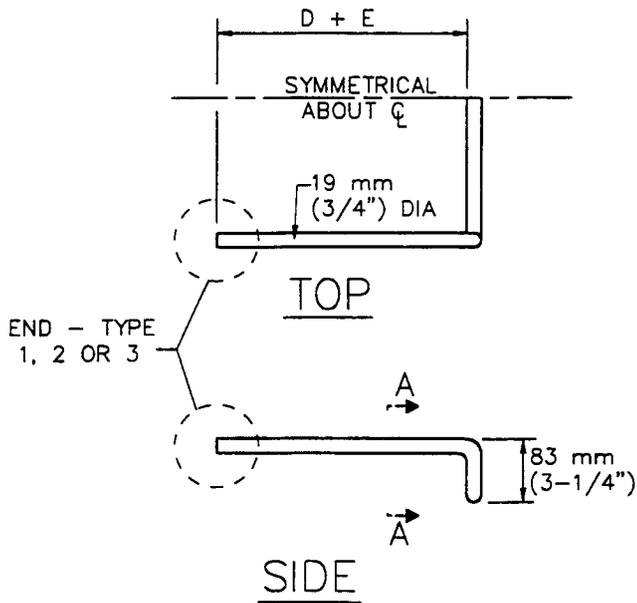
**914 mm (36") MANHOLE FRAME & COVER**

STANDARD PLAN

METRIC

**633 - 3**

SHEET 2 OF 2



END DETAILS - SIDE VIEW

INSTALLATION DETAIL

UNLESS OTHERWISE NOTED:

D = 175 mm (7")  
 E = 150 mm (6") OR T - 25 mm (1"), WHICHEVER IS LESS  
 MINIMUM E IS 75 mm (3")  
 S = 300 mm (12") MAX, EVENLY SPACED  
 W = 400 mm (16") MIN

FOR MANHOLES AND UNDERGROUND VAULTS:  
 S = 400 mm (16") MAX, EVENLY SPACED  
 W = 350 mm (14") MIN

AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER

PROMULGATED BY THE  
 PUBLIC WORKS STANDARDS INC.,  
 GREENBOOK COMMITTEE  
 1984  
 REV. 1992, 1998

STEEL STEP

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN  
 METRIC  
 635 - 2  
 SHEET 1 OF 2

NOTES:

1. STEPS SHALL BE STEEL CONFORMING TO ASTM A307 AND SHALL BE GALVANIZED AFTER FABRICATION. UNLESS OTHERWISE NOTED, STEPS MAY ALSO BE POLYPROPYLENE STEPS, STEEL REINFORCED, CONFORMING TO STD PLAN 636.
2. IF STAINLESS STEEL STEPS ARE REQUIRED, THE MATERIAL SHALL CONFORM TO ASTM A276, 300 SERIES.
3. STEP ENDS MAY BE TYPE 1, 2 OR 3, AS SHOWN.
4. BOTTOM STEP SHALL BE A MAXIMUM OF 600 mm (2') ABOVE FLOOR OR SHELF.
5. STEPS WITH TYPE 1 OR 2 ENDS MAY BE CAST IN PLACE, OR PLACED IN THE CENTER OF 40 mm (1-1/2") MIN DIA DRILLED OR FORMED HOLES AND SET WITH HIGH STRENGTH NON-SHRINK GROUT, 40 MPa (6000 PSI) MIN. STEPS WITH TYPE 3 ENDS SHALL BE CAST IN PLACE.
6. DIMENSIONS SHOWN ON THIS 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.

AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER

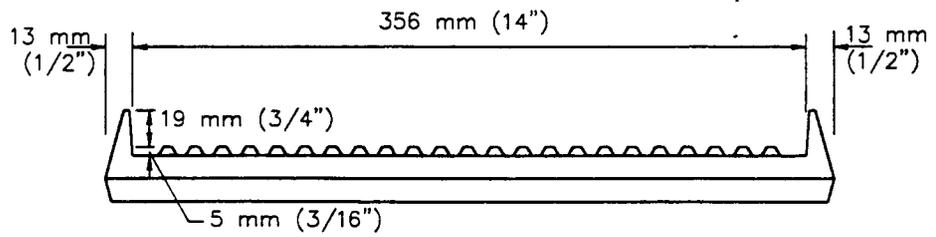
**STEEL STEP**

STANDARD PLAN

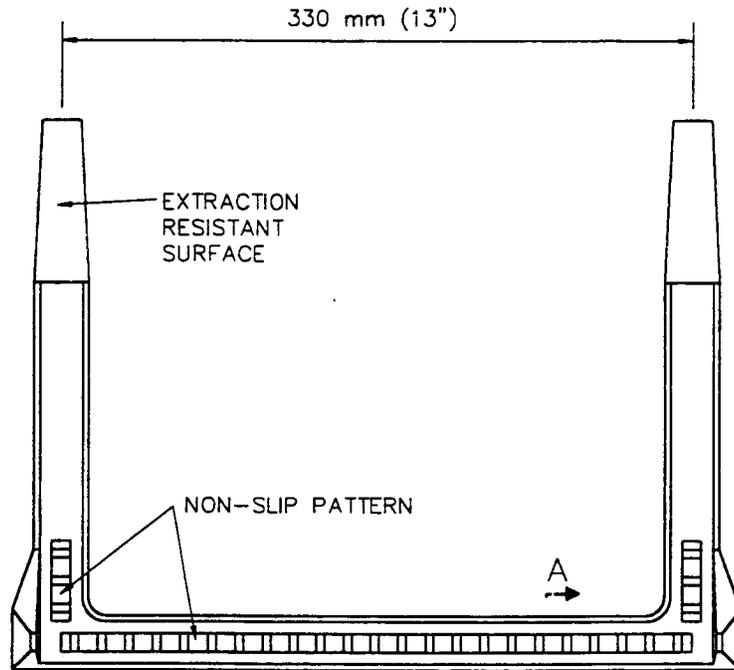
METRIC

**635 - 2**

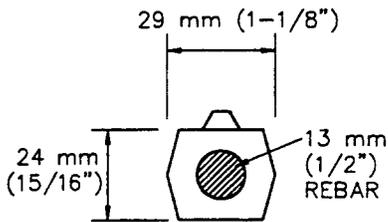
SHEET 2 OF 2



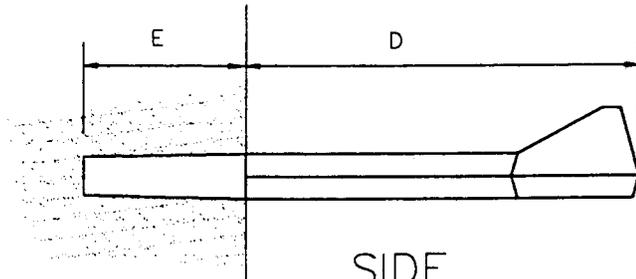
FRONT



TOP



SECTION A-A



SIDE

**AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER**

PROMULGATED BY THE  
PUBLIC WORKS STANDARDS INC..  
GREENBOOK COMMITTEE  
1991  
REV. 1996

**POLYPROPYLENE PLASTIC STEP**

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN  
METRIC  
**636 - 1**  
SHEET 1 OF 2

NOTES:

1. STEPS SHALL BE STEEL-REINFORCED COPOLYMER POLYPROPYLENE PLASTIC CONFORMING TO:
  - (A) ASTM D478 AND C497, EXCEPT THAT THE MINIMUM HORIZONTAL PULLOUT LOAD SHALL BE 6.7 kN (1500 LBS).
  - (B) ASTM A615 GRADE 60 DEFORMED REINFORCING STEEL BAR.
  - (C) CALIFORNIA CODE OF REGULATIONS TITLE 8, GENERAL INDUSTRY SAFETY ORDERS.
2. STEPS SHALL BE CAPABLE OF WITHSTANDING AN IMPACT LOAD OF 95 N.m (70 FT-LBS) AT -7°C (20°F) WITHOUT CRACKING OR FRACTURING.
3. THE MINIMUM TOTAL CROSS-SECTIONAL AREA OF THE EXPOSED PORTION OF THE STEP, INCLUDING THE DEFORMED STEEL BAR AND EXCLUDING THE NON-SLIP TREAD SURFACE, SHALL BE 645 mm<sup>2</sup> (1.0 SQ IN).
4. THE ENTIRE POLYPROPYLENE PLASTIC MATERIAL SURROUNDING THE REINFORCING STEEL BAR SHALL BE CAST MONOLITHICALLY. MINIMUM COVER SHALL BE 5 mm (3/16").
5. A CERTIFICATION OF COMPLIANCE WITH THE REQUIREMENTS OF NOTES 1 THROUGH 4 PREPARED BY AN INDEPENDENT CERTIFIED LABORATORY SHALL BE SUBMITTED TO THE ENGINEER CONCURRENTLY WITH A REQUEST FOR APPROVAL.
6. E = 86 mm (3-3/8"). FOR VAULTS AND MANHOLES, D = 140 mm (5-1/2"). FOR OTHER INSTALLATIONS, D = 190 mm (7-1/2"). THESE DIMENSIONS MAY BE PLUS OR MINUS 6 mm (1/4").
7. STEPS SHALL BE EVENLY SPACED. MAXIMUM VERTICAL SPACING OF STEPS SHALL BE 400 mm (16"), WITH THE BOTTOM STEP A MAXIMUM OF 600 mm (2') ABOVE FLOOR OR SHELF.
8. IF TAPERED STEPS ARE INSTALLED INTO STRAIGHT DRILLED OR FORMED HOLES, APPROVED NON-SHRINK GROUT SHALL BE INJECTED INTO THE HOLE PRIOR TO INSTALLATION. HOLES SHALL BE STRAIGHT AND PARALLEL. EXCEPT AS OTHERWISE NOTED, STEPS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDED PROCEDURES.
9. A DROP STEP WITH A MINIMUM DROP OF 19 mm (3/4") MAY BE USED. THE DROP STEP SHALL MEET ALL OTHER CRITERIA OF THIS PLAN.
10. DIMENSIONS SHOWN ON THIS 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.

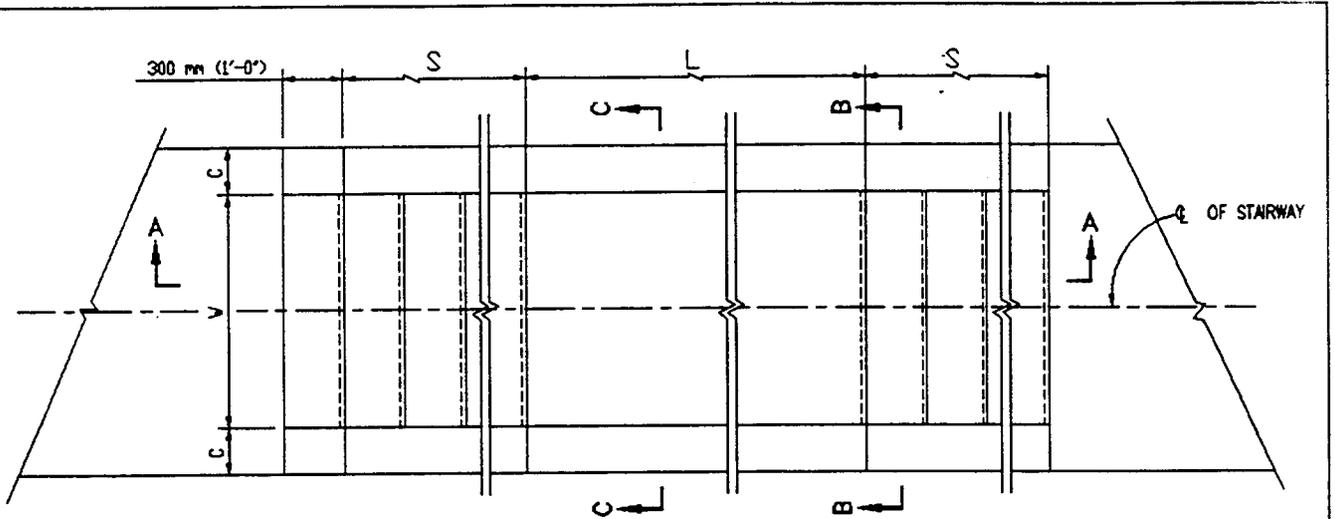
AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER

**POLYPROPYLENE PLASTIC STEP**

STANDARD PLAN  
METRIC

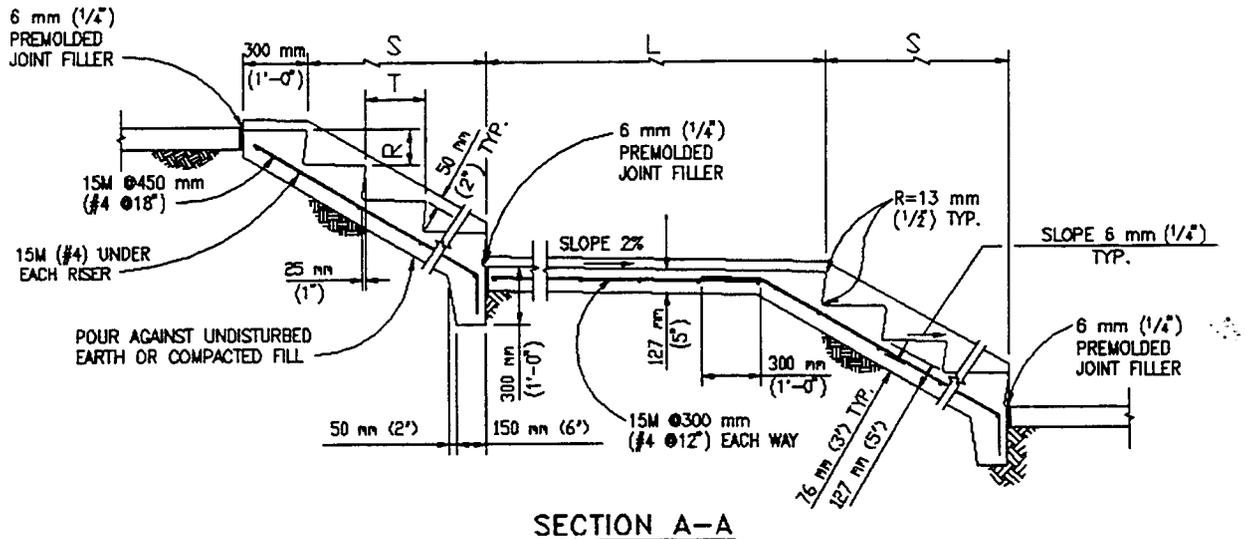
**636 - 1**

SHEET 2 OF 2

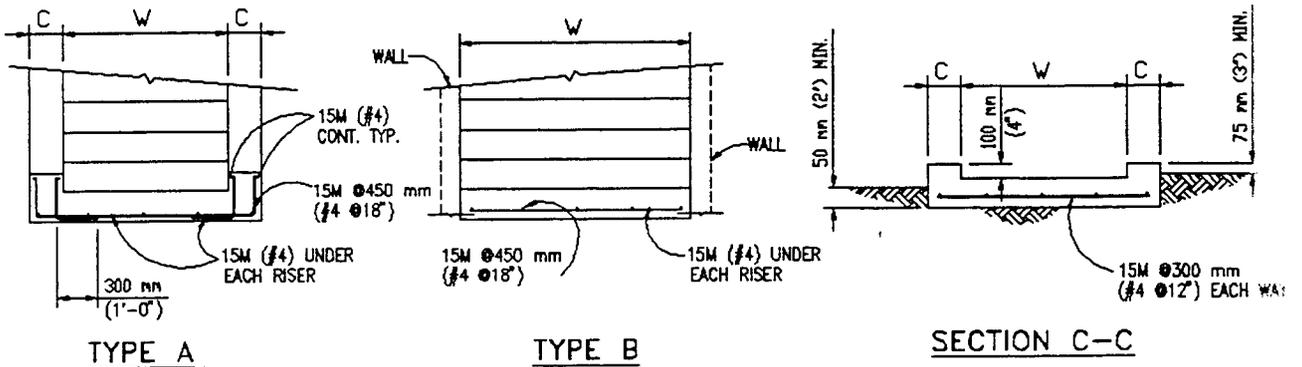


**PLAN**

NOTE: SEE PROJECT PLAN FOR HANDRAIL DETAILS OR STANDARD PLAN 606.



**SECTION A-A**



**TYPE A**

**TYPE B**

**SECTION C-C**

**SECTION B-B**

**AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER**

PROMULGATED BY THE  
PUBLIC WORKS STANDARDS INC.,  
GREENBOOK COMMITTEE  
1994  
REV. 1996

**REINFORCED CONCRETE STAIRWAY**

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN  
METRIC

**640 - 1**

SHEET 1 OF 2

NOTES:

1. SEE THE PROJECT PLANS FOR THE FOLLOWING INFORMATION:

- a. TYPE OF STAIRWAY AND LOCATION
- b. W = WIDTH OF STAIRWAY
- c. L = LENGTH OF LANDINGS
- d. T = LENGTH OF TREAD
- e. R = HEIGHT OF RISER
- f. C = WIDTH OF CURB
- g. S = LENGTH OF STAIRWAY FLIGHT

2. CONCRETE FINISH FOR EXPOSED SURFACES SHALL BE CLASS I, EXCEPT THAT TREADS AND LANDINGS SHALL BE TROWELLED SMOOTH AND GIVEN A FINE BROOM FINISH IN A DIRECTION PERPENDICULAR TO THE CENTERLINE OF THE STAIRWAY. THE BROOM FINISH SHALL BE BROUGHT TO THE NOSE OF THE TREADS AND LANDINGS.

3. TWO HANDRAILS ARE REQUIRED UNLESS OTHERWISE NOTED ON THE PROJECT PLANS, OR UNLESS THE STAIRWAY IS NOT OVER 1.22 m (4 ft) WIDE IN WHICH CASE ONE HANDRAIL IS REQUIRED.

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

AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER

**REINFORCED CONCRETE STAIRWAY**

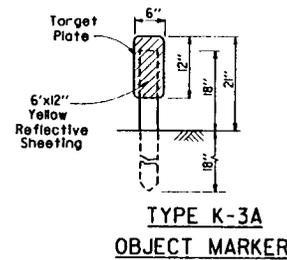
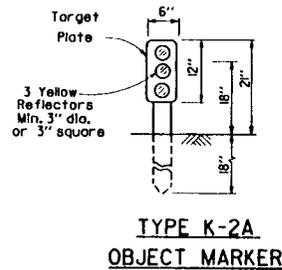
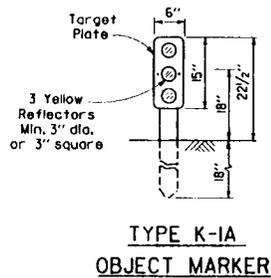
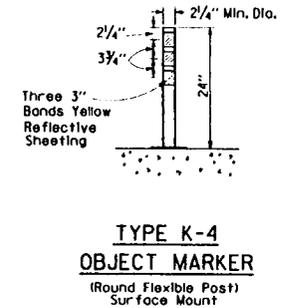
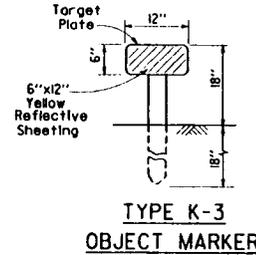
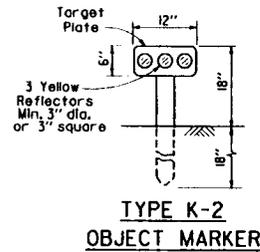
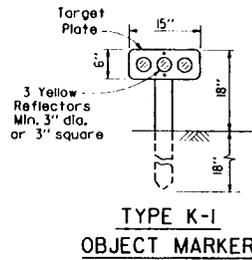
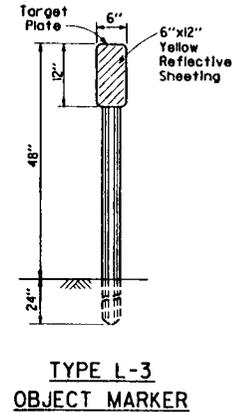
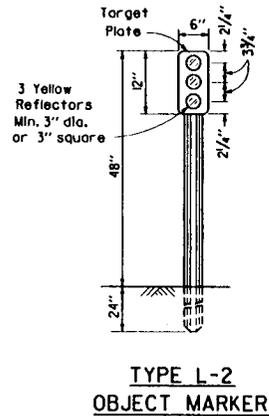
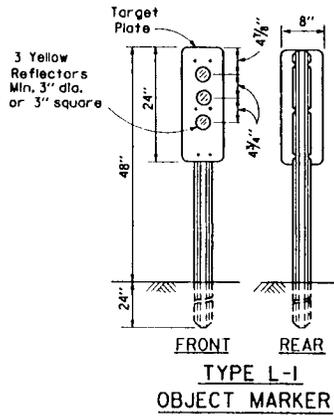
STANDARD PLAN  
METRIC

**640 - 1**  
SHEET 2 OF 2

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

*M. David S.*  
 REGISTERED CIVIL ENGINEER  
 No. 12284  
 Exp. 3-31-93  
 CIVIL  
 STATE OF CALIFORNIA

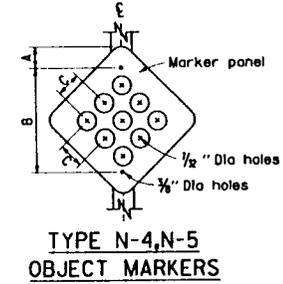
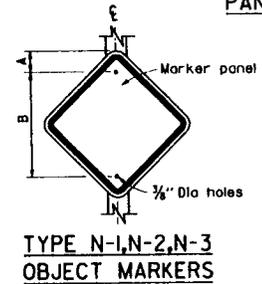
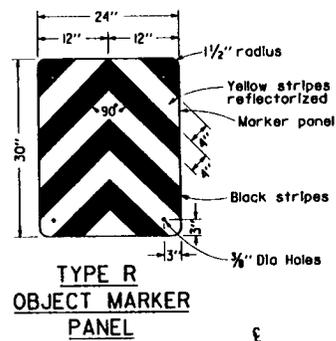
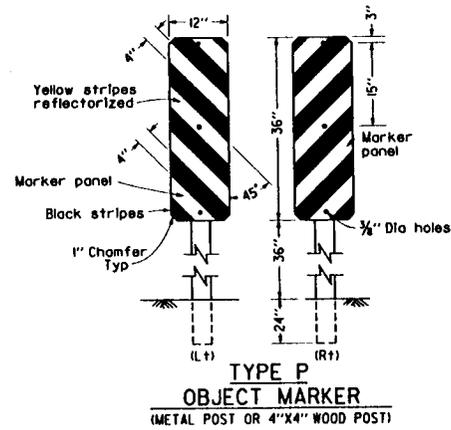
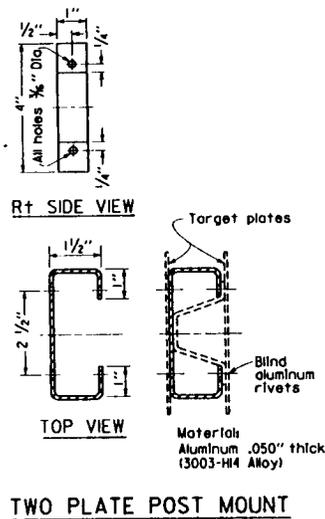
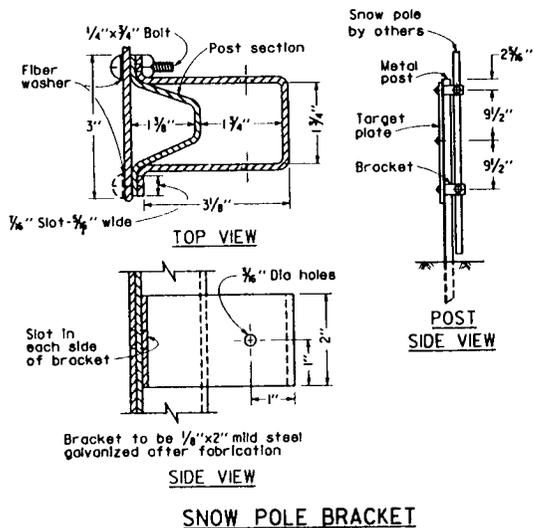
JULY 1, 1992  
 PLANS APPROVAL DATE



STATE OF CALIFORNIA  
DEPARTMENT OF TRANSPORTATION

**MARKERS**

NO SCALE



TYPE N	SIZE	BORDER WIDTH	MARGIN WIDTH	A	B	C	CORNER RADIUS
-1,-2,-3	18" x 18"	3/8"	3/8"	3"	18"	—	1 1/2"
-4,-5	18" x 18"	—	—	3"	18"	4"	1 1/2"

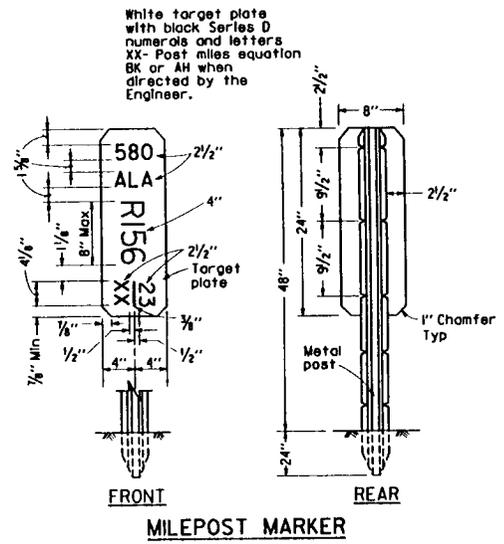
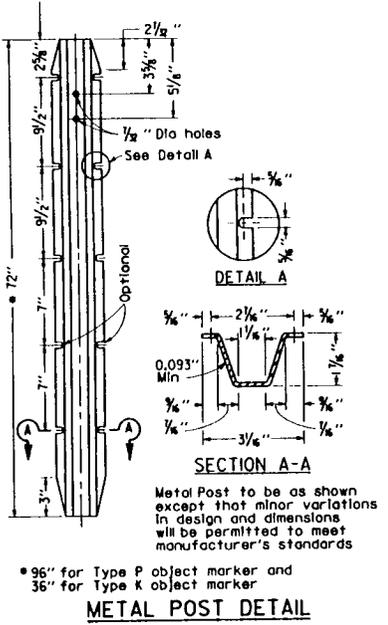
- N-1. Yellow reflective background with black border.
- N-2. Red reflective background with black border.
- N-3. Orange reflective background with black border.
- N-4. Yellow background with 9-3" yellow reflectors.
- N-5. Red background with 9-3" red reflectors.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

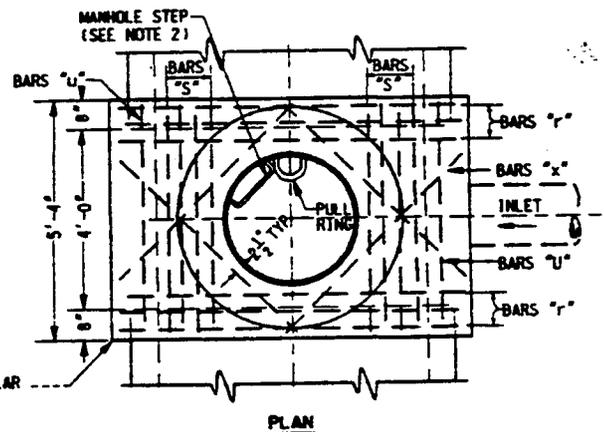
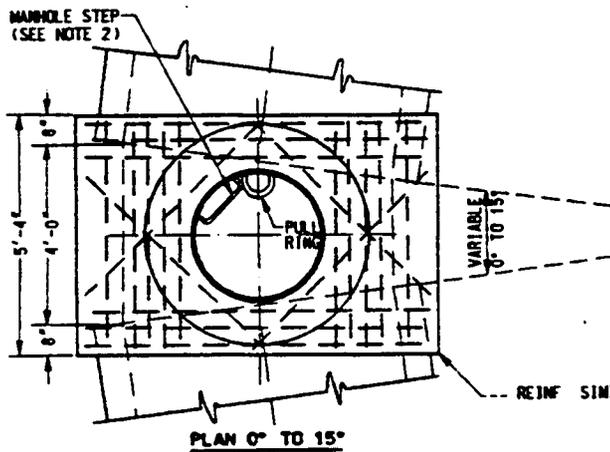
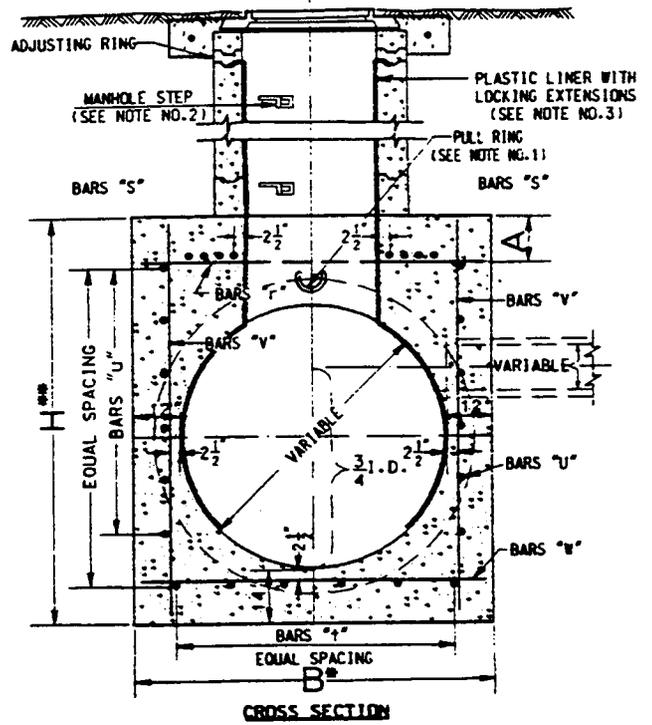
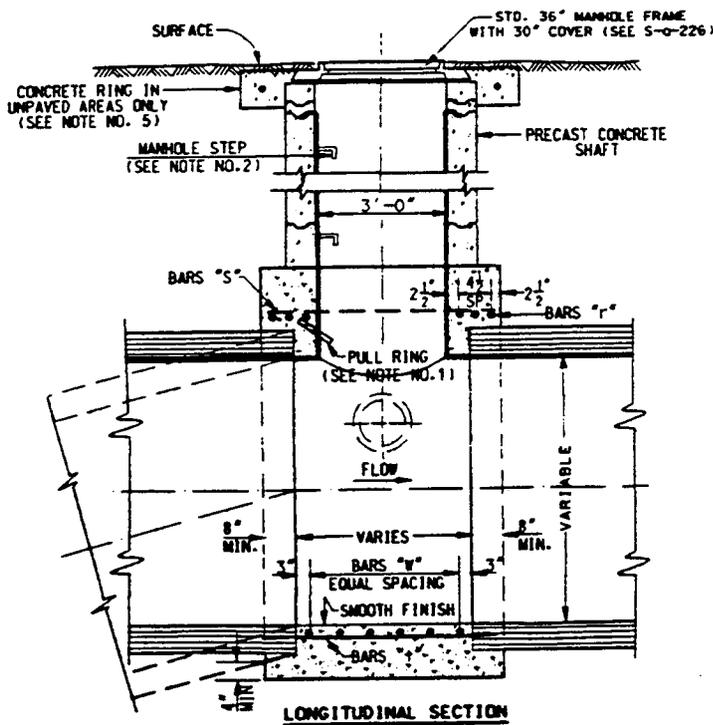
REGISTERED CIVIL ENGINEER  
 July 1, 1992  
 PLANS APPROVAL DATE

P. London Jr.  
 No. 12284  
 Exp. 3-31-93  
 CIVIL  
 STATE OF CALIFORNIA

**NOTES**  
 1. See Standard Plan AT3A for additional object markers.



STATE OF CALIFORNIA  
 DEPARTMENT OF TRANSPORTATION  
**MARKERS**  
 NO SCALE



- DIMENSION B SHALL BE THAT LISTED IN THE TABLE OF REINFORCING BARS OR OUTSIDE DIAMETER OF PIPE PLUS 12". WHICHEVER IS GREATER.
- DIMENSION H SHALL BE THAT LISTED IN THE TABLE OF REINFORCING BARS OR THE DIMENSION NECESSARY TO PROVIDE 6" BETWEEN THE BOTTOM OF THE PIPE AND THE BOTTOM OF THE MANHOLE AND 2 1/2" BETWEEN THE TOP OF THE PIPE AND THE CENTERLINE OF THE REINFORCING STEEL. WHICHEVER IS GREATER.

FOR 48" TO 96" PIPE

COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY  
OFFICE OF CHIEF ENGINEER

CHARLES W. CARRY  
CHIEF ENGINEER  
DECEMBER, 1964

STANDARD MANHOLE, TYPE "B"

STANDARD DRAWING  
S-a-202  
SHEET 1 OF 4

TABLE OF REINFORCING BARS (PART 1)

PIPE DIAM.	DEPTH TO INVERT	A	B*	H**	BARS $\gamma$		BARS $\gamma$		BARS $\gamma$	
					NUMBER & SIZE	LENGTH	NUMBER & SIZE	SPACING & LENGTH	NUMBER & SIZE	LENGTH
48"	10' to 30'	11"	6'-0"	6'-11"	6 - #6	5'-8"	2 - #6	5'-0"	5 - #4	5'-0"
	31' to 50'	14"	6'-0"	7'-2"	6 - #7	5'-8"	2 - #7	5'-0"	5 - #4	5'-0"
51"	10' to 30'	11"	6'-3"	7'-2"	6 - #7	5'-11"	4 - #6	3" Ctrs 5'-0"	5 - #4	5'-0"
	31' to 50'	14"	6'-3"	7'-5"	6 - #7	5'-11"	4 - #7	3" Ctrs 5'-0"	5 - #4	5'-0"
54"	10' to 30'	11"	6'-6"	7'-5"	6 - #7	6'-2"	4 - #7	3" Ctrs 5'-0"	5 - #4	5'-0"
	31' to 50'	14"	6'-6"	7'-8"	6 - #7	6'-2"	4 - #8	3" Ctrs 5'-0"	5 - #4	5'-0"
57"	10' to 30'	12"	6'-9"	7'-9"	6 - #7	6'-5"	6 - #7	3" Ctrs 5'-0"	5 - #4	5'-0"
	31' to 50'	14"	6'-9"	7'-11"	6 - #8	6'-5"	6 - #8	3" Ctrs 5'-0"	5 - #4	5'-0"
60"	10' to 30'	12"	7'-0"	8'-0"	6 - #7	6'-8"	6 - #7	3" Ctrs 5'-0"	5 - #4	5'-0"
	31' to 50'	14"	7'-0"	8'-2"	6 - #8	6'-8"	6 - #8	3" Ctrs 5'-0"	5 - #4	5'-0"
63"	10' to 30'	12"	7'-3"	8'-3"	6 - #8	6'-11"	6 - #8	4" Ctrs 5'-0"	6 - #4	5'-0"
	31' to 50'	14"	7'-3"	8'-5"	6 - #8	6'-11"	6 - #9	4" Ctrs 5'-0"	6 - #4	5'-0"
66"	10' to 30'	13"	7'-6"	8'-7"	6 - #8	7'-2"	6 - #8	4" Ctrs 5'-0"	6 - #4	5'-0"
	31' to 50'	14"	7'-6"	8'-8"	6 - #9	7'-2"	6 - #9	4" Ctrs 5'-0"	6 - #4	5'-0"
69"	10' to 30'	13"	7'-9"	8'-10"	6 - #8	7'-5"	8 - #7	4" Ctrs 5'-0"	6 - #4	5'-0"
	31' to 50'	14"	7'-9"	8'-11"	6 - #9	7'-5"	8 - #8	4" Ctrs 5'-0"	6 - #4	5'-0"
72"	10' to 30'	13"	8'-0"	9'-1"	6 - #8	7'-8"	8 - #7	4" Ctrs 5'-0"	6 - #4	5'-0"
	31' to 50'	14"	8'-0"	9'-2"	6 - #9	7'-8"	8 - #8	4" Ctrs 5'-0"	6 - #4	5'-0"
78"	10' to 30'	13"	8'-6"	9'-8"	6 - #8	8'-2"	8 - #7	4" Ctrs 5'-0"	6 - #4	5'-0"
	31' to 50'	14"	8'-6"	9'-9"	6 - #9	8'-2"	8 - #8	4" Ctrs 5'-0"	6 - #4	5'-0"
84"	10' to 30'	15"	9'-0"	10'-4"	6 - #9	8'-8"	8 - #7	4" Ctrs 5'-0"	8 - #5	5'-0"
	31' to 50'	17"	9'-0"	10'-6"	6 - #9	8'-8"	8 - #8	4" Ctrs 5'-0"	8 - #5	5'-0"
90"	10' to 30'	18"	10'-0"	11'-1"	6 - #9	9'-8"	8 - #7	4" Ctrs 5'-0"	8 - #5	5'-0"
	31' to 50'	21"	10'-0"	11'-4"	6 - #9	9'-8"	8 - #8	4" Ctrs 5'-0"	8 - #5	5'-0"
96"	10' to 30'	21"	10'-8"	11'-10"	6 - #9	10'-4"	8 - #7	4" Ctrs 5'-0"	8 - #5	5'-0"
	31' to 50'	24"	10'-8"	12'-1"	6 - #9	10'-4"	8 - #8	4" Ctrs 5'-0"	8 - #5	5'-0"

\* Dimension B shall be that listed in the Table of Reinforcing Bars or outside diameter of pipe plus 12", whichever is greater.

\*\* Dimension H shall be that listed in the Table of Reinforcing Bars or the dimension necessary to provide 6" between the bottom of the pipe and the bottom of the manhole and 2 1/2" between the top of the pipe and the centerline of the reinforcing steel, whichever is greater.

COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY  
OFFICE OF CHIEF ENGINEER

CHARLES W. CARRY  
CHIEF ENGINEER  
DECEMBER, 1984

STANDARD MANHOLE, TYPE "B"

STANDARD DRAWING  
S-a-202  
SHEET 2 OF 4

TABLE OF REINFORCING BARS (PART 2)

PIPE DIAM.	DEPTH TO INVERT	BARS $\nabla$		BARS $\nabla$		BARS $\nabla$		BARS $\nabla$	
		NUMBER & SIZE	LENGTH	NUMBER & SIZE	SPACING & LENGTH	NUMBER & SIZE	LENGTH	NUMBER & SIZE	LENGTH
48"	10' to 30'	10 - #4	5'-0"	12 - #4	12" Ctrs 6'-5"	6 - #4	5'-8"	4 - #4	4'-1"
	31' to 50'	10 - #4	5'-0"	12 - #5	12" Ctrs 6'-8"	6 - #6	5'-8"	4 - #5	4'-1"
51"	10' to 30'	10 - #4	5'-0"	12 - #4	12" Ctrs 6'-8"	6 - #4	5'-11"	4 - #4	4'-3"
	31' to 50'	10 - #4	5'-0"	12 - #5	12" Ctrs 6'-11"	6 - #6	5'-11"	4 - #5	4'-3"
54"	10' to 30'	10 - #4	5'-0"	12 - #4	12" Ctrs 6'-11"	5 - #5	6'-2"	4 - #4	4'-5"
	31' to 50'	10 - #4	5'-0"	12 - #6	12" Ctrs 7'-2"	6 - #6	6'-2"	4 - #5	4'-5"
57"	10' to 30'	10 - #4	5'-0"	12 - #4	12" Ctrs 7'-3"	5 - #5	6'-5"	4 - #4	4'-8"
	31' to 50'	10 - #4	5'-0"	12 - #6	12" Ctrs 7'-5"	6 - #6	6'-5"	4 - #5	4'-8"
60"	10' to 30'	12 - #4	5'-0"	12 - #4	12" Ctrs 7'-6"	5 - #5	6'-8"	4 - #4	4'-10"
	31' to 50'	12 - #4	5'-0"	12 - #6	12" Ctrs 7'-8"	6 - #7	6'-8"	4 - #5	4'-10"
63"	10' to 30'	12 - #4	5'-0"	12 - #5	12" Ctrs 7'-9"	6 - #6	6'-11"	4 - #4	5'-0"
	31' to 50'	12 - #4	5'-0"	12 - #7	12" Ctrs 7'-11"	6 - #8	6'-11"	4 - #5	5'-0"
66"	10' to 30'	12 - #4	5'-0"	12 - #5	12" Ctrs 8'-1"	6 - #6	7'-2"	4 - #4	5'-2"
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72"	10' to 30'	12 - #4	5'-0"	12 - #6	12" Ctrs 8'-7"	6 - #6	7'-8"	4 - #4	5'-6"
	31' to 50'	12 - #4	5'-0"	12 - #7	12" Ctrs 8'-8"	7 - #8	7'-8"	4 - #5	5'-6"
78"	10' to 30'	12 - #4	5'-0"	12 - #6	12" Ctrs 9'-2"	6 - #7	8'-2"	4 - #5	5'-10"
	31' to 50'	12 - #4	5'-0"	12 - #8	12" Ctrs 9'-3"	7 - #8	8'-2"	4 - #5	5'-10"
84"	10' to 30'	12 - #5	5'-0"	12 - #6	12" Ctrs 9'-10"	7 - #8	8'-8"	4 - #5	6'-2"
	31' to 50'	12 - #7	5'-0"	12 - #8	12" Ctrs 10'-0"	9 - #9	8'-8"	4 - #5	6'-2"
90"	10' to 30'	14 - #7	5'-0"	12 - #7	12" Ctrs 10'-7"	9 - #8	9'-8"	4 - #5	6'-6"
	31' to 50'	14 - #7	5'-0"	12 - #9	12" Ctrs 10'-10"	9 - #10	9'-8"	4 - #5	6'-6"
96"	10' to 30'	14 - #7	5'-0"	12 - #7	12" Ctrs 11'-4"	9 - #9	10'-8"	4 - #5	6'-10"
	31' to 50'	14 - #7	5'-0"	12 - #9	12" Ctrs 11'-7"	10 - #10	10'-8"	4 - #5	6'-10"

COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY  
OFFICE OF CHIEF ENGINEER

CHARLES W. GARRY  
CHIEF ENGINEER  
DECEMBER, 1994

STANDARD MANHOLE, TYPE "B"

STANDARD DRAWING  
S-a-202  
SHEET 3 OF 4

NOTES:

1. ALL MANHOLES SHALL BE PROVIDED WITH A STANDARD PULL RING IN ACCORDANCE WITH S-a-220. THE PULL RING SHALL BE LOCATED 6" ABOVE THE TOP OF THE PIPE ON THE UPSTREAM SIDE OF THE MANHOLE AND ALONG THE AXIS OF THE DOWNSTREAM OUTLET. WHERE THE MANHOLE IS TO BE USED AS A DOWNSTREAM SIPHON MANHOLE, IT SHALL BE PROVIDED WITH AN ADDITIONAL STANDARD PULL RING, BUT LOCATED 6" ABOVE THE TOP OF THE PIPE ON THE DOWNSTREAM SIDE OF THE MANHOLE AND ON THE CENTERLINE OF THE UPSTREAM SIPHON PIPE.
2. MANHOLE STEPS SHALL BE IN ACCORDANCE WITH S-a-209 AND SHALL BE UNIFORMLY SPACED NOT MORE THAN 16" APART. THE TOP STEP SHALL BE PLACED 16" BELOW THE MANHOLE FRAME. THE BOTTOM MANHOLE STEP SHALL BE PLACED NOT LESS THAN 16" NOR MORE THAN 24" ABOVE THE PULL RING. THE MANHOLE STEP SHALL PROJECT 5". THE MANHOLE STEPS SHALL BE PLACED SUCH THAT THEY ARE ADJACENT TO BUT NOT INTERFERING WITH ACCESS TO THE PULL RING.
3. THE MANHOLE SHALL BE PROVIDED WITH PLASTIC LINER WITH LOCKING EXTENSIONS. THE PLASTIC LINER AND THE PLASTIC LINER INSTALLATION SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. THE LINER SHALL EXTEND FROM THE BOTTOM OF THE ADJUSTING RINGS TO A POINT IN THE CHANNEL MATCHING THE BOTTOM OF THE LINER ON THE LINED PIPE. LINER RETURNS SHALL BE PROVIDED WHERE THE LINER TERMINATES AT THE ADJUSTING RING. THE JOINT BETWEEN THE LINER AND THE STAINLESS STEEL STEPS AND PULL RINGS SHALL BE THOROUGHLY SEALED WITH URETHANE MASTIC AS MANUFACTURED BY ALLIED COATINGS CO., HOLLYWOOD, CALIFORNIA (213) 650-6077, OR APPROVED EQUAL. APPLICATION OF SEALANT AND PREPARATION OF SURFACES SHALL BE IN STRICT CONFORMANCE WITH THE MANUFACTURER'S DIRECTIONS.
4. UNLESS OTHERWISE SPECIFIED, ALL CONCRETE SHALL BE 560-B-3250 AND ALL REINFORCING BARS SHALL BE DEFORMED BARS CONFORMING TO ASTM-615 GRADE 40.
5. IN UNPAVED AREAS, A 12" WIDE BY 12" HIGH CONCRETE RING WITH #3 REBAR, 30 DIAMETER LAP SHALL BE PROVIDED AROUND THE MANHOLE FRAME.
6. EXCEPT AS NOTED HEREON, THE PRECAST UNITS SHALL BE MANUFACTURED AND TESTED IN ACCORDANCE WITH ASTM 478. THE CURING OF THE PRECAST UNITS SHALL CONFORM TO SECTION 207-2.7 OF THE STANDARD SPECIFICATIONS. AS AN ALTERNATE, THE UNITS MAY BE CURED USING SATURATED STEAM FOR A MINIMUM OF 12 HOURS FOLLOWED BY 6 DAYS OF WATER CURING OR MEMBRANE CURING. IF THE UNITS ARE CURED BY THE ALTERNATE METHOD, THEY SHALL NOT BE SHIPPED PRIOR TO 8 DAYS AFTER CASTING NOR UNTIL THE CONCRETE HAS ATTAINED A STRENGTH OF 3,500 PSI. THE RISER SECTIONS MAY BE REINFORCED OR UNREINFORCED. REINFORCED SECTIONS SHALL HAVE A MINIMUM WALL THICKNESS OF 5" AND UNREINFORCED SECTIONS SHALL HAVE A MINIMUM WALL THICKNESS OF 6". JOINTS SHALL BE TONGUE AND GROOVE AND SHALL BE ASSEMBLED USING CLASS "B" MORTAR. THE MORTARED JOINTS SHALL BE FLUSH AND TROWELED SMOOTH.

COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY  
OFFICE OF CHIEF ENGINEER

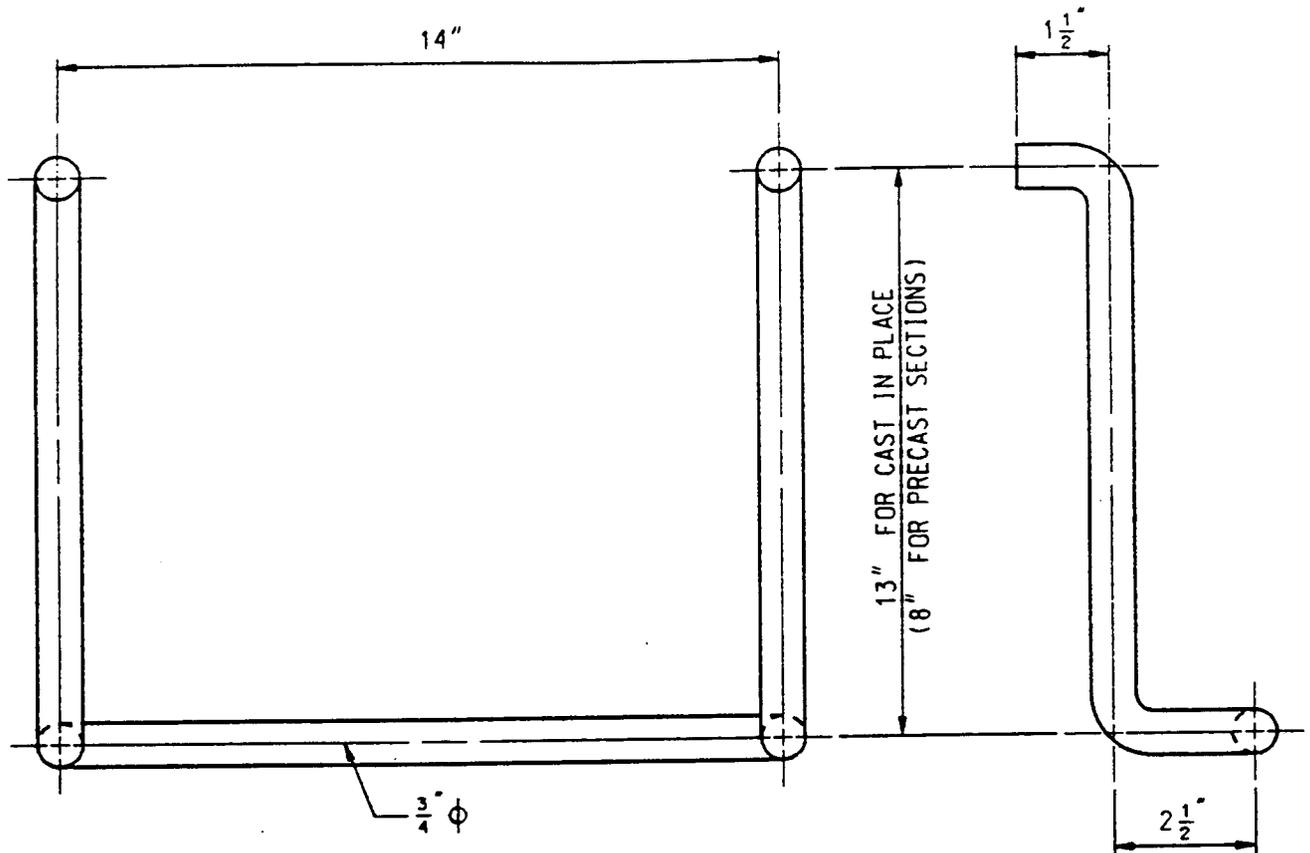
CHARLES W. CARRY  
CHIEF ENGINEER  
DECEMBER, 1984

STANDARD MANHOLE, TYPE "B"

STANDARD DRAWING

S-a-202

SHEET 4 OF 4



STEPS IN PLASTIC LINED MANHOLES AND STRUCTURES AND ANY STEPS IN 24- OR 30-INCH RISERS SHALL BE MADE FROM STAINLESS STEEL CONFORMING TO ASTM A-276, TYPE 316.

FOR ALL OTHER STEPS, THE CONTRACTOR MAY SUBSTITUTE ONE OF THE FOLLOWING REINFORCED COPOLYMER POLYPROPYLENE PLASTIC MANHOLE STEPS (OR APPROVED EQUAL).

MANUFACTURER

M.A. INDUSTRIES, INC.  
 LANE INTERNATIONAL INC.  
 SOUTHWEST CONCRETE PRODUCTS  
 H. BOWEN COMPANY, INC.

STEP I. D.

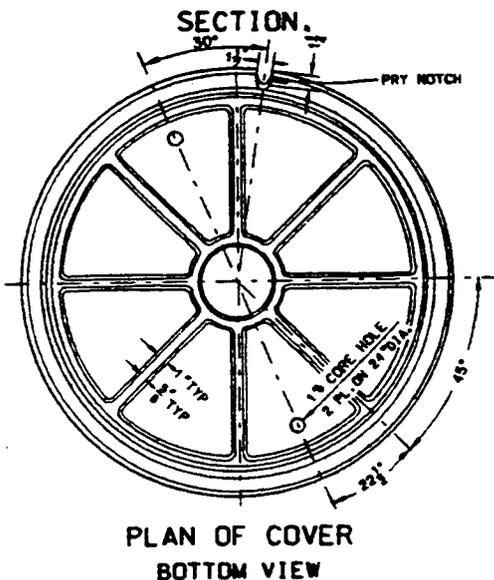
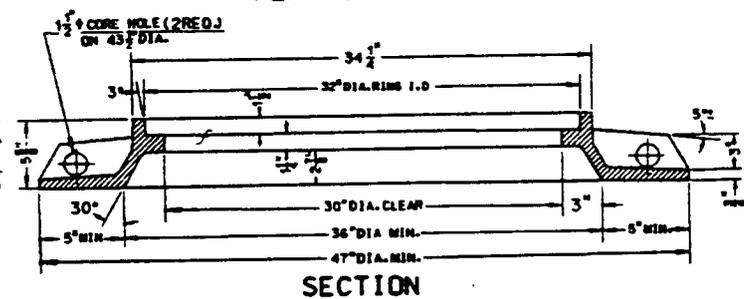
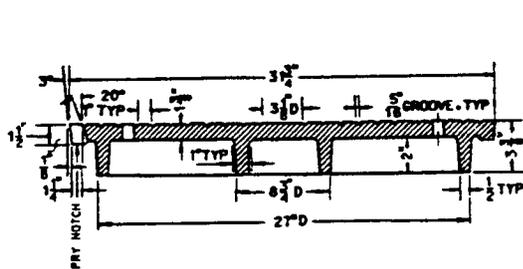
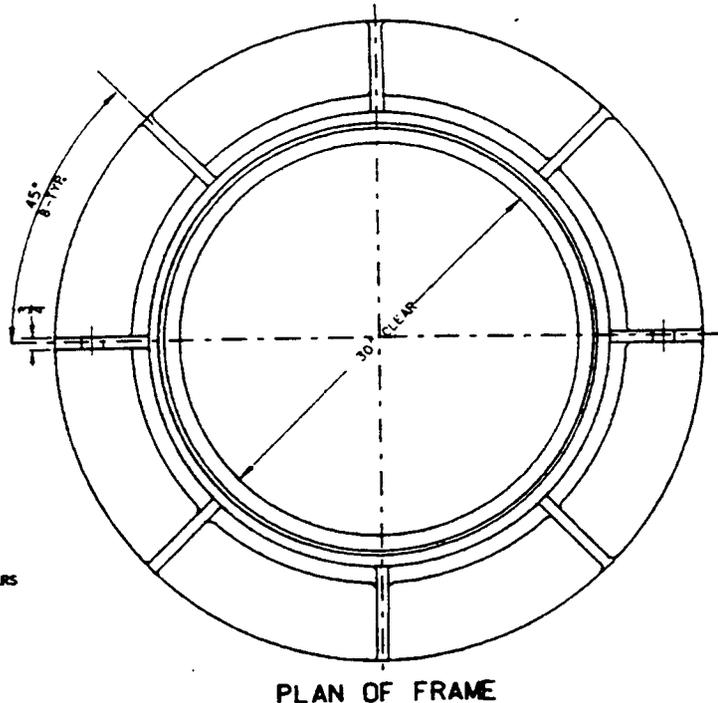
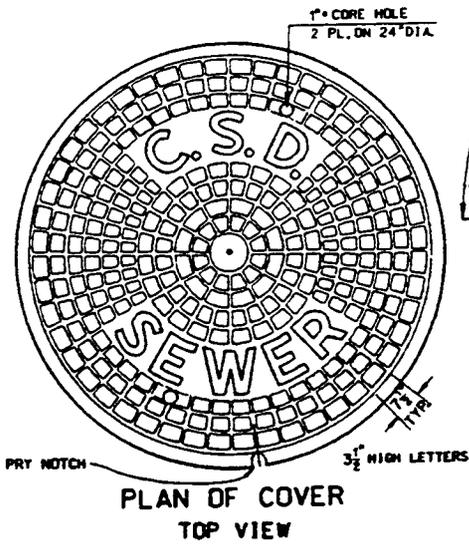
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 BOWCO 93813

COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY  
 OFFICE OF CHIEF ENGINEER

CHARLES W. CARRY  
 CHIEF ENGINEER  
 DECEMBER, 1984

STANDARD MANHOLE STEP

STANDARD DRAWING  
 S-a-209  
 SHEET 1 OF 1



**NOTES:**

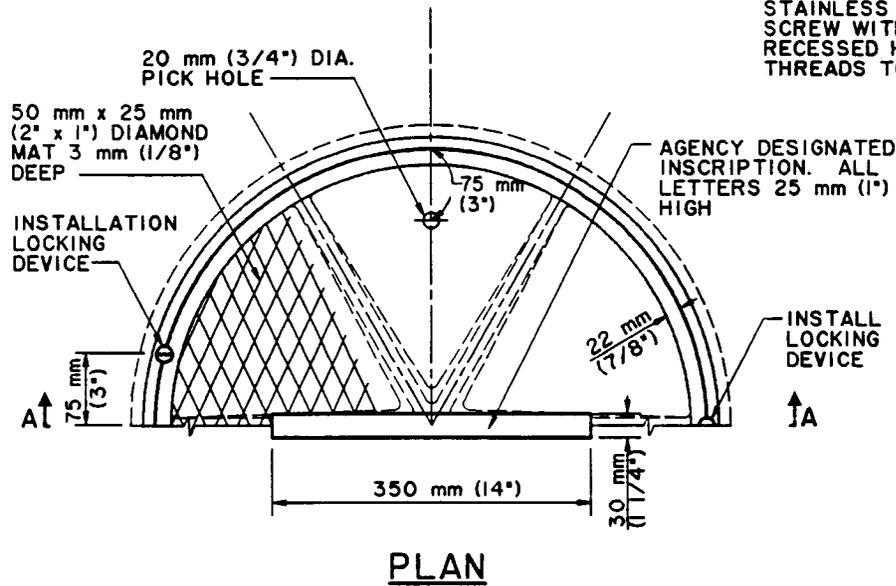
1. THE CAST IRON USED SHALL CONFORM WITH ASTM A-48 CLASS 35.
2. THE FRAME AND COVER SHALL BE COATED WITH ASPHALTUM OR BITUMINOUS PAINT AFTER TESTING AND INSPECTION.
3. MANHOLE FRAME AND COVER SHALL BE TESTED FOR ACCURATE FIT PRIOR TO DELIVERY AND SHALL BE MARKED IN SETS.
4. ALL CASTINGS SHALL COMPLY WITH SECTION 206-3 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, LATEST EDITION.

COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY  
OFFICE OF CHIEF ENGINEER

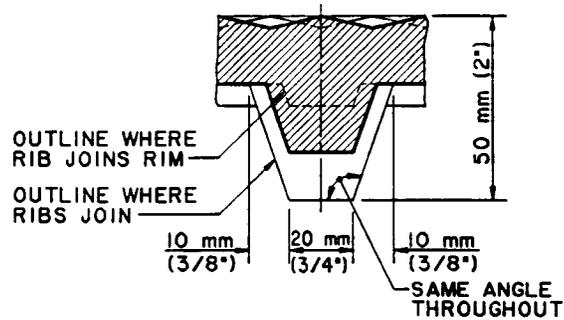
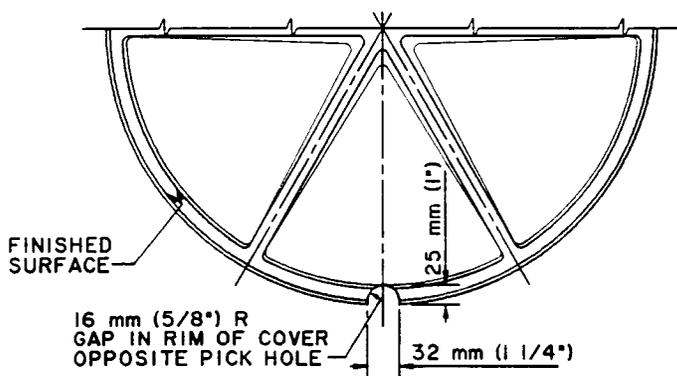
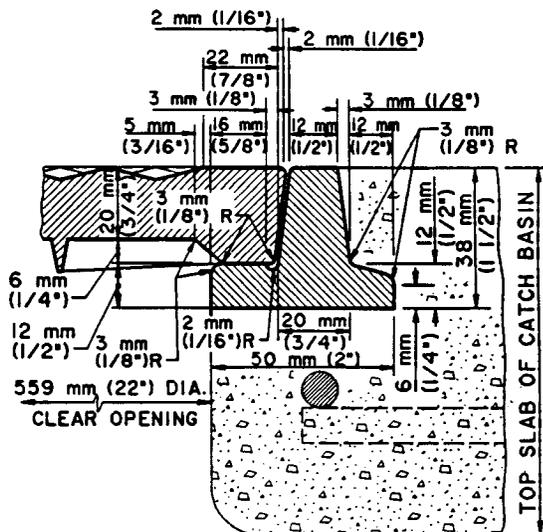
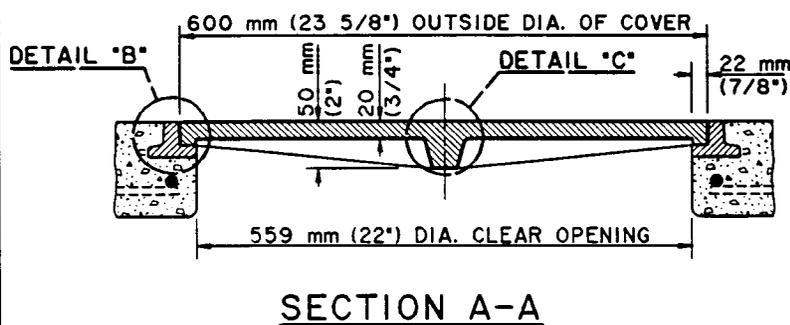
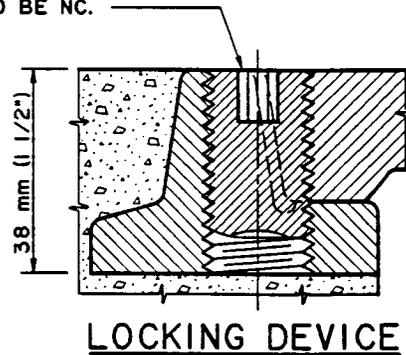
CHARLES W. CARRY  
CHIEF ENGINEER  
DECEMBER, 1984

STANDARD 36" MANHOLE FRAME  
WITH 30" COVER

STANDARD DRAWING  
S-a-226  
SHEET 1 OF 1



DRILL AND TAP HOLE AND INSTALL 20 mm x 32 mm (3/4" x 1 1/4") STAINLESS STEEL SOCKET SET SCREW WITH 10 mm (3/8") RECESSED HEX HOLE ALL THREADS TO BE NC.



AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER

PROMULGATED BY THE PUBLIC WORKS STANDARDS INC., GREENBOOK COMMITTEE 1984 REV. 1996

**CATCH BASIN  
MANHOLE FRAME AND COVER**

STANDARD PLAN METRIC 312 - 2 SHEET 1 OF 2

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

NOTES

1. THE CAST IRON USED SHALL CONFORM WITH ASTM A-48M CLASS 35B.
2. THE FRAME AND COVER SHALL BE COATED WITH ASPHALTUM OR BITUMINOUS PAINT AFTER TESTING AND INSPECTION.
3. FOUNDRY IDENTIFYING MARK, HEAT AND DATE SHALL BE CAST ON THE BOTTOM OF THE COVER AND ON THE INSIDE OF THE FRAME.
4. IMPORTED COVERS AND FRAMES SHALL HAVE THE COUNTRY OF ORIGIN MARKING IN COMPLIANCE WITH FEDERAL REGULATIONS.
5. WEIGHT OF FRAME SHALL BE 15 Kg (30 POUNDS). WEIGHT OF COVER SHALL BE 40 kg (85 POUNDS). ACTUAL WEIGHTS SHALL BE WITHIN A RANGE OF 95% TO 110%.
6. THE MANHOLE FRAME AND COVER SHALL BE INSPECTED BY THE ENGINEER PRIOR TO SHIPMENT TO THE JOB SITE. ACCEPTANCE WILL BE INDICATED BY THE AGENCY'S MARK.
7. THE PROOF-LOAD FOR TEST METHOD B OF THE STANDARD SPECIFICATIONS IS 13,000 kg (28,600 POUNDS).
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.

AMERICAN PUBLIC WORKS ASSOCIATION - SOUTHERN CALIFORNIA CHAPTER

**CATCH BASIN MANHOLE FRAME AND COVER**

STANDARD PLAN  
METRIC  
**312 - 1**  
SHEET 2 OF 2

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## SECTION 01250

## MEASUREMENT AND PAYMENT

## 1. GENERAL.

The contract price and payment shall constitute full compensation as stated in the Contract Clause, CONTRACT PRICES - BIDDING SCHEDULES, for completion of the work. No separate payment will be made for any material or work covered in this specification, but not specifically mentioned as part of a bid items, and all costs into which the work pertains or considered incidental to all bid items. As stated in Contract Clause, SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, the word "provided" shall be understood to mean "furnished and installed" when used in this section or elsewhere in the technical sections.

## 2. CLEAR SITE AND REMOVE OBSTRUCTIONS.

Payment for Clear Site and Remove Obstructions will be made at the applicable contract price, which payment shall constitute full compensation for clearing, grubbing within the channel rights-of-way and at fill sites inside the construction easement and removal of all indicated obstructions within the project limits. Except as otherwise specified, payment for clearing and removal work includes applicable earthwork; removing and plugging abandoned lines; removal of existing asphalt concrete pavement and asphalt curb, flood control features (stone, reinforced concrete, removal of fencing, grouted stone work); removal of miscellaneous trash and debris; removal of vegetation; removal of materials for salvage; protection, replacement or restoration of utilities, fences, walls and features indicated to remain; and the disposal of all materials.

## 3. EXCAVATION.

3.1 Measurement. A survey of the site shall be made prior to commencement of work, and all measurements will be based on this survey without regard to any changes in the site that may be made between the excavation lines and grades indicated on the drawings or staked in the field and ground surfaces as indicated by the above mentioned surveys. The actual slopes as excavated may be greater or less than those indicated or staked depending on the materials excavated and methods used in performing the work, but such alterations shall not change the measurement for payment from the original lines as specified herein. The quantity of directed excavation necessary for the removal of unsuitable foundation material as specified shall be included in the measurement of the excavation where the unsuitable soils are encountered. Quantities will be computed in cubic yards by the average end area method and the planimeter will be considered a precise instrument for measurement of plotted cross sections. All excavation outside of excavation lines shown on the drawings or staked in the field will be considered as being for the convenience of the Contractor.

## 3.2 Payment

3.2.1 Payment for Excavation will be made at the applicable contract price, which payment shall constitute full compensation for excavation and disposal of excavated materials.

3.2.2 Unsatisfactory Soils. No separate payment will be made for the excavation and disposal of unsatisfactory soils. When such excavation is directed, payment will be included in the applicable contract price for the items of work under which the unsuitable soils are encountered. When there is no applicable contract item an adjustment will be made.

3.2.3 Excavation for Structures. No separate payment will be made for excavation for structures. All costs therefore shall be included in the applicable contract item to which the work applies.

3.2.4 Trenches. No separate payment will be made for excavation of utility and pipe trenches. All costs therefore shall be included in the applicable contract prices for the items to which the work applies.

#### 4. COMPACTED FILL.

4.1 Measurement for compacted fill will be made between the excavation and structure lines and the fill limit lines, or between the ground lines and fill lines, as indicated or staked in the field. Quantities will be computed in cubic yards by the average end area method and the planimeter will be considered a precise instrument for measuring plotted cross sections.

#### 4.2 Payment.

4.2.1 Payment for Compacted Fill will be made at the applicable contract price, which payment shall constitute full compensation for obtaining, placing and compacting the fill.

4.2.2 Fill for Structures. No separate payment will be made for fill or backfill about structures. All such costs shall be included in the applicable contract prices for items to which the work applies.

4.2.3 Trenches. No separate payment will be made for backfilling of pipelines. All costs in connection therewith shall be included in the contract prices for items to which the work applies.

4.2.4 Subgrade Preparation. No separate payment will be made for subgrade preparation and all costs in connection therewith shall be included in the contract prices for items to which the work applies.

4.2.5 No separate payment will be made for borrow.

#### 5. STONE PROTECTION.

5.1 Measurement. The quantity of stone to be paid for will be number of tons (2,000 pounds), determined by scale weights, acceptably placed within the lines and grades shown on the drawings or directed by the Contracting Officer.

5.2 Payment for Riprap will be made at the applicable contract price, which payment shall constitute full compensation for obtaining and placing the stone, **and furnishing and installing geotextile**, complete.

5.3 Payment for Landscape Stone will be made at the applicable contract price, which payment shall constitute full compensation for obtaining and placing the stone, complete.

5.4 Payment for Grouted Landscape Stone will be made at the applicable contract price, which payment shall constitute full compensation for obtaining and placing the grouted landscape stone(grout and landscape stone), complete.

5.5 Payment for Grouted Stone will be made at the applicable contract price, which payment shall constitute full compensation for obtaining and placing the grouted stone(grout and stone), complete.

#### 6. CONCRETE.

6.1 Concrete Parapet Wall. Payment for the Concrete Parapet Wall shall be made at the applicable contract price, which payment shall constitute full compensation for earthwork, concrete (including Portland cement), steel reinforcement, wall texturing, joints, waterstops, form work, complete. Payment shall not include removal of stonework; asphalt, and concrete channel lining for which other applicable payment items are provided.

6.2 Concrete Pavement. Payment for the Concrete Pavement shall be made at the applicable contract price, which payment shall constitute full compensation for earthwork, concrete (including Portland cement), steel reinforcement, form work, joints, complete. Payment shall not include removal of stonework, and concrete channel lining for which other applicable payment items are provided.

6.3 Concrete Channel Lining. Payment for the Concrete Channel Lining shall be made at the applicable contract price, which payment shall constitute full compensation for earthwork, concrete (including Portland cement), steel reinforcement, form work, joints, complete. Payment shall not include construction of concrete channel invert and removal of existing stonework and concrete channel lining for which other applicable payment items are provided.

6.4 Concrete Channel Invert. Payment for the Concrete Channel Invert shall be made at the applicable contract price, which payment shall constitute full compensation for earthwork, concrete (including Portland cement), steel reinforcement, form work, joints, complete. Payment shall not include construction of concrete channel lining and removal of existing stonework and concrete channel lining for which other applicable payment items are provided.

6.5 Concrete Driveway. Payment for the Concrete Drive Ways shall be made at the applicable contract price, which payment shall constitute full compensation for earthwork, concrete (including Portland cement), steel reinforcement, form work, joints, concrete curb, complete. Payment shall not include excavation and compacted fill, for which other applicable payment items are provided.

6.6 Concrete Local Depression. Payment for the Concrete Local Depression shall be made at the applicable contract price, which payment shall constitute full compensation for earthwork, concrete (including Portland cement), steel reinforcement, form work, joints, concrete local depression, complete. Payment shall not include excavation and compacted fill, for which other applicable payment items are provided.

## 7. RETAINING WALL.

Payment for each Retaining Wall shall be made at the applicable contract price, which payment shall constitute full compensation for earthwork, concrete (including Portland cement), steel reinforcement, wall texturing, joints, form work, complete. The earthwork included shall be only that earthwork which is located outside the limits of earthwork for which other payment is provided. Payment will not include fencing for which other applicable payment items are provided.

## 8. DOWN DRAIN.

Payment for Down Drain shall be made at the applicable contract price, which payment shall constitute full compensation for earthwork, concrete (including Portland cement), steel reinforcement, form work, joints, complete. Payment shall not include excavation and compacted fill, for which other applicable payment items are provided.

## 9. ASPHALT CONCRETE PAVEMENT.

9.1 Measurement. The unit of measurement for the asphalt concrete pavement will be the ton (2,000 pounds). The Contractor shall weigh each load on a certified platform scale and shall furnish the Contracting Officer with duplicate Weighmaster's Certificates showing the actual net weights. One ticket shall be furnished to the plant inspector and one ticket to the inspector at the construction site. The bituminous mixture shall be weighed after mixing and no deduction will be made for the weight of bituminous material incorporated therein. Asphalt concrete used for the convenience of the Contractor will not be measured for payment.

9.2 Payment for Asphalt Concrete Pavement will be made at the applicable contract price, which payment shall constitute full compensation for asphalt concrete surfacing, curbs, dike, and overside drains including prime coat, tack coat, **concrete header, subgrade preparation and appurtenant work; except construction of Asphalt Concrete Pavement between Station 308+00 and Station 225+00, Left Bank, and between Station 107+50 and Firestone Boulevard, Right Bank, is not a part of this contract and is not included in the quantity for the applicable Bid Item shown in the Bidding Schedule.**

## 10. AGGREGATE BASE COURSE.

10.1 Measurement. The unit of measurement for the Aggregate Base Course will be the ton (2,000 pounds). The Contractor shall weigh each load on a certified platform scale and furnish the Contracting Officer with Duplicate Weighmaster's Certificates showing the actual net weights. One ticket shall be furnished to the plant inspector and one ticket to the inspector at the construction site. Aggregate Base Course used for the convenience of the Contractor will not be measured for payment.

10.2 Payment for Aggregate Base Course will be made at the applicable contract price, which payment shall constitute full compensation for aggregate base course, complete: **except construction of Aggregate Base Course between Station 308+00 and Station 225+00, Left Bank, and between Station 107+50 and Firestone Boulevard, Right Bank, is not a part of this contract and is not included in the quantity for the applicable Bid Item shown in the Bidding Schedule.**

## 11. 6-INCH ASPHALT CONCRETE CURB/BERM.

11.1 Measurement. The unit of measurement for the 6-Inch Asphalt Concrete Curb/Berm will be the linear foot along the flow line.

11.2 Payment for 6-Inch Asphalt Concrete Curb/Berm will be made at the applicable contract price, which payment shall constitute full compensation for the curb and berm installation, complete.

12. DECOMPOSED GRANITE. Payment for Decomposed Granite will be made at the applicable contract unit price, which payment shall constitute full compensation for the decomposed granite, complete; **except construction of Decomposed Granite between Station 107+50 and Station 100+00, Right Bank, is not a part of this contract and is not included in the quantity for the applicable Bid Item shown in the Bidding Schedule.**

13. ACCESS ROAD DRAIN. Payment for Access Road Drain will be made at the applicable contract unit price, which payment shall constitute full compensation for the access road drains, complete, including ACO drain channel, vine pocket, grate, pipe, check valve, formwork, concrete(including Portland cement), steel reinforcement and concrete slurry.

## 14. SAFETY RAILING

14.1 Measurement of Safety Railing will be made to the nearest linear foot horizontally along the centerline from end-to-end of the railing in place.

14.2 Payment for Safety Railing will be made at the applicable contract price, which payment shall constitute full compensation for the safety railing, complete.

## 15. BREAKAWAY SAFETY RAILING.

15.1 Measurement of Breakaway Safety Railing will be made to the nearest linear foot horizontally along the centerline from end-to-end of the railing in place.

15.2 Payments for Breakaway Safety Railing will be made at the applicable contract price, which payment shall constitute full compensation for the breakaway safety railing, complete.

## 16. FENCING

16.1 Measurement of Chain Link Fencing and Ornamental Fencing will be made to the nearest linear foot horizontally along the centerline from end-to-end of the fence in place. Temporary fencing will not be included in the measurement.

16.2 Payment for Chain Link Fencing and Ornamental Fencing will be made at the applicable contract price, which payment shall constitute full compensation for furnishing and installing the fencing, complete in place.

17. GATES. Payment for Chain Link Maintenance, Ornamental Maintenance and Ornamental Pedestrian Gates will be made at the applicable contract price, which payment shall constitute full compensation for the gates, complete. Payment for Ornamental Maintenance Gates shall include one pair of bollards for each set of gate.

18. REINFORCED CONCRETE STAIRWAYS, LEFT LEVEE - STATIONS 392+50, 371+00, 367+75, 350+00, 311+50, 271+50, AND 245+61. Payment for the stairways will be made at the applicable contract price, which payment shall constitute full compensation for stairway, complete, including concrete(including Portland cement), steel reinforcement, and railing. See APWA Standard Plan 640-1 in Section 01200.

19. HYDROSEEDING. Payment for Seeding Operations will be made at the applicable contract price which payment shall constitute full compensation for the grading, tillage, soil amending, fertilizing, seeding, mulching, establishing, and maintaining of areas to be seeded; **except planting work between Station 308+00 and Station 22f5+00, Left Bank, and between Station 107+50 and Firetone Boulevard, Right Bank, is not a part of this contract and is not included in the quantity for the applicable Bid Item shown in the Bidding Schedule.**

20. HYDROSEEDING MAINTENANCE. Payment for Hydroseeding Maintenance will be made at the applicable contract price, which payment shall constitute full compensation for maintenance during the establishment period of the hydroseeded area of twelve(12) months.

21. TREE, SHRUB, GROUND COVER, AND VINE PLANTINGS. Payment for Tree, Shrub, Groundcover, and Vine Plantings will be made at the applicable contract price, which payment shall constitute full compensation for obtaining, planting, and maintaining all trees, shrubs, ground cover, and vines, complete; **except planting work between Station 308+00 and Station 22f5+00, Left Bank, and between Station 107+50 and Firetone Boulevard, Right Bank, is not a part of this contract and is not included in the quantity for the applicable Bid Item shown in the Bidding Schedule.**

22. TREE, SHRUB, GROUND COVER, AND VINE PLANTINGS MAINTENANCE. Payment for Trees, Shrubs, Ground Covers and Vine Plantings Maintenance will be made at the applicable contract price, which payment shall constitute full compensation for maintenance during the establishment period of the Trees, Shrubs, Ground Cover, and Vine Plantings of 12 months.

23. JUTE MESH. Measurement of jute mesh will be by square foot placed. Payment for jute mesh will be made at the applicable contract price, which payment shall constitute full compensation for obtaining and constructing, complete.

24. IRRIGATION SYSTEM. Payment for Irrigation System, **except for the portions specified in 24.1 and 24.2 below**, will be made at the applicable contract price, which payment shall constitute full compensation for the irrigation system, complete in place, including trenching, bedding, and backfilling. Payment will include all costs for electrical system for irrigation controller.

**24.1 Construction of Irrigation System between Station 308+00 and Station 225+00, Left Bank, is not a part of this contract and is not included in the quantity for the applicable Bid Item shown in the Bidding Schedule, except for the following:**

- a. One(1) new 2" water meter at existing gate on Washington Blvd approximately 1600 feet east of the bridge.
- b. Backflow device, flow meter, master valve, one(1) each, and two(2) gate valves as shown on Sht L-9 immediately south of Washington Blvd.
- c. Approximately 1600 feet of 3" mainline pipe from the new water meter to the point of connection(P.O.C.) at the existing galvanized pipe at the bridge. Make connection to the existing galvanized pipe at the P.O.C.

**24.2 Construction of Irrigation System between Station 107+50 and Firestone Blvd, Right Bank, is not a part of this contract and is not included in the quantity for the applicable Bid Item shown in the Bidding Schedule, except for the following:**

- a. Valve station GG-38 and the dripline system connected to this station upstream of Station 107+50.
- b. Cap mainline pipe after valve station GG-38 for future connection.
- c. Cap lateral pipe(valve station GG-40) after the last bubbler at Station 107+50 for future connection.

25. BENCHES, BICYCLE RACKS, PADS AND SIGN PEDESTALS. Payment for Benches, Bicycle Racks, Pads and Sign Pedestals will be made at the applicable contract price, which payment shall constitute full compensation for providing the benches, bicycle racks and concrete pads, **bicycle barriers** and sign pedestals, complete, including concrete and steel reinforcement.

26. BICYCLE TRAIL STRIPING AND SIGNING.

Payment for Bicycle Trail Striping and Signing will be made at the applicable contract price, which payment shall constitute full compensation for providing bicycle trail striping and signing.

27. BICYCLE TRAIL CLOSURE AND DETOUR.

Payment for Bicycle Trail Closure and Detour will be made at the applicable contract price, which payment shall constitute full compensation for providing the closure and detours, including, striping, temporary barricades, signing, fences, and restoration of the closure and detour areas upon completion of the work.

## 28. UTILITY RELOCATION/RECONSTRUCTION

28.1 INLET STRUCTURE OF DIVERSION CHANNEL, STA 397+75, LEFT BANK. Payment for Inlet Structure of Diversion Channel will be made at the applicable contract price, which payment shall constitute full compensation for the inlet and outlet structures, reinforced concrete pipes, trash rack and automatic flap gates, complete in place; including demolition, earthwork, concrete, steel reinforcement, reinforced concrete pipes, trash rack and automatic flap gates. The earthwork included shall be only that earthwork which is located outside the limits of earthwork for which other payment is provided.

28.2 ADJUST TO GRADE. Payment for Adjust To Grade will be made at the applicable contract price, which payment shall constitute full compensation for the adjustment to grade of valves, covers, manholes, etc., complete, including demolition and earthwork.

29. SWIFT-WATER RESCUE ANCHOR DEVICE. Payment for Swift-water Rescue Anchor Device will be made at the applicable contract price, which payment shall constitute full compensation for providing the eyenut anchors, painted yellow circles and "blue dots", complete, including demolition, earthwork, concrete(including Portland cement) and epoxy adhesive.

30. SIDE DRAINS. Payment for Side Drains will be made at the applicable contract price, which payment shall constitute full compensation for providing the reinforced concrete pipes, steel pipes, concrete collars, automatic flap gates, outlet structures, types 1, 2 and 3 inlets, and concrete gutter, complete, including demolition, earthwork, concrete(including Portland cement) and steel reinforcement. The earthwork included shall be only that earthwork which is located outside the limits of earthwork for which other payment is provided. Payment for **each** Side Drain at Stations 91+98, 88+11 and 84+71 shall include the construction of concrete gutters **behind each existing building that drain to each side drain.**

31. **MODIFY SEWER SIPHON VAULT STRUCTURE,LEFT LEVEE, STATION 149+00.** Payment for **Modify Sewer Siphon** Vault Structure will be made at the applicable contract price, which payment shall constitute full compensation for reinforced concrete, **manhole risers and manhole frame and cover**, complete, including demolition, earthwork, concrete(including Portland Cement) and steel reinforcement. The earthwork included shall be only that earthwork which is located outside the limits of earthwork for which other payment is provided. **Payment shall not include Retaining Wall for which other payment is provided.**

## 32. SHOTCRETE.

32.1 **Measurement.** Shotcrete will be measured for payment based upon the quantity per cubic yard, based on 4500 square feet shotcreted to the thickness shown on the contract drawings.

32.2 **Payment for Shotcrete** will be made at the applicable contract price, which payment shall constitute full compensation for furnishing, delivering and placing shotcrete, finishing surfaces and curing.

33. **QUALITY ASSURANCE VEHICLES.** Payment for Quality Assurance Veicles will be made at the applicable contract price, which payment shall constitute full

compensation for providing the vehicles and all labor and materials required for their operation and maintenance.

**34. AS-BUILT DRAWINGS.** Payment for As-built drawings will be made at the applicable contract price, which payment shall constitute full compensation for providing the project as-built drawings.

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SECTION 01430  
ENVIRONMENTAL PROTECTION

## PART 1 GENERAL

## 1.1 DEFINITIONS

For the purpose of this specification, environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for but not limited to aesthetic, cultural and/or historical purposes. The control of environmental pollution and damage requires consideration of air, water, and land, and includes management of visual aesthetics, noise, solid waste, radiant energy and radioactive materials, as well as other pollutants.

## 1.2 ENVIRONMENTAL PROTECTION REQUIREMENTS

These requirements are to provide and maintain, during the life of the contract, environmental protection. Plan for and provide environmental protective measures to control pollution that develops during normal construction practice. Plan for and provide environmental protective measures required to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project; and comply with Federal, State, and local regulations pertaining to the environment, including but not limited to water, air, and noise pollution; biological resources, transportation, recreation, public services and utilities; geology, seismicity and soils; hazardous materials and waste management. The Contractor will comply with all the requirements of the Environmental Protection Plan as described in this section. This plan will be applicable prior to and during the channel modifications from Whittier Narrows Dam to Firestone Boulevard in the Rio Hondo Channel.

## 1.2.1 Environmental Protection Plan

Within two (2) days after Notice of Award, the Contractor will meet with Mr. Ron Lockman (213)452-3847 of the Contracting Officer and Ms. Suzanne Ho (626)458-4322 of the Los Angeles County Department of Public Works, to develop a mutual understanding relative to compliance with this provision and administration of the environmental protection program. Within seven (7) calendar days after the Notice of Award, the Contractor will submit in writing an Environmental Protection Plan covering all mitigation measures contained herein for the protection of the environment as identified and discussed further in this section. Within seven (7) days after the Contractor submits the Environmental Protection Plan, the Government will either approve or submit to the Contractor required revisions. Within seven (7) days of submission of required revisions, the Contractor will submit the revised Environmental Protection Plan to the Government for approval. The Contractor shall not mobilize equipment nor initiate any construction prior to Government approval of the Environmental Protection Plan. Approval of the Contractor's plan will not relieve the Contractor of his responsibility for adequate and continuous control of pollutants and other environmental protection measures. The Government reserves the right to make changes in the Contractor's environmental protection plan and operations as necessary to maintain satisfactory Environmental Protection Performance. The Contractor will be in complete environmental compliance with the Los Angeles County Drainage Area Environmental Impact Report dated December 19, 1994 and the Los Angeles County Drainage Area Review Environmental Impact Statement dated June 1992. The Government reserves the right to halt construction operations at the expense of the Contractor should the Contractor be found in non-compliance with the environmental protection plan approved by the Contracting Officer. Construction operations would resume when compliance is met. The environmental protection plan

(with details for each requirement specified in later provisions of Section 01430) will include but not be limited to the following:

- a) a list of Federal, State and local laws, regulations, and permits concerning environmental protection, pollution control and abatement that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations and permits.
- b) a commuter trip reduction plan to achieve an average ridership of 1.5 individuals.
- c) written procedures limiting the idling of construction equipment at construction sites to two minutes or less.
- d) written procedures to be followed to suspend the use of powered equipment during second-stage smog alerts within one hour of notification.
- e) a list of all construction equipment anticipated to be used on the project, listing the make and model, type of fuel used (diesel, gasoline, or alternative), and engine specifications (e.g. engine size, horsepower, etc.).
- f) a written description of the installation of a wind-speed monitoring device capable of recording and displaying peak 10-second gusts during each hour of construction.
- g) a specification list of parapet wall coatings indicating the volatile organic compound content of all paint formulations.
- h) a map of proposed sediment barriers to be in place during construction.
- i) a list of waste asphalt, concrete, and masonry disposal locations at sites away from the construction site/construction staging sites.
- j) a list of all noise producing equipment and vehicles listing the type of noise pollution control device used on each piece of equipment and identifying equipment for which noise control devices are unavailable.
- k) written procedures limiting the use of noise-producing signals (e.g. safety warnings, etc.), public address systems, music systems, and any other noise producing equipment.
- l) a list of noise specifications for all pile drivers used on the project.
- m) a list of sensitive receptor locations where noise levels may exceed 14 decibels (A-weighted) and where sound barrier walls may need to be constructed.
- n) anticipated traffic flow patterns and changes due to construction activities in the areas impacted by the construction project, access to bus stops, sidewalk access plans, locations of recreational trails, safety structures, and rest stop/seating areas.
- o) locations of signs both on the construction site (limiting speeds to 25 m.p.h. and construction hours to 7:00 AM to 7:00 PM weekdays and 9:00 AM to 6:00 PM Saturdays), and on impacted streets as part of the overall traffic mitigation plan.
- p) a construction routing plan identifying the locations of access driveways to both construction staging sites and construction sites, and the locations of preferred traffic routes to and from construction staging sites and construction sites.

- q) a map identifying the equipment refueling and maintenance areas, locations of hazardous waste storage, materials stockpiles, mobile equipment staging, and parking areas.
- r) a list of transit agency contacts.
- s) a hazardous materials transport plan identifying preferred traffic routes to and from the construction staging sites and construction sites.
- t) records documenting the training of all project construction workers involved in the use of hazardous materials took place prior to the start of project construction.
- u) an Emergency Response Plan including but not limited to locations of hazardous waste spill kits, specific procedures for hazardous materials spill containment and public notification, and notification of local emergency service providers.

#### 1.2.1.1 Laws, Regulations, and Permits

The Contractor will prepare a list of Federal, State and local laws, regulations, and permits concerning environmental protection, pollution control and abatement that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations and permits. These shall include, but not be limited to, all Caltrans permits, and local city ordinance compliance permits (e.g., business, excavation and hauling permits), NPDES and 401 permits which have already been obtained by the Government as discussed in Section 3.3, shall also be listed. Permits identified will be obtained by the Contractor and submitted along with the initial list to the Contracting Officer within seven (7) calendar days after the Notice of Award.

#### 1.2.1.2 Protection of Features

The Contractor will determine methods for the protection of features to be preserved within authorized work areas. The Contractor will prepare a listing of methods to protect resources needing protection, i.e., trees, shrubs, vines, grasses and ground cover, landscape features, air and water quality, fish and wildlife, soil, historical, archaeological and cultural resources. These methods, if not discussed in detail in the Environmental Protection Plan identified in this section, will be added and submitted to the Contracting Officer within seven calendar days after the Notice of Award.

#### 1.2.1.3 Procedures

The Contractor will implement procedures to provide the required environmental protection and to comply with the applicable laws and regulations. The Contractor will set out procedures to be followed to correct pollution of the environment due to accident, natural causes or environmental protection plan as described more in detail in this section. Failure to comply with the approved environmental protection plan could result in payment delays.

#### 1.2.1.4 Permit or License

The Contractor will obtain all needed permits or licenses. Copies of these permits and/or licenses will be submitted to the Contracting Officer within seven (7) calendar days after the Notice of Award date.

#### 1.2.1.5 Drawings

The Contractor will include drawings showing locations of any proposed temporary excavations or embankments for haul roads, material storage areas, structures,

sanitary facilities, stockpiles of earth materials, and disposal areas for excess earth material and unsatisfactory earth materials as discussed and/or in addition to measures described further in this section.

#### 1.2.1.6 Environmental Monitoring Plans

The Contractor will include environmental monitoring plans for the job site which incorporate land, water, air, traffic, recreation, public service, hydrogeology, soils, hazardous materials/waste management and noise monitoring as described further in this section.

#### 1.2.1.7 Traffic Control Plan

The Contractor will include a traffic control plan for the job site and other surrounding areas that would be used during construction hours for transport of materials, equipment, etc., as described further in this section.

#### 1.2.1.8 Surface and Ground Water

The Contractor will establish methods of protecting surface and ground water during construction activities by methods described further in this section.

#### 1.2.1.9 Work Area Plan

The Contractor will include a work area plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. The plan will include measures for marking the limits of use areas. This plan will be submitted to the Contracting Officer for review and approval within seven (7) calendar days after the Notice of Award.

#### 1.2.1.10 Plan of Borrow Area

The Contractor will include a plan of the borrow area for the job site as discussed further in this section. This plan will be submitted to the Contracting Officer for review and approval within seven (7) calendar days after the Notice of Award.

#### 1.2.1.11 Emergency Response Plan

An emergency response plan will be prepared for responding to hazardous materials spills at all project construction sites. The plan will identify actions to immediately control hazardous materials spills, and procedures to notify appropriate health officials.

The Contractor will submit to the Contracting Officer for review and approval an emergency response plan. The plan should outline the response to be taken should an emergency involving but not limited to hazardous material spills at project construction and/or staging area sites occur during construction hours. The plan should identify actions to immediately control hazardous spills, and procedures to notify appropriate health officials, local jurisdictions and authorities. The plan should identify the lead Contractor representative to address an incident of this nature.

The plan should also include specific procedures for hazardous materials spill containment and public notification. The plan should also consider and address appropriate response measures to prevent and/or minimize the exposure of fish and wildlife resources in the lower River, construction workers, and nearby residents.

#### 1.2.1.12 Noise Control Plan

The Contractor will develop a noise control plan. Noise control features and plans will be reviewed and approved by the Government. This plan will include the mitigation measures identified and discussed further in this section.

a. Noise-Control Devices on Construction Equipment/Vehicles

The Contractor will submit a list of all noise producing equipment and vehicles. The list will describe the type of noise control device used on each piece of equipment and identify equipment and vehicles for which noise control devices are not available or feasible as discussed further in this section.

b. Noise-Producing Signals, Public Address, and Music Systems

The Contractor will submit written procedures concerning the use of signals, public address systems, and music systems. The procedures shall specify that noise producing signals (including, but not limited to horns, whistles, alarms, and bells) will be limited to safety warnings. The procedures will also specify volume limitations on public address systems and music systems. The procedures will also specify that the Contracting Officer and/or representatives of the Contracting Officer can at anytime require any representative of the Contractor in non-compliance be removed from the site at the expense of the Contractor if the individual is not willing to abide by the requirements. The Contractor representative can resume work as soon as compliance is met. The procedures will be distributed to all construction supervisors, foreman and workers. It will be the Contractors responsibility to ensure that all Contractor Representatives are apprised of these noise limiting procedures.

1.2.1.13 Public Services and Utilities

The Contractor will send a schedule of project construction activities to all emergency service providers and utility companies near the project area within seven (7) calendar days after the Awarded contract date. The schedule will identify the date and location of proposed construction activities as discussed further in this section.

1.3 SUBCONTRACTORS

Assurance of compliance with this section by subcontractors will be the responsibility of the Contractor and subject to disciplinary action and/or shut down until compliance is met.

1.4 PERMITS OBTAINED BY CORPS OF ENGINEERS

The Corps of Engineers will not obtain any permits for this project. See Contract Clause entitled "PERMITS AND RESPONSIBILITIES".

1.5 REGULATORY REQUIREMENTS

The Contractor will comply with all state regulatory and statutory requirements. This shall include conditions as contained in the State of California Department of Transportation(Caltrans) Permit, City Permits, Regional Water Quality Control Board Waste Discharge and Section 401 Water Quality Certification, and the General Stormwater Construction Activity Permit. Copies of the Corps of Engineers-obtained permits are available from the Contracting Officer.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 PROTECTION OF ENVIRONMENTAL RESOURCES

The environmental resources within the project boundaries and those affected outside the limits of permanent work under this contract will be protected during the entire period of this contract. The Contractor will confine his activities to areas defined by the contract drawings and specifications. Environmental protection will also include the following subparagraphs.

### 3.1.1 Protection of Land Resources

After the Awarded contract date and prior to the beginning of any construction, the Contracting Officer will identify all land resources to be preserved within the Contractor's work area. The Contractor will not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without special permission from the Contracting Officer. No ropes, cables, or guys will be fastened to or attached to any trees for anchorage unless specifically authorized by the Contracting Officer. Where such special emergency use is permitted, the Contractor will provide effective protection for land and vegetation resources at all times as defined in the following subparagraphs.

#### 3.1.1.1 Work Area Limits

Prior to any construction, the Contractor will mark the areas where no work is to be performed under this contract. Isolated areas within the general work area which are to be saved and protected will also be marked or fenced. Monuments and markers will be protected before construction operations commence and during all construction operations. Where construction operations are to be conducted during darkness, the markers will be visible during darkness. The Contractor will convey to his personnel the purpose of marking and/or protection of all necessary objects.

#### 3.1.1.2 Protection of Landscape

Trees, shrubs, vines, grasses, land forms and other landscape features to be preserved, indicated and defined on the drawings submitted by the Contractor as a part of the Environmental Protection Plan, will be clearly identified by marking, fencing, or wrapping with boards, or any other approved techniques.

#### 3.1.1.3 Reduction of Exposure of Unprotected Erodible Soils

Earthwork brought to final grade will be finished as indicated and specified. Side slopes and back slopes will be protected as soon as practicable upon completion of rough grading. All earthwork will be planned and conducted to minimize the duration of exposure of unprotected soils. Except in instances where the constructed feature obscures borrow areas, quarries and waste material areas, these areas will not initially be cleared in total. Clearing of such areas will progress in reasonably sized increments as needed to use the areas developed as approved by the Contracting Officer.

#### 3.1.1.4 Temporary Protection of Disturbed Areas

Such methods as necessary will be utilized to effectively prevent erosion and control sedimentation, including but not limited to the following:

##### a. Retardation and Control of Runoff

Runoff from the construction site will be controlled by construction of diversion ditches, benches, and berms to retard and divert runoff to protected drainage courses, and the Contractor will also utilize any measures required by area-wide plans approved under Paragraph 208 of the Clean Water Act.

The contractor will abide by and implement the provisions outlined in the Storm Water Pollution Prevention Plan (SWPPP) required under the General Storm Water

Construction Activity Permit for the control of storm water. All diversion methods identified shall be used during construction operations. The Contractor has the option to use other methods equivalent to those methods identified in the SWPPP as approved and directed by the Contracting Officer. Should the Contractor choose to use this option, the methods approved by the Contracting Officer must be amended, by the Contractor, in the existing SWPPP to reflect those changes. A copy of the plan can be obtained from the Contracting Officer. All erosion control measures and other protection measures mentioned in this plan will be used for compliance and should be kept on-site at all times.

b. Erosion and Sedimentation Control Devices/Sediment Barriers

Sediment from construction areas and the construction staging site will be trapped in temporary or permanent sediment basins. The Contractor will institute effluent quality monitoring programs as required by state and local environmental agencies. The Contractor will submit a map and/or plan identifying the location of proposed sediment basins.

The Contractor will submit to the Contracting Officer for review and approval a map identifying locations of required sediment barriers (i.e. sandbags, silt fence, temporary containment dams) downstream of each construction site/operation resulting from construction activities to trap sediments.

The Contractor will either cover and secure or stabilize with controlled amounts of sprinkled water any areas of exposed soil (i.e. dirt stockpiles, dirt berms, temporary dirt roads) and/or bulk granular materials.

The Contractor will construct or install all temporary and permanent erosion sedimentation control features. Temporary erosion and sediment control measures such as berms, dikes, drains, sedimentation basins, grassing, and mulching will be maintained until permanent drainage and erosion control facilities are completed and operative.

3.1.1.5 Location of Contractor Facilities

The Contractor's field offices, staging areas, stockpiles, storage, and temporary buildings will be placed in areas designated on the contract drawings and approved by the Contracting Officer.

3.1.1.6 Temporary Excavation and Embankments

Temporary excavation and embankments will be controlled to protect adjacent areas from contamination.

3.1.1.7 Disposal of Solid Wastes

Solid wastes (excluding clearing debris) which includes broken concrete, asphalt, metal scrap, wood and debris from the modification work, will be placed in containers which are emptied on a regular schedule. All handling and disposal will be conducted to prevent contamination. All solid waste materials generated from construction activities will become the property of the contractor and will be removed from the construction site to an area approved by the Contracting Officer. The Contractor will transport all solid waste off all construction site and staging areas and dispose of it in compliance with Federal, State, and local requirements for solid waste disposal. All material will be handled as directed by the Contracting Officer.

The Contractor will submit to the Contracting Officer for review and approval, a list of off-site disposal locations for masonry, concrete, and/or asphalt. Disposal

will be prohibited at project construction sites. Masonry, concrete and/or asphalt will be contained and/or covered while waiting to be disposed.

#### 3.1.1.8 Disposal of Chemical Wastes

Chemical wastes will be stored in corrosion resistant containers, removed from the work area and disposed of in accordance with Federal, State, and local regulations as discussed further in this section.

#### 3.1.1.9 Disposal of Contaminated Soils

a. The Contractor will monitor excavations and areas of earthmoving for gaseous emissions and will sample and analyze any suspected materials. If materials are verified to be contaminated, notify the Contracting Officer for appropriate action. The Contractor will take remedial action based on the extent and magnitude of contaminated conditions as directed by the Contracting Officer.

b. Contaminated soils encountered during project construction will be disposed of in accordance with applicable local, state and federal regulations. Appropriate actions will be taken to minimize exposure to construction workers, recreational users, and nearby residents as discussed further in this section.

#### 3.1.2 Tree Protection

All trees 1-1/2 inches in diameter or greater, that are to be removed by the Contractor can only be removed with specific authorization from the Contracting Officer. No ropes, cables, or guys shall be fastened to or attached to any tree(s) for anchorage unless specifically authorized by the Contracting Officer. Where such special use is permitted, the Contractor shall provide effective protection to prevent damage to the tree and other land and vegetative resources. Unless specifically authorized by the Contracting Officer, no construction equipment or materials shall be placed or used within the dripline of trees shown on the drawings to be saved. No excavation or fill shall be permitted within the dripline of trees to be saved except as shown on the drawings.

#### 3.1.3 Commercial Borrow

Prior to bringing commercially obtained borrow material onsite, the Contractor shall provide the Contracting Officer with the location of the pit or pits, the names of the owners and operators, and the types and estimated quantities of materials to be obtained from each source.

### 3.2 HISTORICAL, ARCHAEOLOGICAL AND CULTURAL RESOURCES

Existing historical, archaeological and cultural resources within the Contractor's work area will be so designated by the Contracting Officer and precautions will be taken by the Contractor to preserve all such resources as they existed at the time they were pointed out to the Contractor. The Contractor will install all protection for these resources so designated on the contract drawings and will be responsible for their preservation during this contract. If during construction items of apparent archaeological or historical interest are discovered, they will be left undisturbed and the Contractor will report the find immediately to the Contracting Officer.

### 3.3 PROTECTION OF WATER RESOURCES

The Contractor will keep construction activities under surveillance, management and control to avoid pollution of surface and ground waters. Special management techniques as set out below will be implemented to control water pollution by the listed construction activities which are included in this contract.

The Contractor will keep copies on-site and comply with the conditions contained in the General Storm Water Construction Activity Permit (Storm Water Pollution Prevention Plan (SWPPP)) in compliance with NPDES requirements and the Section 401 Water Quality Certification obtained for this job. Copies of the permit and Storm Water Pollution Prevention Plan can be obtained from the Contracting Officer. Diversion techniques as described in the Storm Water Pollution Prevention Plan will be used during construction operations. Other diversion techniques equivalent to those may be used as approved by the contracting officer. Should other techniques be used, the SWPPP shall be amended by the Contractor as approved by the Contracting Officer.

### 3.3.1 Washing and Curing Water

Waste waters directly derived from construction activities will not be allowed to enter water areas **or any spreading basin**. These waste waters will be collected and placed in retention ponds where the suspended materials can be settled out or the water evaporated in order to separate the pollutants from the water. The suspended materials shall be disposed of in accordance with Paragraph 3.1.1.7.

### 3.3.2 River Crossings

River crossings will be controlled during construction. Crossings will provide movement of materials or equipment which does not violate water pollution control standards of the Federal, State or local government.

### 3.3.3 Monitoring of Water Areas Affected by Construction: Water Contamination

a. Monitoring of water areas affected by construction activities will be the responsibility of the Contractor in order to prevent contamination of ground water and water along waterways. Shotcrete or gunite shall not be permitted to be used within the channel boundaries. All refuse, oil, greases, and other petroleum products; all toxic materials; all cement or concrete; or water containing such materials will be disposed of in a manner to prevent their entry into the ground water, water along the Rio Hondo Channel **and any spreading basin within the Rio Hondo Spreading Grounds**. These procedures will be reviewed and approved by the Contracting Officer. A log of monitoring activities will be submitted monthly for compliance as discussed further in this section.

b. A spill kit containing absorbent materials will be maintained at active construction site(s) a minimum of one spill kit present at each side of the channel. All employees will be familiar with the Emergency Response Plan, the procedures to utilize the spill kit, and the locations where they are kept.

### 3.3.4 Hazardous Materials Management

#### a. Hazardous Material Spill Response

If hazardous materials are released during construction, appropriate actions will be taken to minimize the exposure of fishery and wildlife resources in the lower Los Angeles River and San Pedro Bay, construction workers, and nearby residents as discussed further in this section.

**b. Hazardous Materials Transport, Storage, and Handling Plans**

The Contractor will submit to the Contracting Officer for review and approval a hazardous materials transport and storage plan. Hazardous materials would include, but not be limited to, contaminated soils, vehicle fuels and other petroleum products, and any paints and solvents. A Material Safety Data Sheet (MSDS) shall be maintained at the construction office by the Contractor for each material identified as a hazardous material by the Environmental Planning representatives from the Corps of Engineers and/or Los Angeles County Department of Public Works.

The hazardous materials storage plan will identify areas in which hazardous materials storage is proposed. This plan will prohibit hazardous materials storage near **any spreading basin**, the channel and/or subdrains. Liquid fuels, paints, solvents, and other hazardous materials would not be stored or handled in bulk quantities in spreading basins and/or channels. All hazardous materials storage shall conform to current local, state, and federal laws and regulations.

The hazardous materials transport plan will identify preferred traffic routes for the transport of hazardous materials, and any special provisions required by current state and federal laws and regulations.

Hazardous material handling and use will be restricted only to trained personnel and only in accordance with the manufacturer's recommendations, and state and federal regulations. The Contractor will provide proof that all project construction workers involved in the use of hazardous materials were trained prior to construction, including a description of the content of the training. The Contractor will submit a monthly list of persons known to have been exposed to hazardous materials (See Mitigation Monthly Logs).

The Contractor shall prepare and submit for review and approval an Emergency Response Plan for response to hazardous material spills at project construction sites. The Plan shall identify sections to immediately control hazardous material spills and procedures to notify health officials.

**3.3.5 Equipment Refueling**

The Contractor will submit to the Contracting Officer for review and approval a list of equipment and vehicle refueling and maintenance areas. Refueling and maintenance of equipment and vehicles in, near or on the levees of the flood control channel **or any spreading basin** are prohibited. Refueling areas will be at least 25 feet from the top of the outermost edge of the channel levee **or spreading basin**. The Contractor will use only low sulfur content diesel fuel in all internal combustion engines used at the construction site. The Contractor is responsible for refueling all equipment and vehicles off-site or at the staging area designated on the plans. Other refueling site locations requested by the Contractor must be approved by the Contracting Officer prior to their use.

**3.3.6 Street Sweeping**

At the close of each working day, any materials as a result of construction activities, such as dirt tracked into the adjacent streets (streets for construction access) or laying uncontained in the construction areas are to be swept up. A log of street sweeping activities will be maintained and submitted monthly for compliance (See Mitigation Monthly Logs).

**3.4 PROTECTION OF FISH AND WILDLIFE RESOURCES**

The Contractor will keep construction activities under surveillance, management and control to minimize interference with, disturbance to and damage of fish and wildlife. Species that require specific attention along with measures for their protection will be listed for all workers by the Contractor prior to beginning of

construction operations. The Contractor may contact the Environmental Planning representatives from the Corps of Engineers, Ron Lockmann at (213) 452-3847 and/or from the Los Angeles County Department of Public Works, Suzanne Ho at (626) 458-4322 for assistance in preparing this list. This list shall be reviewed and approved by the Contracting Officer.

### 3.5 PROTECTION OF AIR RESOURCES

The Contractor shall keep construction activities under surveillance, management and control to minimize pollution of air resources. All activities, equipment, processes, and work operated or performed by the Contractor in accomplishing the specified construction shall be in strict accordance with the State of California and all Federal emission and performance laws and standards. Special management techniques as set out below shall be implemented to control air pollution by the construction activities which are included in the contract.

#### 3.5.1 Particulates

Dust particles, aerosols, and gaseous by-products from all construction activities, processing and preparation of materials shall be controlled at all times, including weekends, holidays and hours when work is not in progress. The Contractor shall maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, spoil areas, borrow areas, and all other work areas within or outside the project boundaries free from particulates which would cause the air pollution standards mentioned in the paragraph: PROTECTION OF AIR RESOURCES to be exceeded or which would cause a hazard or a nuisance. Sprinkling, chemical treatment of an approved type or other methods will be permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated at such intervals as to keep the disturbed area damp at all times. The Contractor must have sufficient competent equipment available to accomplish this task. Particulate control shall be performed as the work proceeds and whenever a particulate nuisance or hazard occurs.

The Contractor shall water down active construction sites to prevent the uplift of dust at all construction site and staging areas at least two (2) times per day (See Mitigation Monthly Logs).

#### 3.5.2 Hydrocarbons and Carbon Monoxide

Hydrocarbons and carbon monoxide emissions from equipment shall be controlled to Federal and State allowable limits at all times.

The Contractor shall submit written procedures to limiting idling of construction equipment at construction sites and staging areas to the Contracting Officer. The procedures shall be distributed to all construction supervisors, foreman and workers. The Contractor shall be responsible for ensuring that all workers have been informed of these procedures.

The Contractor shall provide good maintenance of all equipment including but not limited to the proper tuning of off-road heavy equipment to reduce combustion sources of air emissions (See Mitigation Monthly Logs).

#### 3.5.3 Odors

Odors shall be controlled at all times for all construction activities, processing and preparation of materials.

#### 3.5.4 Monitoring Air Quality

All areas where air quality may be affected by the construction activities shall be monitored by the contractor.

#### 3.5.4.1 Wind-speed Monitoring

The Contractor shall install wind-speed monitoring equipment at the construction site(s) at locations approved by the Contracting Officer. The monitoring equipment shall record and display the peak 10-second gust of wind during each hour of construction. A weekly summary shall be submitted for compliance and include periods when construction activities are curtailed in response to wind conditions along with the meteorological data. The Contracting Officer shall suspend excavation, grading, or other particulate-generating activities when winds (peak 10-second gusts) exceed 25 miles per hour. The contract completion date will be extended by the number of days activities are suspended.

#### 3.5.5 Transport of Materials

All trucks hauling dirt, sediment or other loose materials from construction site are to be covered or shall maintain at least 2 feet of cover from the top edge of the truck to the material being hauled.

#### 3.5.6 Smog Alerts

The Contracting Officer shall notify the Contractor when a second stage smog alert is in effect and order the suspension of the use of powered construction equipment or construction vehicles. The Contractor shall not claim shut-down time due to smog alerts. A log of these shut-down periods shall be prepared and submitted (See Mitigation Monthly Logs).

#### 3.5.7 Trip Reduction Plan

The Contractor shall develop a trip reduction plan for all construction workers and employees who would be at the construction site to achieve an average vehicle ridership of 1.5 individuals per day. The trip reduction plan should be submitted to the Contracting Officer for review and approval.

#### 3.5.8 Construction Equipment Idling

The Contractor shall submit written procedures to prohibit construction equipment at construction sites and staging areas from idling for more than two minutes when not in active use, to the Contracting Officer. The procedures shall be distributed to all construction supervisors and foreman.

#### 3.5.9 Traffic Routing Plan

The Contractor shall develop a traffic routing plan identifying the most efficient traffic routes to the project site and staging areas and submit to the Contracting Officer for review and approval. The routes should consider community safety and route construction traffic on less-congested streets and away from residential streets.

The Contractor shall schedule all concrete and compacted fill material deliveries to occur between the hours of 7:00 a.m. and 7:00 p.m. weekdays and 9:00 a.m. and 6:00 p.m. Saturdays. Other construction material deliveries shall occur between the hours of 9:00 a.m. and 4:00 p.m. Monday through Saturday. No construction shall occur on Sundays.

Signing and flagmen shall be utilized where construction equipment interfaces with public traffic. The plan shall identify where the flagmen shall be situated to assist the flow of traffic during deliveries.

The plan shall also identify locations of construction site and construction staging site access driveways for construction workers, employees, and construction materials deliveries. The plan shall also include vehicular and pedestrian detour plans (including autos and buses), details of truck haul routes and site access points, details of roadway restriping and signage for vehicular and pedestrian circulation, including turn restrictions, lane assignments, speed limit and crosswalks, relocation of bus stops, and parking details, including restrictions and prohibitions. Access driveways shall be planned with the consideration of minimizing use of local residential streets for construction vehicles traffic. The Plan shall also establish the locations of haul routes on major streets or highways into and out of staging sites and construction sites and specifically near these sites.

#### 3.5.10 Parapet Wall Coatings

The Contractor shall submit for review and approval the specifications of parapet wall coatings to the Contracting Officer. The specifications shall identify the volatile organic compound content of all paint formulations to be used. The Contractor shall use only paints with 250 grams per liter of these compounds, rather than those with 340 grams per liter.

#### 3.5.11 Fuel Source for Equipment

The Contractor shall use methane, natural gas, or propane-powered equipment and vehicles, rather than gasoline or diesel-powered equipment or vehicles where feasible. The Contracting Officer shall approve the equipment not powered by methane, natural gas, or propane-powered equipment or vehicles prior to the start of construction. The Contractor shall submit a list of construction equipment anticipated to be used on the project to the Contracting Officer for review and approval. The list shall identify all construction equipment by type of fuel used (diesel, gasoline, or alternative fuel). The Contractor shall provide documentation of contact with Contractors and/or major equipment suppliers for each piece of equipment using gasoline or diesel fuel to indicate why the use of an alternative fuel is not feasible.

#### 3.5.12 Bus Stop Access Plan

The Contractor shall contact the local transit agencies servicing the area to notify them of construction activities. If bus stops are affected, the Contractor shall coordinate with the transit agencies and prepare a bus stop access plan identifying the locations and anticipated duration of closure of bus stops. Bus stop access should be maintained wherever possible during the entire construction period. Install safety feature such as fencing, barriers, and/or warning signs if bus stops are affected. to allow adjacent bus stops to remain open. The Contractor shall submit to the Contracting Officer a list of transit agency contacts and written verification by the Contractor that bus stops would not be affected. Verification shall include the date, transit agency contact, map of routes to be used and statement of no effect.

#### 3.5.13 Pedestrian Access

The Contractor shall submit to the Contracting Officer for review and approval a sidewalk access plan, identifying the location and anticipated duration of closure of sidewalks. The plan should maintain pedestrian access throughout the construction period by keeping sidewalks open as much as public safety considerations would permit. Install safety features such as the following but not limited to fencing, barriers, and warning signs in construction areas to allow adjacent sidewalks to remain open.

### 3.6 NOISE

### 3.6.1 Mobile or Fixed Equipment

All mobile or fixed noise-producing equipment used on the project, which is regulated for noise output by a local, state, or federal agency, shall comply with such regulation as discussed further in this section.

### 3.6.2 Construction Equipment and Vehicles

All noise-producing construction equipment and vehicles using internal combustion engines shall be equipped with mufflers, and air-inlet silencers where appropriate, in good operating condition that meet or exceed original factory specification. Mobile or fixed "package" equipment (e.g., arc-welder, air compressor) shall be equipped with shrouds and noise control features that are readily available for that type of equipment.

### 3.6.3 Electrically-Powered Equipment

Electrically-powered equipment instead of pneumatic or internal combustion powered equipment shall be used, where feasible as discussed further in this section.

3.6.3.1 The Contractor shall submit a monthly summary of the number of electrically powered, pneumatically powered and internal combustion powered equipment used on the project as discussed further in this section (See Mitigation Monthly Logs).

### 3.6.4 Noise-Producing Construction Activity

Noise-producing construction activity shall comply with local noise control regulations.

### 3.6.5 Equipment and Vehicles

The Contractor shall submit to the Contracting Officer a list of all noise producing project equipment and vehicles. The list shall describe the type of noise control device used on each piece of equipment, and identify equipment and vehicles for which noise control devices are not available or feasible. All equipment shall provide noise-producing project equipment and vehicles using internal combustion engines with mufflers, and air-inlet silencers, that meet or exceed original factory specifications. Equip mobile or fixed "package" equipment (eg. arc-welders, air compressors) with shrouds and noise-control features that are readily available for that type of equipment. Anything used different from what is described shall be approved by the Contracting Officer in writing.

### 3.6.6 Stockpile of material

The Contractor shall submit to the Contracting Officer for review and approval a list of material stockpile (such as but not limited to concrete, asphalt, and masonry) and mobile equipment staging, parking, and maintenance areas. Stockpiles are defined as any type of material left temporarily on site and the property of the Contractor. These stockpiles should be located at least 50 feet away (or the greatest distance allowable as approved by the Contracting Officer if 50 feet is not available) from noise-sensitive receptors. Examples of receptors are identified as, but not limited to schools, hospitals, and residential areas.

### 3.6.7 Posted Traffic Signs

The Contractor shall post traffic signs at all construction and staging site areas limiting traffic speeds to 25 miles per hour. The signs shall be posted such that all construction workers and employees on the site can visually observe the sign from their vehicles at all access points of the project limits. The Contractor shall also place 25 miles per hour signs on local streets alongside or adjacent to

the construction zone areas. Upon completion of the posting, the Contractor shall provide the Contracting Officer with a written statement stating that signs have been posted with the identification of all locations.

The Contractor shall post signs at all construction zones limiting construction hours to 7:00 a.m. - 7:00 p.m., weekdays, 9:00 a.m. - 6:00 p.m. on Saturdays. The Contractor shall submit, one day after posting, in writing to the Contracting Officer, written verification that the construction hours of operation signs were posted at all access locations in areas visible to all construction workers, employees and local residents. These hours of construction would apply, but not be limited to noisy maintenance activities and all debris and material transport. Where local jurisdictions impose more stringent limits on the hours of construction activity, these limits should take precedence and be followed.

The Contractor shall submit to the Contracting Officer for review and approval a list identifying locations prohibiting left-turns along the restriped street segment near construction staging sites so that the remaining roadway width not utilized by traffic accessing the staging site could be fully used for through-traffic flow. The Contractor shall post signs prohibiting left turns along the restriped street segment near construction staging sites, three (3) days prior to the start of construction. The Contractor shall submit to the Contracting Officer written verification that no left turn signs were posted at all appropriate construction site access points prior to project construction.

The Contractor shall submit to the Contracting Officer for review and approval a list of contacts made with local City jurisdictions during the permitting process.

The Contractor shall submit to the Contracting Officer for review and approval a construction traffic routing plan, identifying the locations of access driveways. Local streets are prohibited as routes leading to access driveways. Exceptions can apply where necessary and unavoidable and at the approval of the Contracting Officer.

#### 3.6.8 Impact pile drivers

The Contractor shall submit to the Contracting Officer for review and approval a list of noise specifications for all impact pile drivers to be used during project construction. These specifications shall include the noise intensity and pile driver make and model. Impact pile drivers shall be limited to 95 decibels, A-weighted at a distance of 50 feet consistent with federal GSA "Construction Equipment and Practices" Guide Specifications.

### 3.7 TESTS

The Contractor shall establish and maintain quality control for environmental protection operations to assure compliance with contract requirements and maintain records of his quality control for all construction operations, including, but not limited to the following items. The Contractor shall record on daily reports any problems in complying with laws, regulations and ordinances and corrective action taken. Three copies of these records and tests, as well as the records of corrective action taken, shall be furnished to the Government as directed by the Contracting Officer.

#### 3.7.1 Laws, Regulations and Ordinances

The Contractor must comply with all Federal, State, and local laws, regulations and ordinances concerning pollution control.

#### 3.7.2 Protection of Land Resources

The Contractor shall prevent landscape defacement and provide post-construction clean-up and replacement, if necessary.

### 3.7.3 Protection of Water Resources

The Contractor shall prevent the contamination of Los Angeles River or other bodies of water with harmful chemicals; the Contractor shall dispose of waste materials; and the Contractor shall provide erosion control. A clean site shall be maintained at all times. Trash and all refuse generated by the construction workers and/or employees shall be disposed of properly.

### 3.7.4 Pollution Control Facilities

The Contractor shall provide for the maintenance of pollution control facilities. The Contractor shall conduct a training course on the maintenance of pollution control facilities.

## 3.8 INSPECTION

The Corps monitor will notify the Contracting Officer of non-compliance with the Environmental Protection Plan. The Contracting Officer, will notify the Contractor in writing of any observed non-compliance with the Contractor's Environmental Protection Plan. The Contractor shall, after receipt of such notice, inform the Contracting Officer of proposed corrective action and take such action as may be approved. If the Contractor fails to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions will be granted or costs or damages allowed to the Contractor for any such suspension.

## 3.9 POST CONSTRUCTION CLEANUP

When the project is completed and prior to final acceptance, the Contractor shall remove all construction equipment, materials, vehicles, trash, debris and miscellaneous property of the Contractor and subcontractors, and employees of the Contractor and subcontractors from the site and restore all the areas used by the Contractor and subcontractors to the condition they were in prior to the Contractor occupying the site.

## 3.10 MAINTENANCE OF POLLUTION FACILITIES

The Contractor shall maintain all constructed facilities and temporary pollution control devices for the duration of the contract or for that length of time construction activities create the particular pollutant.

## 3.11 TRAINING OF CONTRACTOR PERSONNEL IN POLLUTION CONTROL AND USE OF HAZARDOUS MATERIALS

The Contractor shall train personnel in all phases of environmental protection prior to construction. The training shall include methods of detecting and avoiding pollution, familiarization with pollution standards, both statutory and contractual, and installation and care of facilities (instruments required for monitoring purposes) to insure adequate and continuous environmental pollution control.

The Contractor shall provide training to all construction workers involved in the use of hazardous materials. This training shall take place five calendar days prior to the start of construction with the Contracting Officer present. The Contractor shall submit to the Contracting Officer documentation that the training class occurred and provide an outline of the content of the course and a list and sign-in sheet of attendees. The training class would continue giving project construction

workers orientation training on the start day of construction to ensure that the workers understood the training received five days earlier.

### 3.12 PROTECTION OF RECREATIONAL ACTIVITIES

#### 3.12.1 Recreational Trail Plan

The Contractor is required to submit to the Contracting Officer for review and approval a recreational trail plan identifying phased closure and/or detour of the bicycle trail for the duration of the project (also see Section 1200- 9.6.4). The Signage shall include the closed reach, reach of the temporary detour/closure and duration of detour and/or closures. All signage for the temporary and/or closure for the bicycle trail, pedestrian paths, and equestrian trails shall be placed within seven (7) calendar days of the approved plan. The recreational trail plan shall include posting temporary detour and/or closure signs at construction sites, affected equestrian trail and bike path and all temporary access locations. Maintenance, closure and detours of a continuous trail throughout the construction period shall be provided for by the Contractor. Any closures and/or detours shall be coordinated with the Los Angeles County Department of Parks and Recreation, at Mr. Jim Parks at (213) 738-2965 and the Los Angeles County Department of Public Works, Mr. Greg Jacquez at (626) 458-3941.

### 3.13 PROTECTION FOR PUBLIC SAFETY

#### 3.13.1 Project Construction Schedule

The Contractor shall send a schedule of project construction activities in writing to all emergency service providers and utility companies that service the project area and adjacent properties. Review and approval of this notification should be obtained from the Contracting Officer prior to submittance to the emergency service providers and utility companies. The schedule shall identify the date and location of proposed construction activities. The Contractor shall submit copies of the written notification to the Contracting Officer one day after compliance for record.

#### 3.13.2 Safety Structures

The Contractor shall submit a list of safety structures to the Contracting Officer for review and approval. Safety features could include but are not limited to fencing, barriers placed around construction areas, warning signs, and placement of construction equipment at night in areas that are secured from the general public. The Contractor shall provide written notice to the Contracting Officer that the approved safety structures are in place one day after placement.

### 3.14 ENVIRONMENTAL PROTECTION MEASURES DURING CONSTRUCTION

The Contractor shall prepare the following Mitigation Monthly Logs by completing the forms on a daily basis and shall submit the logs to the contracting office on or before the first of each month. Each entry shall identify the necessary information required on the logs, and the signature of the Contractor and in some cases the Contracting Officer and/or Representatives thereof on a daily basis. The following is the list of Mitigation Monthly Logs required to be completed by the Contractor.

TEMPORARY TRAFFIC CONTROL ACTIVITIES  
CONSTRUCTION MATERIALS DELIVERY RECORDS  
SECOND-STAGE SMOG ALERT/SUSPENSION OF POWER EQUIPMENT USE  
SUMMARY OF POWER SUPPLY TYPES  
WIND SPEED MONITORING \*\*  
INSPECTION OF HAUL OF MATERIAL  
SITE WATERING ACTIVITIES

OFF-ROAD HEAVY EQUIPMENT MAINTENANCE ACTIVITIES  
CONSTRUCTION WORK WITHIN FLOOD CONTROL CHANNELS  
INSPECTION OF STOCKPILED MATERIALS  
STREET SWEEPING ACTIVITIES  
OFF-SITE DISPOSAL LOCATIONS OF WASTE ASPHALT, CONCRETE, AND MASONRY  
HAZARDOUS MATERIAL SPILL KIT INSPECTION  
POWER EQUIPMENT USAGE  
VIBRATORY /IMPACT PILE DRIVER USAGE  
CLEANING AND RE-PAINTING ACTIVITIES (E.G., GRAFFITI REMOVAL)  
HAZARDOUS MATERIALS USERS\*\*\*  
EXCAVATED MATERIALS SAMPLING  
SUMMARY OF PERSONS EXPOSED TO HAZARDOUS MATERIALS  
SUMMARY OF ENVIRONMENTAL PROGRAMS (WASTE MANAGEMENT DIV.) COORDINATION

\*\* These logs shall be submitted on a weekly basis to the Contracting Officer.

\*\*\* These logs shall be submitted on a quarterly basis to the Contracting Officer.

### 3.15 MITIGATION MONTHLY LOGS

Attached is the first page of each monthly log required to be completed by the Contractor. The complete logs will consist of entries for each day of each month for the duration of the construction period as directed by the Contracting Officer. A complete log chart package shall be furnished to the Contractor after the Notice to Proceed.

-- End of Section --

**LACDA - WHITTIER NARROWS DAM TO FIRESTONE BOULEVARD  
MITIGATION MONITORING MONTHLY LOGS  
TEMPORARY TRAFFIC CONTROL ACTIVITIES (AQ-2)**

Mo. _____ Yr. _____	TIME	TEMPORARY TRAFFIC CONTROL ACTIVITIES IMPLEMENTED	LOCATION	REASON REQUIRED	CONTRACTOR SIGNATURE
1					
2					
3					
4					
5					
<b>COMMENTS</b>					

**LACDA - WHITTIER NARROWS DAM TO FIRESTONE BOULEVARD  
MITIGATION MONITORING MONTHLY LOGS  
CONSTRUCTION MATERIALS DELIVERY RECORDS (AQ-3)**

Mo. _____ Yr. _____	TIME	CONSTRUCTION MATERIALS DELIVERED	LOCATION DELIVERED	NUMBER OF DELIVERIES	CONTRACTOR SIGNATURE
1					
2					
3					
4					
5					
<b>COMMENTS</b>					

**LACDA - WHITTIER NARROWS DAM TO FIRESTONE BOULEVARD  
MITIGATION MONITORING MONTHLY LOGS  
SECOND-STAGE SMOG ALERTS/SUSPENSION OF POWER EQUIPMENT USE (AQ-6)**

Mo. _____ Yr. _____	2 <sup>ND</sup> -STAGE SMOG ALERT CALLED?	TYPE OF EQUIPMENT WHERE USE SUSPENDED	LOCATION	CONTRACTOR SIGNATURE
1				
2				
3				
4				
5				
COMMENTS				

**LACDA - WHITTIER NARROWS DAM TO FIRESTONE BOULEVARD  
MITIGATION MONITORING MONTHLY LOGS  
SUMMARY OF POWER SUPPLY TYPES (AQ-7)**

Mo. _____ Yr. _____	TYPE OF POWER SUPPLY USED	LOCATION	REASON REQUIRED	CONTRACTOR SIGNATURE
1				
2				
3				
4				
5				
<b>COMMENTS</b>				

**LACDA - WHITTIER NARROWS DAM TO FIRESTONE BOULEVARD  
MITIGATION MONITORING MONTHLY LOGS  
WIND SPEED MONITORING (AQ-9)**

Mo. _____ Yr. _____	WIND SPEED		TIME		CONSTRUCTION ACTIVITIES SUSPENDED	CONTRACTOR SIGNATURE
1						
2						
3						
4						
5						
<b>COMMENTS</b>						

**LACDA - WHITTIER NARROWS DAM TO FIRESTONE BOULEVARD  
MITIGATION MONITORING MONTHLY LOGS  
DIRT AND SEDIMENT HAUL TRUCK INSPECTIONS (AQ-10)**

Mo. _____ Yr. _____	TIME	LOCATION	INSPECTION OF DIRT AND SEDIMENT HAUL TRUCKS	CONTRACTOR SIGNATURE
1				
2				
3				
4				
5				
COMMENTS				

**LACDA - WHITTIER NARROWS DAM TO FIRESTONE BOULEVARD  
MITIGATION MONITORING MONTHLY LOGS  
SITE WATERING ACTIVITIES (AQ-11/WQ-5)**

Mo. _____ Yr. _____	TIME OF WATERING	LOCATION	CONTRACTOR SIGNATURE
1			
2			
3			
4			
5			
<b>COMMENTS</b>			

**LACDA - WHITTIER NARROWS DAM TO FIRESTONE BOULEVARD  
MITIGATION MONITORING MONTHLY LOGS  
OFF-ROAD HEAVY EQUIPMENT MAINTENANCE ACTIVITIES (AQ-EIS-1)**

Mo. _____ Yr. _____	TIME	MAINTENANCE ACTIVITY	LOCATION	CONTRACTOR SIGNATURE
1				
2				
3				
4				
5				
<b>COMMENTS</b>				

**LACDA - WHITTIER NARROWS DAM TO FIRESTONE BOULEVARD  
 MITIGATION MONITORING MONTHLY LOGS  
 CONSTRUCTION WORK WITHIN FLOOD CONTROL CHANNEL (WQ-1)**

Mo. _____ Yr. _____	WORK HOURS	LOCATION OF WORK WITHIN THE FLOOD CONTROL CHANNEL	CONSTRUCTION WORK WITHIN THE FLOOD CONTROL CHANNEL	FLOW CONDITIONS IN THE FLOOD CONTROL CHANNEL	CONTRACTOR SIGNATURE
1					
2					
3					
4					
5					
COMMENTS					

**LACDA - WHITTIER NARROWS DAM TO FIRESTONE BOULEVARD  
MITIGATION MONITORING MONTHLY LOGS  
INSPECTION OF BULK GRANULAR MATERIALS (WQ-4)**

Mo. _____ Yr. _____	TIME	TYPE OF MATERIAL STOCKPILE (APPROXIMATE QUANTITY AND LOCATION)	CONDITION OF STOCKPILE (COVERED/DUST EMISSIONS?)	CONTRACTOR SIGNATURE
1				
2				
3				
4				
5				
<b>COMMENTS</b>				

**LACDA - WHITTIER NARROWS DAM TO FIRESTONE BOULEVARD  
MITIGATION MONITORING MONTHLY LOGS**

Mo. _____ Yr. _____	TIME	STREET SWEEPING ACTIVITIES (ADJACENT STREET LOCATIONS)	CONTRACTOR SIGNATURE
1			
2			
3			
4			
5			
<b>COMMENTS</b>			

**LACDA - WHITTIER NARROWS DAM TO FIRESTONE BOULEVARD**  
**MITIGATION MONITORING MONTHLY LOGS**  
 DISPOSAL LOCATIONS FOR ASPHALT, CONCRETE, AND MASONRY (WQ-7)

Mo. _____ Yr. _____	MATERIAL TYPE	DISPOSAL SITE LOCATION	CONTRACTOR SIGNATURE
1			
2			
3			
4			
5			
<b>COMMENTS</b>			

**LACDA - WHITTIER NARROWS DAM TO FIRESTONE BOULEVARD  
MITIGATION MONITORING MONTHLY LOGS  
HAZARDOUS MATERIAL SPILL KIT INSPECTION (WQ-9)**

Mo. _____ Yr. _____	TIME	LOCATION OF SPILL KITS (LIST ALL CONSTRUCTION SITE AREAS)	CONTRACTOR SIGNATURE
1			
2			
3			
4			
5			
COMMENTS			

**LACDA - WHITTIER NARROWS DAM TO FIRESTONE BOULEVARD  
MITIGATION MONITORING MONTHLY LOGS  
POWER EQUIPMENT USAGE (NOI-4)**

Mo. _____ Yr. _____	TYPES OF POWER EQUIPMENT USED	LOCATION	CONTRACTOR SIGNATURE
1			
2			
3			
4			
5			
<b>COMMENTS</b>			

**LACDA - WHITTIER NARROWS DAM TO FIRESTONE BOULEVARD  
MITIGATION MONITORING MONTHLY LOGS  
VIBRATORY/IMPACT PILE DRIVER USAGE (NOI-10)**

Mo. _____ Yr. _____	NUMBER AND TYPES OF PILE DRIVERS USED	LOCATION	CONTRACTOR SIGNATURE
1			
2			
3			
4			
5			
<b>COMMENTS</b>			

**LACDA - WHITTIER NARROWS DAM TO FIRESTONE BOULEVARD  
MITIGATION MONITORING MONTHLY LOGS  
CLEANING AND RE-PAINTING ACTIVITIES (AES-2)**

Mo. _____ Yr. _____	DATE & TIME CLEANED & REPAINTED	LOCATION AND SIZE OF REPAINTING OF SURFACE	CONTRACTOR SIGNATURE	INSPECTOR SIGNATURE
<u>1</u>				
<u>2</u>				
<u>3</u>				
<u>4</u>				
<u>5</u>				
<u>COMMENTS</u>				

**LACDA - WHITTIER NARROWS DAM TO FIRESTONE BOULEVARD  
MITIGATION MONITORING MONTHLY LOGS  
LOG OF HAZARDOUS MATERIALS USERS (HAZ-2)**

Mo. _____ Yr. _____	USERS NAME	TYPE OF HAZARDOUS MATERIAL USED	CONTRACTOR SIGNATURE
1			
2			
3			
4			
5			
<b>COMMENTS</b>			

**LACDA - WHITTIER NARROWS DAM TO FIRESTONE BOULEVARD  
MITIGATION MONITORING MONTHLY LOGS  
REPORTS ON EXCAVATED MATERIAL SAMPLING (HAZ-6)**

Mo. _____ Yr. _____	TYPE OF EXCAVATED MATERIALS	LOCATION OF SAMPLING	CONTRACTOR SIGNATURE
1			
2			
3			
4			
5			
<b>COMMENTS</b>			

**LACDA - WHITTIER NARROWS DAM TO FIRESTONE BOULEVARD  
MITIGATION MONITORING MONTHLY LOGS  
SUMMARY OF PERSONS EXPOSED TO HAZARDOUS MATERIALS (HAZ-7)**

Mo. _____ Yr. _____	NAME OF EXPOSED PERSON	TYPE OF HAZARDOUS MATERIAL	CONTRACTOR SIGNATURE
1			
2			
3			
4			
5			
<b>COMMENTS</b>			

**LACDA - WHITTIER NARROWS DAM TO FIRESTONE BOULEVARD**  
**MITIGATION MONITORING MONTHLY LOGS**  
 SUMMARY OF ENVIRONMENTAL PROGRAMS (WASTE MANAGEMENT) COORDINATION (HAZ-8)

Mo. _____ Yr. _____	TIME	CONTACT NAME	EXPLANATION OF COORDINATION	CONTRACTOR SIGNATURE
1				
2				
3				
4				
5				
<b>COMMENTS</b>				

RHC, WHITTIER NARROWS DAM TO FIRESTONE BOULEVARD

DACW09-99-B-0001

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SECTION 01451  
CONTRACTOR QUALITY CONTROL

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3740 (1994a) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction

ASTM E 329 (1993b) Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

## 1.2 PAYMENT

Separate payment will not be made for providing and maintaining an effective Quality Control program, and all costs associated therewith shall be included in the applicable unit prices or lump-sum prices contained in the Bidding Schedule.

## PART 2 PRODUCTS (Not Applicable)

## PART 3 EXECUTION

## 3.1 GENERAL

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause entitled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. The system shall cover all construction operations, both onsite and offsite, and shall be keyed to the proposed construction sequence. The project superintendent will be held responsible for the quality of work on the job and is subject to removal by the Contracting Officer for non-compliance with quality requirements specified in the contract. The project superintendent in this context shall mean the individual with the responsibility for the overall management of the project including quality and production.

## 3.2 ADDITIONAL CONSTRUCTION HEADING AND CONTRACTOR PERSONNEL

Contractor's attention is directed to the magnitude and complexity of the project and the necessity to complete the project within a limited amount of time. In order to assure completion of the project within the contract duration in accordance with the project plans and specifications, the following construction headings and additional contractor personnel are required:

Headings

**Four construction headings are required. Refer to SECTION 01200: GENERAL REQUIREMENTS.**

Additional Personnel

Project Superintendent(**total of four for the project - one for each heading**)  
Contractor Quality Control Manager(**total of four for the project - one for each heading**)

### 3.3 QUALITY CONTROL PLAN

#### 3.3.1 General

The Contractor shall furnish for review by the Government, not later than 30 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause entitled "Inspection of Construction." The plan shall identify personnel, procedures, control, instructions, test, records, and forms to be used. The Government will consider an interim plan for the first 15 days of operation. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the features of work included in an accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work to be started.

#### 3.3.2 Content of the CQC Plan

The CQC Plan shall include, as a minimum, the following to cover all construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents:

a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff shall implement the three phase control system for all aspects of the work specified. The staff shall include a CQC System Manager who shall report to the project superintendent.

b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.

c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Copies of these letters will also be furnished to the Government.

d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with SECTION: SUBMITTAL PROCEDURES.

e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities will be approved by the Contracting Officer.)

f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

g. Procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures will establish verification that identified deficiencies have been corrected.

h. Reporting procedures, including proposed reporting formats.

i. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks and has separate control requirements. It could be identified by different trades or disciplines, or it could be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable feature under a particular section. This list will be agreed upon during the coordination meeting.

### 3.3.3 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

### 3.3.4 Notification of Changes

After acceptance of the CQC Plan, the Contractor shall notify the Contracting Officer in writing of any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

## 3.4 COORDINATION MEETING

After the Preconstruction Conference, before start of construction, and prior to acceptance by the Government of the CQC Plan, the Contractor shall meet with the Contracting Officer or authorized Representative and discuss the Contractor's quality control system. The CQC Plan shall be submitted for review a minimum of 14 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting shall be prepared by the Government and signed by both the Contractor and the Contracting Officer. The minutes shall become a part of the contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

## 3.5 QUALITY CONTROL ORGANIZATION

### 3.5.1 General

The requirements for the CQC organization are a CQC System Manager and sufficient number of additional qualified personnel to ensure contract compliance. The Contractor shall provide a CQC organization which shall be at the site at all times during progress of the work and with complete authority to take any action necessary to ensure compliance with the contract. All CQC staff members shall be subject to acceptance by the Contracting Officer.

### 3.5.2 CQC System Manager

The Contractor shall identify as CQC System Manager an individual within his organization at the site of the work who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager shall be a construction person with a minimum of 3 years in related work. This CQC System Manager shall be on the site at all times during construction and will be employed by the prime Contractor. The CQC System Manager shall be assigned no other duties. An alternate for the CQC System Manager will be identified

in the plan to serve in the event of the System Manager's absence. The requirements for the alternate will be the same as for the designated CQC System Manager.

### 3.5.3 Organizational Changes

The Contractor shall maintain his CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff the Contractor shall revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

### 3.5.4 Additional Requirement.

In addition to the requirements described above, the CQC System Manager shall have completed the course entitled "Construction Quality Management for Contractors". This course is offered periodically. Contact U.S. Army Corps of Engineers, Los Angeles District, Phil Strayhorn, (213) 452-3374 for information.

## 3.6 SUBMITTALS

Submittals shall be made as specified in SECTION: SUBMITTAL PROCEDURES. The CQC organization shall be responsible for certifying that all submittals are in compliance with the contract requirements.

## 3.7 CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. At least three phases of control shall be conducted by the CQC System Manager for each definable feature of work as follows:

### 3.7.1 Preparatory Phase

This phase shall be performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase shall include:

- a. A review of each paragraph of applicable specifications.
- b. A review of the contract drawings.
- c. A check to assure that all materials and/or equipment have been tested, submitted, and approved.
- d. Review of provisions that have been made to provide required control inspection and testing.
- e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.
- f. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.
- g. A review of the appropriate activity hazard analysis to assure safety requirements are met.
- h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.

i. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.

j. Discussion of the initial control phase.

k. The Government shall be notified at least 24 hours in advance of beginning the preparatory control phase. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The results of the preparatory phase actions shall be documented by separate minutes prepared by the CQC System Manager and attached to the daily CQC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

### 3.7.2 Initial Phase

This phase shall be accomplished at the beginning of a definable feature of work. The following shall be accomplished:

a. A check of work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.

b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.

c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

d. Resolve all differences.

e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.

f. The Government shall be notified at least 24 hours in advance of beginning the initial phase. Separate minutes of this phase shall be prepared by the CQC System Manager and attached to the daily CQC report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.

g. The initial phase should be repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.

### 3.7.3 Follow-up Phase

Daily checks shall be performed to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. The checks shall be made a matter of record in the CQC documentation. Final follow-up checks shall be conducted and all deficiencies corrected prior to the start of additional features of work which may be affected by the deficient work. The Contractor shall not build upon or conceal non-conforming work.

### 3.7.4 Additional Preparatory and Initial Phases

Additional preparatory and initial phases shall be conducted on the same definable features of work if the quality of on-going work is unacceptable, if there are changes in the applicable CQC staff, onsite production supervision or work crew, if work on a definable feature is resumed after a substantial period of inactivity, or if other problems develop.

## 3.8 TESTS

### 3.8.1 Testing Procedure

The Contractor shall perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Upon request, the Contractor shall furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. The Contractor shall procure the services of a Corps of Engineers approved testing laboratory or establish an approved testing laboratory at the project site. The Contractor shall perform the following activities and record and provide the following data:

- a. Verify that testing procedures comply with contract requirements.
- b. Verify that facilities and testing equipment are available and comply with testing standards.
- c. Check test instrument calibration data against certified standards.
- d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.
- e. Results of all tests taken, both passing and failing tests, will be recorded on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test will be given. If approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. An information copy of tests performed by an offsite or commercial test facility will be provided directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

### 3.8.2 Testing Laboratories

#### 3.8.2.1 Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel shall meet criteria detailed in ASTM D 3740 and ASTM E 329.

#### 3.8.2.2 Capability Recheck

If the selected laboratory fails the capability check, the Contractor will be assessed a charge of \$675.00 to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the contract amount due the Contractor.

### 3.8.3 On-Site Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

## 3.9 COMPLETION INSPECTION

### 3.9.1 Punch-Out Inspection

Near the completion of all work or any increment thereof established by a completion time stated in the Special Clause entitled "Commencement, Prosecution, and Completion

of Work," or stated elsewhere in the specifications, the CQC System Manager shall conduct an inspection of the work and develop a "punch list" of items which do not conform to the approved drawings and specifications. Such a list of deficiencies shall be included in the CQC documentation, as required by paragraph DOCUMENTATION below, and shall include the estimated date by which the deficiencies will be corrected. The CQC System Manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished the Contractor shall notify the Government that the facility is ready for the Government "Pre-Final" inspection.

### 3.9.2 Pre-Final Inspection

The Government will perform this inspection to verify that the facility is complete and ready to be occupied. A Government "Pre-Final Punch List" may be developed as a result of this inspection. The Contractor's CQC System Manager shall ensure that all items on this list have been corrected and so notify the Government so that a "Final" inspection with the customer can be scheduled. Any items noted on the "Pre-Final" inspection shall be corrected in a timely manner. These inspections and any deficiency corrections required by this paragraph will be accomplished within the time slated for completion of the entire work or any particular increment thereof if the project is divided into increments by separate completion dates.

### 3.9.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, his superintendent or other primary management person and the contracting Officer's representative will be in attendance at this inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups, and major commands may also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notice will be given to the Contracting Officer at least 14 days prior to the final acceptance inspection and must include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the contract clause entitled "Inspection of Construction".

## 3.10 DOCUMENTATION

The Contractor shall maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers and shall be on an acceptable form that includes, as a minimum, the following information:

- a. Contractor/subcontractor and their area of responsibility.
- b. Operating plant/equipment with hours worked, idle, or down for repair.
- c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.
- d. Test and/or control activities performed with results and references to specifications/drawings requirements. The control phase should be identified (Preparatory, Initial, Follow-up). List deficiencies noted along with corrective action.

- e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.
- f. Submittals reviewed, with contract reference, by whom, and action taken.
- g. Off-site surveillance activities, including actions taken.
- h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
- i. Instructions given/received and conflicts in plans and/or specifications.
- j. Contractor's verification statement.
- k. These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. The original and one copy of these records in report form shall be furnished to the Government daily within 24 hours after the date(s) covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, one report shall be prepared and submitted for every seven days of no work and on the last day of a no work period. All calendar days shall be accounted for throughout the life of the contract. The first report following a day of no work shall be for that day only. Reports shall be signed and dated by the CQC System Manager. The report from the CQC System Manager shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel.

### 3.11 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the worksite, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

### 3.12 CONTRACTOR PROJECT MANAGEMENT SYSTEM.

#### 3.12.1 General.

3.12.1.1 The Contractor Project Management System is included to assure adequate planning and execution of the work, to assist the Contracting Officer on appraising the reasonableness of the schedule, to evaluate progress of the work, and make progress payments, and to make decisions relative to time and/or cost adjustments which may result from changes in the work.

3.12.1.2 The management system is to be based on a computerized Network Analysis (Critical Path Method) operated by on-site personnel at terminals located in the Contractors's on-site office. On-site management shall be capable of using the system to address all project activities and resources on a real time interactive basis and be capable of rapidly evaluating alternative scenarios which will optimize project management. Evidence of technical expertise of on-site personnel with the proposed computerized Network Analysis System shall be submitted for Contracting Officer's approval prior to on-site work.

3.12.1.3 The Contractor shall resource load all work activities. As a minimum, resource loading shall identify equipment, management, skilled and unskilled labor

requirements. The Contractor may at his option decide on greater detail for his own purposes, but if this option is elected, the system must be able to consolidate resources into the above defined categories for use by the Contracting Officer.

3.12.1.4 The Contractor shall incorporate any and all milestone and contract required events which may be specified elsewhere within these specifications. Should milestone events be not specifically identified by the Government within these specifications, the Contractor shall identify at least five percent of the network activities and designate them as milestone activities.

3.12.1.5 The Contractor Project Management System is to be staffed and prepared pursuant of CONTRACT CLAUSE: SCHEDULE FOR CONSTRUCTION CONTRACTS, and CONTRACT CLAUSE: SUPERINTENDENT BY THE CONTRACTOR. In preparing this system the Contractor assume responsibility for conformance with contract requirements, planning, sequencing of work, and determining the construction means and methods.

3.12.2 Submission and Approval. Submission and approval of the system shall be as follows:

3.12.2.1 The complete network system consisting of the detailed network mathematical analysis (including on-site manpower loading schedule) and network logic diagrams shall be submitted for approval within thirty (30) calendar days after receipt of Notice to Proceed. This shall be submitted in assembled hardcopy paper format and via 3-1/2 HD (High Density) floppy disk to allow restoring on Government Computers in accordance with the Corps of Engineers Standard Data Exchange Format as described in ER 1-1-11.

3.12.2.2 The Contractor shall participate in a review and evaluation of the proposed network logic diagrams and mathematical analysis by the Contracting Officer. Any revisions necessary as a result of this review shall be resubmitted for approval of the Contracting Officer within three (3) calendar days after the conference. The approved schedule shall be used by the Contractor for planning, organizing and directing the work, reporting progress, and requesting payment for work accomplished.

3.12.3 Network Modifications.

3.12.3.1 In those cases where the contract performance is delayed due to causes beyond the control of the Contractor, and a time extension may be allowable under one or more of the CONTRACT CLAUSES: CHANGES, or DIFFERING SITE CONDITIONS, or DEFAULT (FIXED PRICE CONSTRUCTION), or SUSPENSION OF WORK, or other applicable clauses, as a condition recedent to granting a time extension, the Contractor shall submit a time proposal in such format as to identify the specific subnet diagram and activities affected.

3.12.3.2 Change order proposals shall include description or listing of all proposed changes to the network, by activity, and demonstrate the effect on the contract required completion date. A complete list of activities changed and subnet of activities affected by the change shall be submitted.

3.12.3.3 Float or slack is defined as the amount of time between the early start date and the late start date, or the early finish date and the late finish date, of any of the activities in the NAS schedule. Float or slack is not time for the exclusive use or benefit of either the Government or the Contractor. Extensions of time for performance may be granted to the extent that equitable time adjustment for the activities affected exceed the total float or where otherwise justified, effect on contract completion can be shown. The contract completion date is fixed, and will be amended only if the modifications which include time are signed by the Contracting Officer.

3.12.3.4 Rapid resolution of change orders and the granting of other time extensions where authorized by the Contracting Officer is a critical part of the overall

management system. Implementation of all justified activity and logic changes shall be made and reflected on the next monthly update after approval of the Contracting Officer.

3.12.3.5 If, in the opinion of the Contracting Officer, the current schedule no longer accurately reflects the Contractor's real plan for accomplishing the work, or no longer reflects a viable way of finishing the work on schedule, the Contractor shall be directed to revise the schedule and submit it for approval within seven (7) calendar days of direction.

3.12.4 Logic Diagrams and Reports.

3.12.4.1 Logic diagrams.

3.12.4.1.1 Logic diagrams shall show the order and interdependency of activities and sequence in which the work is to be accomplished as planned by the Contractor.

3.12.4.1.2 Detailed networks need not be timed scaled, but drafted to have a continuous flow from left to right, showing how the start of a given activity is dependent on the completion of preceding activities, and how its completion restricts the start of the following activities.

3.12.4.1.3 An assembled logic diagram of the complete project shall be submitted with the initial NAS, showing each activity's identifying numbers, duration and description, with the critical path easily identified. Updated assembled diagrams will be provided as required by logic changes (but not more frequently than the monthly update). The logic diagram shall be plotted on architectural size E paper.

3.12.4.1.4 In addition to the detailed schedule, a summary schedule shall be developed by the Contractor. The summary schedule shall consist of minimum thirty (30) activities and maximum of 100 activities, and be updated monthly.

3.12.4.2 Reports.

3.12.4.2.1 After the network approval, the Contractor shall review and evaluate the actual progress with the Contracting Officer's representative on a weekly basis, and submit any updated weekly reports three (3) workdays after the meeting.

3.12.4.2.2 Three (3) weekly reports, selected from specific items of the menu will be required, for specified time window of the project (such as the next two weeks). These reports must be flexible in format, allowing generation of reports relating specifically to critical work areas, or areas of particular interest. The Government will identify the subject of the requested reports for the following week at a weekly review meeting. All activities involving the Government that affect progress will be coded to allow a separate report.

3.12.4.2.3 Monthly update reports will be submitted at midmonth showing status and actual start and finish dates of project activities, and will be capable of comparing the current status with the approved base schedule. Each monthly update report shall be uniquely identified and shall be stored on the Contractor's computer until the final pay estimate is processed. The content of the monthly update shall be flexible to show items listed in the menu. The midmonth report shall be used for partial payments.

3.12.4.2.4 A meeting shall be held three (3) workdays before the delivery of the midmonth report to discuss all input data. If the Contractor desires to make changes in his method of operation and scheduling, he shall clearly present the proposed changes.

3.12.4.2.5 A narrative report shall be submitted with midmonth report indicating current and anticipated problems, delaying factors, and conditions that are impacting

the Contractor's work effort. An analysis showing the reasons for the delay/gain and their impact upon the current schedule shall be included. When it is apparent the scheduled milestone(s) and completion date(s) will not be met, the Contractor shall propose specific methods he intends to implement to bring the project back on schedule at no cost to the Government. Such measure may include but are not limited to:

a. Increasing construction manpower in such quantities and crafts as will substantially eliminate the backlog of work effort.

b. Increasing the number of working hours per shift; shifts per workday; workdays per week; the amount of construction equipment; or any combination thereof.

c. Rescheduling of activities to achieve maximum practical concurrence of work shifts.

3.12.4.2.6 The Contractor shall implement such procedures as may be necessary for the active participation by his subcontractors in preparing and updating the schedule. Subcontractors shall be provided with schedules which identify the interfaces of their work with the work of others. At minimum, the Contractor shall provide bar graphs to each major subcontractor showing activity times with plots on an Early Start basis. Copies of these schedules shall also be provided to the Contracting Officer. The relationship between subcontractor and interdependency or work shall be managed by the Contractor. When these interdependencies are violated or impaired, the Contractor shall identify the problem, resolve it, and provide the information to the Contracting Officer as part of the monthly report.

#### 3.12.5 Payment Requests.

3.12.5.1 The monthly update report shall be used as a basis for the monthly partial pay estimate. The report will state the cost, actual percent complete, and current value of partially completed or completed work. Subtotals from subnets representing separate areas of construction will be given, along with a grand dollar value of work completed for the project.

3.12.5.2 The first payment shall not be made until the Network Analysis Schedule has been approved by the Contracting Officer. If, in the judgment of the Contracting Officer, The Contractor fails or refuses to provide an approved schedule and other progress or input data specified, the Contractor shall be deemed not to have provided the required information upon which progress payments may be made, and no payment request will be honored.

3.12.5.3 Activities submitted for payment shall be based on the approved network activities and monetary amount. No payment shall be made for activities conducted in deviation of the approved logic.

3.12.5.4 Payment for activities conducted when previously dependent activities have not been completed or accepted due to quality defects shall be restricted at the discretion of the Contracting Officer, and may be the basis for a resubmittal of the logic diagram.

#### 3.13 IMPLEMENTATION OF GOVERNMENT RESIDENT MANAGEMENT SYSTEM FOR CONTRACTOR QUALITY CONTROL OF CONTRACT

The contractor shall utilize a Government furnished CQC Programming Module (A computerized executable file which is DOS based and operates on a minimum of 80386 IBM compatible computers). The contractor must use the CQC module and provide updates from this module on electronic format. The Module includes a Daily CQC Reporting System form which must also be used. This form may be in addition to other Contractor desired reporting forms. However, all other such reporting forms shall be consolidated into this one Government specified Daily CQC Report Form. The

Contractor will also be required to complete Government-Furnished Module elements which includes, but is not limited to Prime Contractor staffing; letter codes; planned cumulative progress earnings; subcontractor information showing trade, name, address, point-of-contact, and insurance expiration dates; definable features of work; pay activity and activity information; required Quality Control tests tied to individual activities; planned User Schooling tied to specific specification paragraphs and contractor activities; Installed Property Listing, Transfer Property Listing and submittal information relating to specification section, description, activity number, review period and expected procurement period. The sum of all activity values shall equal the contract amount, and all Bid Items, Options and Additives shall be separately identified, in accordance with the "Bidding Schedule". Bid Items may include multiple Activities, but Activities may only be assigned to one such Bid Item. This Module shall be completed to the satisfaction of the Contracting Officer prior to any contract payment (except for Bonds, Insurance and/or Mobilization, as approved by the Contracting Officer) and shall be updated as required.

(1) During the course of the contract, the Contractor will receive various Quality Assurance comments from the Government that will reflect corrections needed to Contractor activities or reflect outstanding or future items needing the attention of the Contractor. The Contractor will acknowledge receipt of these comments by specific number reference on his Daily CQC Report, and will also reflect on his Daily CQC Report when these items are specifically completed or corrected to permit Government verification.

(2) The Contractor's schedule system shall include, as specific and separate activities, all Preparatory Phase Meetings (inspections); all O&M Manuals; and all Test Plans of Electrical and Mechanical Equipment or Systems that require validation testing or instructions to Government representatives.

(3) The Contracting Officer can provide information regarding training on the use of the RMS system.

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## SECTION 03301

## CAST-IN-PLACE STRUCTURAL CONCRETE

## PART 1 GENERAL

## 1.1 RELATED WORK SPECIFIED ELSEWHERE

## 1.1.1 Expansion, Contraction and Construction Joints in Concrete

SECTION: EXPANSION, CONTRACTION AND CONSTRUCTION JOINTS IN CONCRETE.

## 1.1.2 Steel Bars for Concrete Reinforcement

SECTION: CONCRETE REINFORCEMENT.

## 1.1.3 Formwork for Concrete

SECTION: FORMWORK FOR CONCRETE.

## 1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN CONCRETE INSTITUTE (ACI)

ACI 211.1	(1991)	Standard Practice for	
		Selecting Proportions for Normal,	
		Heavyweight and Mass Concrete	
ACI 305R	(1991)	Hot Weather Concreting	

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 31	(1991)	Making and Curing Concrete	
		Test Specimens in the Field	
ASTM C 33	(1990)	Concrete Aggregates	
ASTM C 39	(1986)	Compressive Strength of	
		Cylindrical Concrete Specimens	
ASTM C 42	(1990)	Obtaining and Testing Drilled	
		Cores and Sawed Beams in Concrete	
ASTM C 70	(1979; R 1985)	Surface Moisture in	
		Fine Aggregate	
ASTM C 94	(1992)	Ready-Mixed Concrete	
ASTM C 136	(1992a)	Sieve Analysis of Fine and	
		Coarse Aggregates	
ASTM C 143	(1990a)	Slump of Hydraulic Cement Concrete	
ASTM C 150	(1992)	Portland Cement	

ASTM C 171	(1992) Sheet Materials for Curing Concrete
ASTM C 172	(1990) Sampling Freshly Mixed Concrete
ASTM C 192	(1990a) Making and Curing Concrete Test Specimens in the Laboratory
ASTM C 231	(1991b) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	(1986) Air-Entraining Admixtures for Concrete
ASTM C 309	(1991) Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 494	(1992) Chemical Admixtures for Concrete
ASTM C 566	(1989) Total Moisture Content of Aggregate by Drying
ASTM C 597	(1983; R 1991) Pulse Velocity Through Concrete
ASTM C 618	(1992a) Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
ASTM C 803	(1990) Penetration Resistance of Hardened Concrete
ASTM C 805	(1985) Rebound Number of Hardened Concrete
ASTM C 1077	(1991a) Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM D 75	(1987; R 1992) Sampling Aggregates
CORPS OF ENGINEERS (COE)	
COE CRD-C 100	(1975) Method of Sampling Concrete Aggregate and Aggregate Sources and Selection of Material for Testing
COE CRD-C 104	(1980) Method of Calculation of Fineness Modulus of Aggregate
COE CRD-C 112	(1969) Surface Moisture in Aggregate by Water Displacement
COE CRD-C 143	(1962) Meters for Automatic Indication of Moisture in Fine Aggregate
COE CRD-C 400	(1963) Requirements for Water for Use in Mixing or Curing Concrete

COE CRD-C 521 (1981) Standard Test Method for  
Frequency and Amplitude of  
Vibrators for Concrete

COE CRD-C 621 (1989) Packaged Dry, Hydraulic-Cement  
Grout (Nonshrink)

CONCRETE PLANT MANUFACTURER'S BUREAU (CPMB)

6th Edition (CRD-C 95) Concrete Plant Standards

NATIONAL BUREAU OF STANDARDS (NBS) HANDBOOK

44 Specifications, Tolerance and Other Technical Requirements for  
Commercial Weighing and Measuring Devices (4th Edition 1971 with  
Replacement Sheets)

### 1.3 QUALITY ASSURANCE

#### 1.3.1 Aggregate Sources

1.3.1.1 Concrete aggregates can be produced from the approved sources listed below:

- a. Lytle Creek, between I-10 and I-15.
- b. Gypsum Canyon, between Prado Dam and Villa Park.
- c. San Gabriel River, between Santa Fe Dam and Glendora Mountain.
- d. Temescal Valley, between Indian Canyon and El Cerrito.
- e. Pacoima Canyon, between Foothill and Glenoaks.

1.3.1.2 Concrete aggregates may be furnished from any of the above listed sources or at the option of the Contractor may be furnished from any other source designated by the Contractor and approved by the Contracting Officer, subject to the conditions hereinafter stated.

1.3.1.3 After the award of the contract, the Contractor shall designate in writing only one source or one combination of sources from which he proposes to furnish aggregates. If the Contractor proposes to furnish aggregates from a source or from sources not listed above, he may designate only a single source or single combination of sources for aggregates. Samples for acceptance testing shall be provided as specified herein. If a source for coarse or fine aggregate so designated by the Contractor is not approved for use by the Contracting Officer, the Contractor may not submit for approval other sources but shall furnish the coarse or fine aggregate, as the case may be, from an approved source listed above at no additional cost to the Government. Listing of a concrete aggregate source is not to be construed as approval of all materials from the source. The right is reserved to reject materials from certain localized areas, zones, strata, or channels, when such materials are unsuitable for concrete aggregate as determined by the Contracting Officer. Materials produced from an approved source shall meet all the requirements specified herein.

#### 1.3.2 Preconstruction Sampling and Testing

##### 1.3.2.1 Aggregates

The aggregate sources listed above have in the past been determined to be capable of producing materials of a quality acceptable for this project. The Contractor shall provide samples of aggregates from proposed sources listed and not listed in above.

Aggregate samples shall consist of not less than 1,000 pounds of each size coarse aggregate and 1,000 pounds of fine aggregate, taken under the supervision of the Contracting Officer in accordance with COE CRD-C-100. Samples shall be delivered to:

U.S. Army Engineer  
Waterways Experiment Station  
P.O. Box 631  
Vicksburg, MS 39181-0631

Samples shall be delivered to the above address within 15 days after Notice to Proceed. All sampling and shipment of samples shall be at the Contractor's expense. A maximum of 45 days after receipt of the samples will be required to complete evaluation of aggregates from sources listed herein. A maximum of 60 days after receipt of the samples will be required to complete evaluation of aggregates from sources not listed herein. Testing by and at the expense of the Government will be in accordance with the applicable CRD or ASTM test method. Tests to which aggregate may be subjected are specific gravity, absorption, cycles of freezing and thawing in concrete, alkali-aggregate reaction, organic impurities, and any other test necessary to demonstrate that the aggregate is of a quality that is at least equivalent to those sources listed herein. If the source selected by the Contractor fails to supply materials that are at least equivalent to the sources listed as determined by the Government, the Contractor will be required to propose a new source or elect a source listed above to supply aggregates. If the Contractor elects to obtain aggregates from more than one source, samples of aggregates from each source to be evaluated will be obtained as described above. Any testing of additional sources or retesting of sources which fail initially, will be at the expense of the Contractor. The Government reserves the right to reject materials found to be unsuitable when produced from any source, even a source that is listed herein.

#### 1.3.3 Cementitious Materials

At least 60 days in advance of concrete placement, the Contractor shall notify the Contracting Officer of the source of cementitious materials, along with sampling location, brand name, type, and quantity to be used in the manufacture of the concrete. If cement or pozzolan is to be obtained from more than one source, the initial notification shall state the estimated amount to be obtained from each source and the proposed schedule of shipments. No material shall be used until notice has been given by the Contracting Officer that test results are satisfactory, and all movement of materials after sampling shall be as directed.

#### 1.3.4 Air-Entraining Admixture

Air-entraining admixture or other chemical admixtures that have been in storage at the project site for longer than 6 months or that have been subjected to freezing shall be tested at the expense of the Contractor when directed by the Contracting Officer and shall be rejected if test results are not satisfactory.

#### 1.3.5 Prequalified Cement Sources

Cement shall be delivered and used directly from a mill of a producer designated as a qualified source. Samples of cement for check testing will be taken at the project site or concrete-producing plant by a representative of the Contracting Officer for testing at the expense of the Government. A list of prequalified cement sources is available from the Commander and Director, U.S. Army Engineer Waterways Experiment Station, P.O. Box 631, Vicksburg, MS 39181-0631.

#### 1.3.6 Prequalified Pozzolan Sources

Pozzolan shall be delivered and used directly from a producer designated as a qualified source. Samples of pozzolan for check testing will be taken at the project site by a representative of the Contracting Officer for testing at the expense of the

Government. A list of prequalified pozzolan sources is available from the Commander and Director, U.S. Army Engineer Waterways Experiment Station, P.O. Box 631, Vicksburg, MS 39181-0631.

#### 1.3.7 Cement

Cement if not from a prequalified source, will be sampled at the source and stored in sealed bins pending completion of testing. Sampling, testing, and the shipping inspection from the point of sampling, when the point is other than at the site of the work, will be made by or under the supervision of the Government and at its expense. No cement shall be used until notice has been given by the Contracting Officer that test results are satisfactory. In the event of failure, the cement may be resampled and tested at the request of the Contractor, at his expense. When the point of sampling is other than at the site of the work, the fill gates of the sampled bin and conveyances used in shipment will be sealed under Government supervision and kept sealed until shipment from the bin has been completed. If tested cement is rehandled at transfer points, the extra cost of inspection shall be at the Contractor's expense. The cost of testing cement excess to project requirements shall also be at the expense of the Contractor. The charges for testing cement at the expense of the Contractor will be deducted from the payments due the Contractor at a rate of \$1.20 dollars per ton of cement represented by the tests.

#### 1.3.8 Pozzolan

Pozzolan if not from a prequalified source, will be sampled at the source and stored in sealed bins pending completion of certain tests. Pozzolan will also be sampled at the site when determined necessary. All sampling and testing will be by and at the expense of the Government. Release for shipment and approval for use will be based on compliance with 7-day lime-pozzolan strength requirements and other physical and chemical and uniformity requirements for which tests can be completed by the time the 7-day lime-pozzolan strength test is completed. Release for shipment and approval for use on the above basis will be contingent on continuing compliance with the other requirements of the specifications. If a bin fails, the contents may be resampled and tested at the Contractor's expense. In this event the pozzolan may be sampled as it is loaded into cars, trucks, or barges provided they are kept at the source until released for shipment. Unsealing and resealing of bins and sealing of shipping conveyances will be done by or under the supervision of the Government. Shipping conveyances will not be accepted at the site of the work unless received with all seals intact. If pozzolan is damaged in shipment, handling, or storage, it shall be promptly removed from the site of the work. Pozzolan that has not been used within 6 months after testing shall be retested at the expense of the Contractor when directed by the Contracting Officer and shall be rejected if the test results are not satisfactory. If tested pozzolan is rehandled at transfer points, the extra cost of inspection shall be at the Contractor's expense. The cost of testing excess pozzolan shall be at the Contractor's expense at a rate of \$2.00 dollars per ton. The amount will be deducted from payment to the Contractor.

#### 1.3.9 Curing Compounds

Curing compounds will be accepted based on compliance with applicable specifications.

#### 1.3.10 Construction Testing by Government

The Government will sample and test aggregates and concrete to determine compliance with the specifications. The Contractor shall provide facilities and labor as may be necessary for procurement of representative test samples. Samples of aggregates will be obtained at the point of batching in accordance with ASTM D 75. Concrete will be sampled in accordance with ASTM C 172. Slump and air content will be determined in accordance with ASTM C 143 and ASTM C 231, respectively. Compression test specimens will be made and laboratory cured in accordance with ASTM C 31, and compression test specimens tested in accordance with ASTM C 39.

1.4 EVALUATION AND ACCEPTANCE

1.4.1 Concrete Strength

The strength of the concrete will be considered satisfactory so long as the average of all sets of three consecutive test results equals or exceeds the required specified strength f'c and no individual test (average of two cylinders) result falls below the specified strength f'c by more than 500 pounds per square inch. Additional analysis or testing may be required at the Contractor's expense when the strength of the concrete in the structure is considered potentially deficient.

1.4.1.1 Investigation of Low-Strength Test Results

When any strength test of standard-cured test cylinders falls below the specified strength requirement by more than 500 pounds per square inch or if tests of field-cured cylinders indicate deficiencies in protection and curing, steps shall be taken to assure that the load-carrying capacity of the structure is not jeopardized. Nondestructive testing in accordance with ASTM C 597, C 803, or C 805 may be permitted by the Contracting Officer to determine the relative strengths at various locations in the structure as an aid in evaluating concrete strength in place or for selecting areas to be cored. Such tests, unless properly calibrated and correlated with other test data, shall not be used as a basis for acceptance or rejection.

1.4.1.2 Testing of Cores

When the strength of concrete in place is considered potentially deficient, cores shall be obtained and tested in accordance with ASTM C 42. At least three representative cores shall be taken from each member or area of concrete in place that is considered potentially deficient. The location of cores will be determined by the Contracting Officer to least impair the strength of the structure. If the concrete in the structure will be dry under service conditions, the cores shall be air dried (temperature 60 to 80 degrees F, relative humidity less than 60 percent) for 7 days before testing and shall be tested dry. If the concrete in the structure will be more than superficially wet under service conditions, the cores shall be tested after moisture conditioning in accordance with ASTM C 42. Concrete in the area represented by the core testing will be considered adequate if the average strength of the cores is equal to at least 85 percent of the specified strength requirement and if no single core is less than 75 percent of the specified strength requirement.

1.4.2 Construction Tolerances

Variation in alignment, grade, and dimensions of the structures from the established alignment, grade, and dimensions shown on the drawings shall be within the tolerances specified in the following table:

TABLE I. TOLERANCES FOR BRIDGES, EROSION PROTECTION STRUCTURES, AND HYDRAULIC STRUCTURES

(1) Departure from established alignment .....	1 inch
(2) Departure from established grades .....	1 inch
(3) Variation from the plumb or the specified batter in the lines and surfaces of walls	Exposed, in 10 feet..... 1/2 inch Backfilled, in 10 feet... 1 inch
(4) Variation from the level or from the grades indicated on the drawings in slabs, horizontal grooves	Exposed, in 10 feet..... 1/2 inch Backfilled, in 10 feet... 1 inch

- (5) Variation in cross-sectional dimensions of slabs, walls, and similar parts
  - Minus..... 1/4 inch
  - Plus..... 1/2 inch
- (6) Footings:
  - a. Variation of dimensions in plan
    - Minus..... 1/2 inch
    - Plus..... 2 inches when formed or plus 3 inches when placed against unformed excavation.
  - b. Misplacement of eccentricity
    - 2 percent of the footing width in the direction of misplacement but not more than..... 2 inches
  - c. Reduction in thickness
    - Minus..... 5 percent of specified thickness
- (7) Variation in the sizes and locations of slab and wall openings ..... 1/2 inch
- (8) Sills and sidewalls for radial gates and similar watertight structures
  - Variation from the plumb or level ..... Not greater than 1/8 inch in 10 feet

1.4.3 Surface Requirements

The surface requirements for the classes of finish required by SECTION: FORMWORK FOR CONCRETE, shall be as hereinafter specified. Allowable irregularities are designated "abrupt" or "gradual" for purposes of providing for surface variations. Offsets resulting from displaced, misplaced, or mismatched forms, or sheathing, or by loose knots in sheathing, or other similar form defects, shall be considered "abrupt" irregularities. Irregularities resulting from warping, unplaneness, or similar uniform variations from planeness, or true curvature, shall be considered "gradual" irregularities. "Gradual" irregularities will be checked for compliance with the prescribed limits with a 5-foot template, consisting of a straightedge for plane surfaces and a shaped template for curved or warped surfaces. In measuring irregularities, the straightedge or template may be placed anywhere on the surface in any direction, with the testing edge held parallel to the intended surface.

<u>Class of Finish</u>	<u>Irregularities</u>	
	<u>Abrupt, inches</u>	<u>Gradual, inches</u>
C	*	1/4
D	1	1

\*Variation for Class C finish shall not exceed zero positive and 1/8 inch negative in the direction of flow of the water.

1.4.4 Appearance

Permanently exposed surfaces shall be cleaned, if stained or otherwise discolored, by a method that does not harm the concrete and that is approved by the Contracting Officer.

1.5 SUBMITTALS

1.5.1 Test Reports

1.5.1.1 Concrete Mixture Proportions

Concrete mixture proportions shall be determined by the Contractor, in accordance with the requirements in paragraph: Mixture Proportioning, and submitted for approval. The proportions of all ingredients and nominal maximum coarse aggregate size that will be used in the manufacture of each quality of concrete shall be stated. Proportions shall indicate the weight of cement, pozzolan and water; the weights of aggregates in a saturated surface-dry condition; and the quantities of admixtures. The submission shall be accompanied by test reports from a laboratory complying with ASTM C 1077 which show that proportions thus selected will produce concrete of the qualities indicated. No substitution shall be made in the source or type of materials used in the work without additional tests to show that the new materials and quality of concrete are satisfactory.

#### 1.5.1.2 Cement and Pozzolan

Cement and pozzolan will be accepted on the basis of the manufacturer's certification of compliance, accompanied by mill test reports that materials meet the requirements of the specification under which they are furnished. Certification and mill test reports shall identify the particular lot furnished. No cement or pozzolan shall be used until notice of acceptance has been given by the Contracting Officer. Cement and pozzolan will be subject to check testing from samples obtained at the mill, at transfer points, or at the project site, as scheduled by the Contracting Officer, and such sampling will be by or under the supervision of the Government at its expense. Material not meeting specifications shall be promptly removed from the site of work.

#### 1.5.1.3 Grout

##### 1.5.1.3.1 General

Descriptive literature of the grout proposed for use shall be furnished together with a certificate from the manufacturer stating that it is suitable for the application or exposure for which it is being considered. In addition, a detailed plan shall be submitted for approval, showing equipment and procedures proposed for use in mixing and placing the grout.

##### 1.5.1.3.2 Prepackaged Material

Prepackaged material requiring only the addition of water will be accepted on the basis of certified laboratory test results showing that the material meets the requirements of COE CRD-C 621. When fine aggregate is to be added, the Contractor shall also furnish for approval the design mix proportions together with certified copies of laboratory test results indicating that the mix is in conformance with the requirements of COE CRD-C 621.

##### 1.5.1.3.3 Mixture Proportions

Mixture proportions using a volume-change controlling ingredient shall be submitted for approval. The submittal shall include the design mix proportions of all ingredients and certified copies of laboratory test results indicating that the materials and the mix is in conformance with the requirements of COE CRD-C 621.

#### 1.5.2 Manufacturer's Certificate

##### 1.5.2.1 Impervious-Sheet Curing Materials

Impervious-sheet curing materials shall be certified for compliance with all specification requirements.

##### 1.5.2.2 Air-Entraining Admixture

Air-entraining admixture shall be certified for compliance with all specification requirements.

#### 1.5.2.3 Curing Compound

Curing compound shall be certified for compliance with all specification requirements.

#### 1.5.3 Review of Plant, Equipment, and Methods

##### 1.5.3.1 Batch Plant

Details of the data on concrete plant shall be submitted for review by the Contracting Officer for conformance with paragraph: Batching Plant.

##### 1.5.3.2 Mixers

The make, type, and capacity of concrete mixers proposed for mixing concrete shall be submitted for review by the Contracting Officer for conformance with paragraph: Mixers. The results of the initial mixer uniformity tests as required in paragraph: Mixer Uniformity shall be submitted at least 5 days prior to the initiation of placing.

##### 1.5.3.3 Conveying Equipment

The methods and equipment for transporting, handling, and depositing the concrete shall be submitted for review by the Contracting Officer for conformance with paragraph: Conveying Equipment.

##### 1.5.3.4 Placing

All placing equipment and methods shall be submitted for review by the Contracting Officer for conformance with paragraph: Placing.

##### 1.5.3.5 Joint Cleanup

The method and equipment proposed for joint cleanup and waste disposal shall be submitted for review by the Contracting Officer for conformance with paragraph: Construction Joint Treatment.

##### 1.5.3.6 Curing

The curing medium and methods to be used shall be submitted for review by the Contracting Officer for conformance with paragraph: Curing and Protection.

##### 1.5.3.7 Hot-Weather Requirements

If concrete is to be placed under hot-weather conditions, the proposed materials and methods meeting the requirements of paragraphs: Hot Weather Placing and Unformed Surfaces, will be approved by the Contracting Officer.

## PART 2 PRODUCTS

### 2.1 MATERIALS

#### 2.1.1 Cementitious Materials

Cementitious materials shall be Portland cement or Portland cement in combination with pozzolan and shall conform to appropriate specifications listed below.

#### 2.1.1.1 Portland Cement

ASTM C 150, Type II including false set requirements and low alkali.

#### 2.1.1.2 High-Early-Strength Portland Cement

ASTM C 150, Type III with tricalcium aluminate limited to 8 percent, low alkali, used only when specifically approved in writing.

#### 2.1.1.3 Pozzolan

Pozzolan shall conform to ASTM C 618, Class F, with loss on ignition limited to 6 percent.

#### 2.1.2 Aggregates

Aggregates shall be produced from the sources listed and under the conditions described in paragraph: Quality Assurance, subparagraph Aggregates. Fine and coarse aggregates shall conform to the grading requirements of ASTM C 33. The nominal maximum size shall be as listed in paragraph: Nominal Maximum-Size Coarse Aggregate. The proposed gradations to be used shall be submitted to the Contracting Officer for approval.

#### 2.1.3 Admixtures

Admixtures to be used, when required or permitted, shall conform to the appropriate specification listed below:

##### 2.1.3.1 Air-Entraining Admixture

ASTM C 260.

##### 2.1.3.2 Water-Reducing or Retarding Admixtures

ASTM C 494, Type A, B, or D.

#### 2.1.4 Curing Materials

##### 2.1.4.1 Impervious-Sheet Materials

ASTM C 171, type optional, except polyethylene film, if used, shall be white opaque.

##### 2.1.4.2 Membrane-Forming Curing Compound

ASTM C 309, Type 1-D or 2, Class B. Nonpigmented compound shall contain a fugitive dye. The loss of water for both pigmented and nonpigmented curing compounds when tested as specified, shall be not more than 0.03 pound per square foot in 24 hours nor more than 0.09 pound per square foot in 72 hours.

#### 2.1.5 Water

Water for mixing and curing shall be fresh, clean, drinkable, and free of injurious amounts of oil, acid, salt, or alkali, except that undrinkable water may be used if it meets the requirements of COE CRD-C 400.

#### 2.1.6 Magnesium Phosphate Concrete

**The bonding materials shall be magnesium phosphate concrete, either single component (water activated) or dual component (with a prepackaged liquid activator), as**

approved by the Contracting Officer. Magnesium phosphate concrete shall conform to the following requirements:

Property	Test Method	Requirement
Compressive Strength: at 3 hours, psi at 24 hours, psi	California Test 551 California Test 551	3,000 min. 5,000 min.
Flexure Strength: at 24 hours, psi	California Test 551	500 min.
Bond Strength at 24 hours SSD Concrete, psi Dry Concrete, psi	California Test 551 California Test 551	300 min. 400 min.
Water Absorption, %	California Test 551	10 max.
Abrasion Resistance at 24 hours, grams	California Test 551	25 max.
Drying Shrinkage at 4 days, %	ASTM Designation: C596	0.13 max.
Soluble Chlorides by weight, %	California Test 422	0.05 max.
Water Soluble Sulfates by weight, %	California Test 417	0.25 max.

Magnesium phosphate concrete shall be formulated for minimum initial set time of 15 minutes and minimum final set time of 25 minutes at 70°F. The materials, prior to use, shall be stored in a cool, dry environment.

Mix water used with water activated material shall conform to the requirements of COE CRD-C400.

The quantity of water for single component type of liquid activator (for dual component type) to be blended with the dry component, shall be within the limits recommended by the manufacturer and shall be the least amount required to produce a pourable batter.

Before using concrete material that has not been previously approved, a minimum of 45 pounds shall be submitted to the Contracting Officer for testing. The Contractor shall allow 45 days for the testing. Each shipment of concrete material that has been previously approved shall be accompanied by a Certificate of Compliance.

## 2.2 MIXTURE PROPORTIONING

### 2.2.1 Quality and Location

For each portion of the structure, mixture proportions shall be selected so that the following strength and water-cement ratio requirements are met.

#### 2.2.1.1 Strength

Specified compressive strength  $f'_c$  shall be as follows:

<u>Compressive Strength</u>	<u>Structure or Portion of Structure</u>
3,000 - 28 days	Cast-In-Place Structures not otherwise specified.

4,000 - 28 days

Cast-In-Place Box Culverts and side drain outlet structures.

#### 2.2.1.2 Maximum Water-Cement Ratio

Maximum water-cement ratio shall be 0.50 for all concrete structures.

#### 2.2.2 Nominal Maximum-Size Coarse Aggregate

Nominal maximum-size coarse aggregate for parapet and retaining walls and footings shall be 1 inch, except 3/4-inch nominal maximum-size coarse aggregate shall be used when any of the following conditions exist: the narrowest dimension between sides of forms is less than 7-1/2 inches, the depth of the slab is less than 4-1/2 inches, or the minimum clear spacing between reinforcing is less than 2 inches.

#### 2.2.3 Air Content

Air content as determined by ASTM C 231 shall be between 4 and 6 percent.

#### 2.2.4 Slump

The slump shall be determined in accordance with ASTM C 143 and shall be within the range of 1 to 3 inches for footings, and 1 to 5 inches for parapet and retaining walls.

#### 2.2.5 Concrete Proportioning

Trial design batches and testing requirements for various qualities of concrete specified shall be the responsibility of the Contractor. Samples of approved aggregates shall be obtained in accordance with the requirements of ASTM D 75. Samples of materials other than aggregate shall be representative of those proposed for the project and shall be accompanied by the manufacturer's test reports indicating compliance with applicable specified requirements. Trial mixtures having proportions, consistencies, and air content suitable for the work shall be made based on methodology described in ACI 211.1, using at least three different water-cement ratios, which will produce a range of strength encompassing those required for the work. The water-cement ratios required in paragraph: Maximum Water-Cement Ratio, will be converted to a weight ratio of water to cement plus pozzolan by weight equivalency as described in ACI 211.1. Trial mixtures shall be designed for maximum permitted slump and air content. The temperature of concrete in each trial batch shall be reported. For each maximum aggregate size selected at each water-cement ratio, at least three test cylinders for each test age shall be made and cured in accordance with ASTM C 192. They shall be tested at 7 and 28 days in accordance with ASTM C 39. From these test results, a curve will be plotted showing the relationship between water-cement ratio and strength.

#### 2.2.6 Average Strength

In meeting the water-cement ratio and strength requirements specified in paragraph: Strength above, the selected mixture proportion shall produce an average strength ( $f_{cr}$ ) exceeding the specified strength  $f'_c$  by the amount indicated below with a water-cement ratio at or below that specified above. Where a concrete production facility has test records, a standard deviation shall be established. Test records from which a standard deviation is calculated shall represent materials, quality control procedures, and conditions similar to those expected, shall represent concrete produced to meet a specified strength or strengths ( $f'_c$ ) within 1,000 pounds per square inch of that specified for proposed work, and shall consist of at least 30 consecutive tests. A strength test shall be the average of the strengths of two cylinders made from the same sample of concrete and tested at 28 days or at another test age designated for determination of  $f'_c$ .

### 2.2.6.1 Required Average Compressive Strength

Required average compressive strength  $f_{cr}$  used as the basis for selection of concrete proportions shall be the larger of the equations that follow using the standard deviation as determined above:

$$f_{cr} = f'_c + 1.34S \text{ where } S = \text{standard deviation}$$

$$f_{cr} = f'_c + 2.33S - 500$$

### 2.2.6.2 Modification Factor for Standard Deviation

Where a concrete production facility does not have test records meeting the requirements above but does have a record based on 15 to 29 consecutive tests, a standard deviation may be established as the product of the calculated standard deviation and a modification factor from the following table:

<u>No. of Tests*</u>	<u>Modification Factor for Standard Deviation</u>
less than 15	Use paragraph 2.2.6.3 hereinafter
15	1.16
20	1.08
25	1.03
30 or more	1.00

\* Interpolate for intermediate numbers of tests.

### 2.2.6.3 Determining Required Average Strength

When a concrete production facility does not have field strength test records for calculation of the standard deviation, the required average strength  $f_{cr}$  shall be determined as follows:

If the specified compressive strength  $f'_c$  is 3,000 to 5,000 psi,  $f_{cr} = f'_c + 1,200$ .

## 2.3 PRODUCTION EQUIPMENT

### 2.3.1 Batching Plant

Batching plant shall conform to the requirements of the CRD-C-95. Concrete Plant Standards of CPMB and as specified; however, rating plates attached to batch plant equipment are not required.

#### 2.3.1.1 Equipment

The batching controls shall be semiautomatic or automatic. The semiautomatic batching system shall be provided with interlocks such that the discharge device cannot be actuated until the indicated material is within the applicable tolerance. The batching system shall be equipped with an accurate recorder or recorders that meet the requirement of the Concrete Plant Standards of CPMB. Separate bins or compartments shall be provided for each size group of aggregate cement and pozzolan. Aggregates shall be weighed either in separate weigh batchers with individual scales or cumulatively in one weigh batcher on one scale. Aggregate shall not be weighed in the same batcher with cement and pozzolan. If both cement and pozzolan are used, they may be batched cumulatively provided that the Portland cement is batched first. If measured by weight, water shall not be weighed cumulatively with another ingredient. Water batcher filling and discharging valves shall be so inter-locked that the discharge valve cannot be opened before the filling valve is fully closed.

An accurate mechanical device for measuring and dispensing each admixture shall be provided. Each dispenser shall be interlocked with the batching and discharging operation of the water so that each admixture is separately batched and discharged automatically in a manner to obtain uniform distribution throughout the batch in the specified mixing period. Admixtures shall not be combined prior to introduction of water or sand. The plant shall be arranged so as to facilitate the inspection of all operations at all times. Suitable facilities shall be provided for obtaining representative samples of aggregates from each bin or compartment.

2.3.1.2 Scales

The weighing equipment shall conform to the applicable requirements of NBS Handbook 44, except that the accuracy shall be plus or minus 0.2 percent of scale capacity. The Contractor shall provide standard test weights and any other auxiliary equipment required for checking the operating performance of each scale or other measuring devices. The tests shall be made at the frequency required in paragraph: Scales, and in the presence of a Government inspector.

2.3.1.3 Batching Tolerances

2.3.1.3.1 Weighing Tolerances

Whichever of the following tolerances is greater shall apply, based on required scale reading.

<u>Material</u>	<u>Percent of Required Weight</u>	<u>Percent of Scale Capacity</u>
Cementitious materials	+1	+0.3
Aggregate	+2	+0.3
Water	+1	+0.3
Admixture	+3	+0.3

2.3.1.3.2 Volumetric Tolerances

For volumetric batching equipment, the following tolerances shall apply to the required volume of material being batched:

- Water: Plus or minus 1 percent
- Admixtures: Plus or minus 3 percent

2.3.1.4 Moisture Control

The plant shall be capable of ready adjustment to compensate for the varying moisture content of the aggregates and to change the weights of the materials being batched. An electric moisture meter complying with the provisions of COE CRD-C 143 shall be provided for measuring moisture in the fine aggregate. The sensing element shall be arranged so that the measurement is made near the batcher charging gate of the sand bin or in the sand batcher.

2.3.2 Mixers

2.3.2.1 General

The mixers shall not be charged in excess of the capacity recommended by the manufacturer. The mixers shall be operated at the drum or mixing blade speed

designated by the manufacturer. The mixers shall be maintained in satisfactory operating condition, and the mixer drums shall be kept free of hardened concrete. Should any mixer at any time produce unsatisfactory results, its use shall be promptly discontinued until it is repaired.

#### 2.3.2.2 Concrete Plant Mixers

Concrete plant mixers shall be tilting, nontilting, horizontal-shaft, vertical-shaft type, or pug mill type and shall be provided with an acceptable device to lock the discharge mechanism until the required mixing time has elapsed. The mixing time and uniformity shall conform to all the paragraphs in ASTM C 94 applicable to central-mixed concrete.

#### 2.3.2.3 Truck Mixers

Truck mixers, the mixing of concrete therein, and concrete uniformity shall conform to the requirements of ASTM C 94. A truck mixer may be used either for complete mixing (transit-mixed) or to finish the partial mixing done in a stationary mixer (shrink-mixed). Each truck shall be equipped with two counters from which it will be possible to determine the number of revolutions at mixing speed and the number of revolutions at agitating speed.

### 2.4 CONVEYING EQUIPMENT

#### 2.4.1 General

Concrete shall be conveyed from mixer to forms as rapidly as practicable and within the time interval in paragraph: Time Interval Between Mixing and Placing by methods that will prevent segregation or loss of ingredients. Any concrete transferred from one conveying device to another shall be passed through a hopper that is conical in shape and shall not be dropped vertically more than 5 feet, except where suitable equipment is provided to prevent segregation and where specifically authorized. Telephonic or other satisfactory means of rapid communication between the mixing plant and the forms in which concrete is being placed shall be provided and available for use by Government Inspectors.

#### 2.4.2 Buckets

The interior hopper slope shall be not less than 58 degrees from the horizontal, the minimum dimension of the clear gate opening shall be at least 5 times the nominal maximum-size aggregate, and the area of the gate opening shall not be less than 2 square feet. The maximum dimension of the gate opening shall not be greater than twice the minimum dimension. The bucket gates shall be essentially grout tight when closed and may be manually, pneumatically, or hydraulically operated except that buckets larger than 2 cubic yards shall not be manually operated. The design of the bucket shall provide means for positive regulation of the amount and rate of deposit of concrete in each dumping position.

#### 2.4.3 Transfer Hoppers

Concrete may be charged into nonagitating hoppers for transfer to other conveying devices. Transfer hoppers shall be capable of receiving concrete directly from delivery vehicles and have conical-shaped discharge features. The machine shall be equipped with a hydraulically operated gate and with a means of external vibration to effect complete and facile discharge. Concrete shall not be held in nonagitating transfer hoppers more than 30 minutes.

#### 2.4.4 Trucks

Truck mixers operating at agitating speed or truck agitators used for transporting plant-mixed concrete shall conform to the requirements of ASTM C 94. Non-agitating equipment may be used for transporting plant-mixed concrete over a smooth road when the hauling time is less than 15 minutes. Bodies of nonagitating equipment shall be smooth, watertight, metal containers specifically designed to transport concrete, shaped with rounded corners to minimize segregation, and equipped with gates that will permit positive control of the discharge of the concrete.

#### 2.4.5 Chutes

When concrete can be placed directly from a truck mixer, agitator, or nonagitating equipment, the chutes attached to this equipment may be used. A discharge deflector shall be used when required by the Contracting Officer. Separate chutes and other similar equipment will not be permitted for conveying concrete except when specifically approved.

#### 2.4.6 Belt Conveyors

Belt conveyors may be used when approved. Such conveyors shall be designed and operated to assure a uniform flow of concrete from mixer to final place of deposit without segregation of ingredients or loss of mortar and shall be provided with positive means for preventing segregation of the concrete at the transfer points and the point of placing. Belt conveyors shall be constructed such that the idler spacing shall not exceed 36 inches. If concrete is to be placed through installed horizontal or sloping reinforcing bars, the conveyor shall discharge concrete into a pipe or elephant trunk that is long enough to extend through the reinforcing bars. In no case shall concrete be discharged to free fall through the reinforcing bars.

#### 2.4.7 Pump Placement

Concrete may be conveyed by positive displacement pump when approved. The pumping equipment shall be piston or squeeze pressure type. The pipeline shall be rigid steel pipe or heavy-duty flexible hose. The inside diameter of the pipe shall be at least 3 times the nominal maximum-size coarse aggregate in the concrete mixture to be pumped but not less than 4 inches. The maximum-size coarse aggregate shall not be reduced to accommodate the pumps. The distance to be pumped shall not exceed limits recommended by the pump manufacturer. The concrete shall be supplied to the concrete pump continuously. When pumping is completed, concrete remaining in the pipeline shall be ejected without contamination of concrete in place. After each operation, equipment shall be thoroughly cleaned, and flushing water shall be wasted outside of the forms.

### PART 3 EXECUTION

#### 3.1 PREPARATION FOR PLACING

##### 3.1.1 Embedded Items

Before placement of concrete, care shall be taken to determine that all embedded items are firmly and securely fastened in place as indicated on the drawings, or required. Embedded items shall be free of oil and other foreign matter such as loose coatings or rust, paint, and scale. The embedding of wood in concrete will be permitted only when specifically authorized or directed. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable materials to prevent the entry of concrete into voids.

##### 3.1.2 Concrete on Earth Foundations

Earth surfaces upon which concrete is to be placed shall be clean, damp, and free from standing or running water. Prior to placement of concrete, the earth foundation shall have been satisfactorily compacted in accordance with the provisions

of SECTION: FILLS AND SUBGRADE PREPARATION. Concrete shall not be placed on a soft, spongy and yielding foundation. Additionally, the foundation shall be inspected by the Contractor prior to concrete placement in order to certify that it is ready to receive concrete. The results of each inspection shall be submitted in writing.

### 3.1.3 Construction Joint Treatment

#### 3.1.3.1 General

Concrete surfaces to which other concrete is to be bonded shall be prepared for receiving the next lift or adjacent concrete by cleaning with either air-water cutting, sandblasting, high-pressure water jet, or other approved method. The entire surface of the existing concrete shall be cleaned to a depth of not less than 1/4 inch and to such additional depth where necessary to expose a sound, unweathered concrete surface that is not contaminated by oils or other foreign matter.

#### 3.1.3.2 Cleaning

##### 3.1.3.2.1 Air-Water Cutting

Air-water cutting of a construction joint shall be performed at the proper time and only on horizontal construction joints. The surface shall be cut with an air-water jet to remove all laitance and to expose clean, sound, fine aggregate, but not so as to undercut the edges of the larger particles of aggregate. The air pressure used in the jet shall be 100 pounds per square inch plus or minus 10 pounds per square inch, and the water pressure shall be just sufficient to bring the water into effective influence of the air pressure. After cutting, the surface shall be washed and rinsed as long as there is any trace of cloudiness of the wash water. The surface shall again be washed just prior to placing the succeeding lift. Where necessary to remove accumulated laitance, coatings, stains, debris, and other foreign material, sandblasting will be required as the last operation before placing the next lift.

##### 3.1.3.2.2 High-Pressure Water Jet

A stream of water under a pressure of not less than 3,000 pounds per square inch may be used for cleaning. Its use shall be delayed until the concrete is sufficiently hard so that only the surface skin or mortar is removed and there is no undercutting of coarse-aggregate particles. Where the cleaning occurs more than 2 days prior to placing the next lift or where work in the area subsequent to the cleaning causes dirt or debris to be deposited on the surface, the surface shall be cleaned again as the last operation prior to placing the next lift. If the water jet is incapable of a satisfactory cleaning, the surface shall be cleaned by sandblasting.

##### 3.1.3.2.3 Sandblasting

When employed in the preparation of construction joints, sandblasting shall be performed as the final operation completed before placing the following lift. The operation shall be continued until all accumulated laitance, coatings, stains, debris, and other foreign materials are removed. The surface of the concrete shall then be washed thoroughly to remove all loose materials. The surface shall again be washed just prior to placing the succeeding lift.

##### 3.1.3.2.4 Waste Disposal

The method used in disposing of waste water employed in cutting, washing, and rinsing of concrete surfaces shall be such that the waste water does not stain, discolor, or affect exposed surfaces of the structures, or damage the environment of the project area. The method of disposal shall be subject to approval.

##### 3.1.3.2.5 Surface Condition

The surface of the lift shall be damp at the time of placement of the next lift and shall be free of standing water.

### 3.2 PLACING

#### 3.2.1 General

Concrete placement will not be permitted when, in the opinion of the Contracting Officer, weather conditions prevent proper placement and consolidation. Concrete shall be deposited as close as possible to its final position in the forms and, in so depositing, there shall be no vertical drop greater than 5 feet except where suitable equipment is provided to prevent segregation and where specifically authorized. Depositing of the concrete shall be so regulated that it may be effectively consolidated in horizontal layers 1-1/2 feet or less in thickness with a minimum of lateral movement. The amount deposited in each location shall be that which can be readily and thoroughly consolidated. The surfaces of construction joints shall be kept continuously wet for the first 12 hours during the 24-hour period prior to placing concrete. Free water shall be removed prior to placement of concrete. Sufficient placing capacity shall be provided so that concrete placement can be kept plastic and free of cold joints while concrete is being placed.

#### 3.2.2 Time Interval Between Mixing and Placing

Concrete shall be placed within 30 minutes after discharge into non-agitating equipment. When concrete is truck mixed or when a truck mixer or agitator is used for transporting concrete mixed by a concrete plant mixer, the concrete shall be delivered to the site of the work, and discharge shall be completed within 1-1/2 hours after introduction of the cement to the aggregates. When the length of haul makes it impossible to deliver truck-mixed concrete within these time limits, batching of cement and a portion of the mixing water shall be delayed until the truck mixer is at or near the construction site.

#### 3.2.3 Cold-Weather Placing

Concrete shall not be placed without a procedure approved in accordance with paragraph: Cold-Weather Requirements when the concrete is likely to be subjected to freezing temperatures before the expiration of the curing period. The ambient temperature of the space adjacent to the concrete placement and surfaces to receive concrete shall be above 32 degrees F. The placing temperature of the concrete having a minimum dimension less than 12 inches shall be between 55 and 75 degrees F. The placing temperature of the concrete having a minimum dimension greater than 12 inches shall be between 50 and 70 degrees F. Heating of the mixing water or aggregates will be required to regulate the concrete-placing temperatures. Materials entering the mixer shall be free from ice, snow, or frozen lumps. Salt, chemicals, or other materials shall not be mixed with the concrete to prevent freezing, except that an approved chemical accelerator may be used.

#### 3.2.4 Hot-Weather Placing

Concrete shall be properly placed and finished with approved submittal procedures in accordance with paragraph: Hot-Weather Requirements. The concrete-placing temperature shall not exceed 90 degrees F. Cooling of the mixing water and/or aggregates will be required to obtain an adequate placing temperature. An approved retarder may be used to facilitate placing and finishing. Steel forms and reinforcement shall be cooled prior to concrete placement when steel temperatures are greater than 120 degrees F. Conveying and placing equipment shall be cooled if necessary to maintain proper concrete-placing temperature.

#### 3.2.5 Consolidation

Immediately after placing, each layer of concrete shall be consolidated by internal vibrating equipment. Vibrators will not be used to transport concrete within the forms. Hand spading may be required if necessary with internal vibrating along formed surfaces permanently exposed to view. Form or surface vibrators shall not be used. Spare vibrators shall be kept on site during all concrete placement operations. Consolidation will proceed independently of all other placing operations. Vibrators for consolidation will not be attached to Bidwell Type or any other screeding or leveling equipment selected by the Contractor.

<u>Application</u>	<u>Head Diameter inches</u>	<u>Frequency VPM</u>	<u>Amplitude inches</u>
Thin walls, beams, etc.	1-1/4 - 2-1/2	9,000 - 13,500	0.02 - 0.04
General construction	2 - 3-1/2	8,000 - 12,000	0.025 - 0.05

The frequency and amplitude shall be within the range indicated in the table above as determined in accordance with paragraph: Vibrators. The vibrator shall be inserted vertically at uniform spacing over the entire area of placement. The distance between insertions shall be approximately 1-1/2 times the radius of action of the vibrator. The vibrator shall penetrate rapidly to the bottom of the layer and at least 6 inches into the preceding layer if such exists. It shall be held stationary until the concrete is consolidated and then withdrawn slowly.

### 3.3 FINISHING

#### 3.3.1 Unformed Surfaces

##### 3.3.1.1 General

The ambient temperature of spaces adjacent to surfaces being finished shall be not less than 50 degrees F. In hot weather when the rate of evaporation of surface moisture, as determined by use of Figure 2.1.5 of ACI 305R, may reasonably be expected to exceed 0.2 pound per square foot per hour, provisions for windbreaks, shading, fog spraying, or wet covering with a light-colored material shall be made in advance of placement, and such protective measures shall be taken as quickly as finishing operations will allow. All unformed surfaces that are not to be covered by additional concrete or backfill shall have a float finish, unless a trowel finish is specified, and shall be true to the elevation shown on the drawings. Surfaces to receive additional concrete or backfill shall be brought to the elevation shown on the drawings and left true and regular. Exterior surfaces shall be sloped for drainage unless otherwise shown on the drawing or as directed. Joints shall be carefully made with a jointing or edging tool. The finished surfaces shall be protected from stains or abrasions.

##### 3.3.1.2 Float Finish

Surfaces shall be screeded and darbied or bullfloated to bring the surface to the required finish level with no coarse aggregate visible. No water, cement, or mortar shall be added to the surface during the finishing operation. The concrete, while still green but sufficiently hardened to bear a man's weight without deep imprint, shall be floated to a true and even plane. Floating may be performed by use of suitable hand floats or power-driven equipment. Hand floats shall be made of magnesium or aluminum. Tolerance for a floated finish shall be true plane within 5/16 inch in 10 feet as determined by a 10-foot straightedge placed anywhere on the slab in any direction.

##### 3.3.1.3 Trowel Finish

A trowel finish shall be applied to the following surfaces: top of walls. Concrete surfaces shall be finished with a float finish, and after surface moisture has disappeared, the surface shall be troweled to a smooth, even, dense finish free from

blemishes including trowel marks. Tolerance shall be true planes within 5/16 inch in 10 feet as determined by a 10-foot straightedge placed anywhere on the slab in any direction.

### 3.3.2 Formed Surfaces

After form removal, all fins and loose materials shall be removed. All voids and honeycombs exceeding 1/2 inch in diameter and all tie-rod holes shall be reamed or chipped and filled with dry-pack mortar. Defective areas larger than 36 square inches in any surface, permanently exposed or not, shall be delineated in a rectangular shape by a saw cut a minimum depth of one inch. All defective concrete in the delineated area shall be removed and replaced with carefully placed and compacted concrete. The cement used in the mortar or concrete for all surfaces shall be a blend of Portland cement and white cement properly proportioned so that the final color when cured will be the same as adjacent concrete. Temperature of the concrete, ambient air, replacement concrete, or mortar during remedial work including curing shall be above 50 degrees F. The prepared area shall be dampened, brush-coated with a neat cement grout or with an approved epoxy resin, and filled with mortar or concrete. The mortar shall consist of 1 part cement to 2-1/2 parts fine aggregate. The quantity of mixing water shall be the minimum necessary to obtain a uniform mixture and to permit placing. Mortar shall be thoroughly compacted in place and struck off to adjacent concrete. Replacement concrete shall be drier than the usual mixture and thoroughly tamped into place and finished. Forms shall be used if required. Metal tools shall not be used to finish permanently exposed surfaces. The patched areas shall be cured for 7 days.

## 3.4 DEMONSTRATION SECTION

### 3.4.1 General

Prior to placing concrete for parapet and retaining walls, the Contractor shall construct a concrete wall with the approved concrete mix proportion, to demonstrate his proposed operations of production placement and curing method. The section shall demonstrate procedure and capability of grade preparation, reinforcement, form work, concrete placing, vibrating, finishing, and texture within the tolerances specified. The demonstration section shall be 25 feet in length and shall conform with all applicable specifications.

#### 3.4.1.1

Methods and equipment employed for placement shall demonstrate the adequacy for use in placement of concrete and shall conform with the requirements specified herein. The quantities of all materials placed within the section shall be accurately tabulated and provided immediately to the Contracting Officer for comparison with the theoretical quantities.

#### 3.4.1.2 Demonstration Section Evaluation

The Contractor shall not proceed with concrete placement prior to the approval of the demonstration section. Within a period of 7 days after completion of the section, the Contracting Officer shall determine the adequacy and acceptability of the section. The Contractor shall be notified as to the acceptability of the section and will be required to modify methods of construction, materials, mix design, and remove the section for noncompliance with specifications.

#### 3.4.1.3 Removal of Demonstration Section

The unacceptable demonstration section shall be the property of the Contractor and removed from site with the requirement of SECTION: ENVIRONMENTAL PROTECTION.

## 3.5 CURING AND PROTECTION

### 3.5.1 General

All concrete shall be cured by an approved method for a period of 7 days. Immediately after placement, concrete shall be protected from premature drying, extremes in temperatures, rapid temperature change, and mechanical injury. All materials and equipment needed for adequate curing and protection shall be available and at the placement site prior to the start of concrete placement. Concrete shall be protected from the damaging effects of rain for 12 hours and from flowing water for 14 days (7 days with Type III cement). Concrete shall be shielded from direct rays of the sun for 3 days. No fire or excessive heat shall be permitted near or in direct contact with concrete at any time.

### 3.5.2 Moist Curing

Concrete moist-cured shall be maintained continuously (not periodically) wet for the entire curing period. If water or curing materials stain or discolor concrete surfaces that are to be permanently exposed, they shall be cleaned as required in paragraph: Appearance. Where wooden form sheathing is left in place during curing, the sheathing shall be kept wet at all times. Horizontal surfaces may be moist cured by ponding, by covering with a minimum uniform thickness of 2 inches of continuously saturated sand, or by covering with saturated nonstaining burlap or cotton mats. Horizontal construction joints may be allowed to dry for 12 hours immediately prior to the placing of the following lift.

### 3.5.3 Membrane Curing

Concrete may be cured with an approved curing compound in lieu of moist curing except that membrane curing will not be permitted on any surface to which a sack-rubbed finish is to be applied, on any surface containing protruding steel reinforcement, or on abrasive aggregate finish.

#### 3.5.3.1 Pigmented Curing Compound

A pigmented-type curing compound conforming to ASTM C 309 may be used on surfaces that will not be exposed to view when the project is completed. Membrane curing shall not be used on surfaces that are to receive any subsequent treatment depending on adhesion or bonding to the concrete. A nonpigmented-type curing compound, containing a fugitive dye, conforming to ASTM C 309 with the reflective requirements waived may be used on surfaces that will be exposed to view when the project is completed.

#### 3.5.3.2 Application

The curing compound shall be applied to formed surfaces immediately after the forms are removed and prior to any patching or other surface treatment except the cleaning of loose sand, mortar, and debris from the surface. The surfaces shall be thoroughly moistened with water, and the curing compound applied as soon as free water disappears. The curing compound shall be applied to unformed surfaces as soon as free water has disappeared. The curing compound shall be applied in a two-coat continuous operation by approved motorized power-spraying equipment operating at a minimum pressure of 75 pounds per square inch, at a uniform coverage of not more than 400 square feet per gallon for each coat, and the second coat shall be applied perpendicular to the first coat. When adverse breeze conditions occur, Contractor shall take the necessary precautions to prevent the curing compound from becoming airborne. These precautions shall include, but not limited to, lowering the spray nozzle to approximately 2 feet away from the concrete surface and erecting wind breaks. The method used shall be submitted to the Contracting Officer for approval. Concrete surfaces that have been subjected to rainfall within 3 hours after curing compound has been applied shall be resprayed by the method and at the coverage herein

specified. All concrete surfaces on which the curing compound has been applied shall be adequately protected for the duration of the entire curing period from pedestrian and vehicular traffic and from any other cause that will disrupt the continuity of the curing membrane.

#### 3.5.4 Impervious-Sheet Curing

The concrete invert surfaces may be cured by an approved impervious sheet. All surfaces shall be thoroughly wetted and be completely covered with waterproof paper, polyethylene film, or polyethylene-coated burlap having the burlap thoroughly water-saturated before placing. Covering shall be laid with light-colored side up. Covering shall be lapped not less than 12 inches and securely weighted down or shall be lapped not less than 4 inches and taped to form a continuous cover with completely closed joints. The sheet shall be weighted to prevent displacement so that it remains in contact with the concrete during the specified length of curing. Coverings shall be folded down over exposed edges of slabs and secured by approved means. Sheets shall be immediately repaired or replaced if tears or holes appear during the curing period.

#### 3.5.5 Cold Weather

When the daily outdoor low temperature is less than 32 degrees F, the temperature of the concrete shall be maintained above 40 degrees F for the first 7 days after placing. In addition, during the period of protection removal, the air temperature adjacent to the concrete surfaces shall be controlled so that concrete near the surface will not be subjected to a temperature differential of more than 25 degrees F as determined by observation of ambient and concrete temperatures indicated by suitable thermometers installed adjacent to the concrete surface and 2 inches inside the surface of the concrete. The installation of the thermometers shall be made by the Contractor at such locations as may be directed. Curing compounds shall not be used on concrete surfaces that are maintained at curing temperature by use of free steam.

### 3.6 CONTRACTOR QUALITY CONTROL

#### 3.6.1 General

The Contractor shall perform the inspection and tests described in paragraph: Inspection Details and Frequency of Testing, and based upon the results of these inspections and tests, he shall take the action required in paragraph: Action Required and submit reports as required in paragraphs: Action Required and Reports. The laboratory performing the tests shall conform with ASTM C 1077. The individuals who sample and test concrete or the constituents of concrete as required in this specification shall have demonstrated a knowledge and ability to perform the necessary test procedures equivalent to the ACI minimum guidelines for certification of Concrete Field Testing Technicians, Grade I.

#### 3.6.2 Inspection Details and Frequency of Testing

##### 3.6.2.1 Fine Aggregate

##### 3.6.2.1.1 Grading

At least once during each shift in which concrete is being delivered, there shall be one sieve analysis and fineness modulus determination in accordance with ASTM C 136 and COE CRD-C 104, respectively, for the fine aggregate or for each fine aggregate, if it is batched in more than one size or classification. The location at which samples are taken may be selected by the Contractor as the most advantageous for control. However, the Contractor is responsible for delivering fine aggregate to the mixer within specification limits. Results of tests shall be reported in writing.

#### 3.6.2.1.2 Moisture Content

When in the opinion of the Contracting Officer the electric moisture meter is not operating satisfactorily, there shall be at least four tests for moisture content in accordance with either ASTM C 70, C 566, or COE CRD-C 112 during each 8-hour period of mixing plant operation. The times for the tests shall be selected randomly within the 8-hour period. An additional test shall be made whenever the slump is shown to be out of control or excessive variation in workability is reported by the placing foreman. When the electric moisture meter is operating satisfactorily, at least two direct measurements of moisture content shall be made per week to check the calibration of the meter.

#### 3.6.2.2 Coarse Aggregate

##### 3.6.2.2.1 Grading

At least once during each shift that concrete is being delivered, there shall be a sieve analysis in accordance with ASTM C 136 for each size group of coarse aggregate. The location at which samples are taken may be selected by the Contractor as the most advantageous for production control. However, the Contractor is responsible for delivering the aggregate to the mixer within specification limits. A test record of samples of aggregate taken shall show the results of the five most recent tests including the current test. The Contractor may adopt limits for control coarser than the specification limits for samples taken other than at the batch plant bins to allow for degradation during handling. Results of tests shall be reported in writing.

##### 3.6.2.2.2 Moisture Content

A test for moisture content of each size of coarse aggregate in accordance with ASTM C 566 or COE CRD-C 112 shall be made at least once a shift. When two consecutive readings for smallest size coarse aggregate differ by more than 0.5 percent, frequency of testing shall be increased to that specified for fine aggregate in paragraph: Moisture Content. These results shall be used to adjust the added water in the control of the batch plant.

#### 3.6.2.3 Deleterious Substances

When in the opinion of the Contracting Officer a problem exists in connection with deleterious substances in fine or coarse aggregates, tests shall be made in accordance with ASTM C 33 at a frequency not less than one per week. Results of tests shall be reported in writing.

#### 3.6.2.4 Scales

##### 3.6.2.4.1 Weighing Accuracy

The accuracy of the scales shall be checked by test weights at least once a month for conformance with the applicable requirement of paragraph: Scales. Such tests shall also be made whenever there are variations in properties of the fresh concrete that could result from batching errors. Results of tests shall be reported in writing.

##### 3.6.2.4.2 Batching and Recording Accuracy

Once a week the accuracy of each batching and recording device shall be checked during a weighing operation by noting and recording the required weight, recorded weight, and the actual weight batched. The Contractor shall provide the necessary calibration devices and confirm that the admixture dispensers described in paragraph: Equipment are operating properly. Results of tests shall be reported in writing.

#### 3.6.2.5 Batch-Plant Control

The measurement of all constituent materials including cement, pozzolan, each size of aggregate, water, and admixtures shall be continuously controlled. The aggregate weights and amount of added water shall be adjusted as necessary to compensate for free moisture in the aggregates. The amount of air-entraining admixture shall be adjusted to control air content within specified limits. A report shall be prepared indicating type and source of cement used, type and source of pozzolan used, amount and source of admixtures used, aggregate source, the required aggregate and water weights per cubic yard, amount of water as free moisture in each size of aggregate, and the batched aggregate and water weights per cubic yard for each class of concrete batched during plant operation. The report shall be submitted to the Contracting Officer.

#### 3.6.2.6 Concrete

##### 3.6.2.6.1 Air Content

At least two tests for air content shall be made on randomly selected batches of each class of concrete during each 8-hour period of concrete production. Additional tests shall be made when excessive variation in workability is reported by the placing foreman or the Contracting Officer. Tests shall be made in accordance with ASTM C 231. For concrete having a nominal maximum aggregate size of 3/4 to 1-1/2 inches, the average of each set of two tests shall be plotted on a control chart on which the average is set at 5 percent and the upper and lower control limits at 4 and 6 percent, respectively. The control charts shall be submitted to the Contracting Officer.

##### 3.6.2.6.2 Slump

At least two slump tests shall be made on randomly selected batches of each mixture of concrete during each day's concrete production in accordance with ASTM C 143. Additional tests shall be made when excessive variation in workability is reported by the placing foreman or the Contracting Officer. The average of each set of two tests shall be plotted on a control chart on which the upper and lower limits are set 1.5 inches above and below the mid-range value. The range shall be plotted on a control chart on which the upper control limit is 3.0 inches. The control chart shall be submitted to the Contracting Officer.

##### 3.6.2.6.3 Batch Tickets

The manufacturer of the concrete shall furnish to the Contracting Officer's Representative with each batch of concrete, before unloading at the site, a delivery ticket prepared in accordance with the requirements of ASTM C 94.

##### 3.6.2.7 Preparation for Placing

Foundation or construction joints, forms, and embedded items shall be inspected in sufficient time prior to each concrete placement by the Contractor in order to certify to the Contracting Officer that they are ready to receive concrete. The results of each inspection shall be reported in writing.

##### 3.6.2.8 Placing

The placing foreman shall supervise all placing operations, shall determine that the correct quality of concrete or grout is placed in each location as directed by the Contracting Officer, and shall be responsible for measuring and recording concrete temperatures, ambient temperature, weather conditions, time of placement, yardage placed, and method of placement. A report shall be submitted in writing to the Contracting Officer.

##### 3.6.2.9 Vibrators

The frequency and amplitude of each vibrator shall be determined in accordance with COE CRD-C 521 prior to initial use and at least once a month when concrete is being placed. Additional tests shall be made when a vibrator does not appear to be adequately consolidating the concrete. The frequency shall be determined while the vibrator is operating in concrete with the tachometer being held against the upper end of the vibrator while almost submerged and just before the vibrator is withdrawn from the concrete. The amplitude shall be determined with the head vibrating in air. Two measurements shall be taken, one near the tip and another near the upper end of the vibrator head, and these results averaged. The make, model, type, and size of the vibrator and frequency and amplitude results shall be reported in writing.

#### 3.6.2.10 Curing

##### 3.6.2.10.1 Moist Curing

At least once each day during the curing period, an inspection shall be made of all areas subject to moist curing. The surface moisture condition shall be reported in writing.

##### 3.6.2.10.2 Curing Compound

No curing compound shall be applied until it has been verified that the compound is properly mixed and ready for spraying. At the end of each operation, the quantity of compound used and the area of concrete surface covered shall be reported, and the rate of coverage in square feet per gallon shall be computed. The report shall state whether coverage is uniform.

##### 3.6.2.10.3 Impervious-Sheet Curing

At least once each day during the curing period, an inspection shall be made of all areas being cured using impervious sheets. The condition of the covering and the tightness of the laps and tapes shall be noted and recorded.

#### 3.6.2.11 Protection

At least once a day during the curing period, an inspection shall be made of all areas subject to cold-weather protection. Deficiencies shall be noted. During removal of protection, measurement of concrete and ambient temperature shall be made at least hourly. A report shall be submitted in writing to the Contracting Officer.

#### 3.6.2.12 Mixer Uniformity

##### 3.6.2.12.1 Concrete Plant Mixer

At the start of concrete placing, and at least once every 3 months when concrete is being placed, uniformity of concrete shall be determined. The tests shall be performed in accordance with ASTM C 94. Whenever adjustments in mixer or increased mixing times are necessary because of failure of any mixer to comply, the mixer shall be retested after adjustment. Results of tests shall be reported in writing.

##### 3.6.2.12.2 Truck Mixers

At the start of concrete placing and at least once every 6 months when concrete is being placed, uniformity of concrete shall be determined in accordance with ASTM C 94. The truck mixers shall be selected randomly for testing. When satisfactory performance is found in one truck mixer, the performance of mixers of substantially the same design and condition of blades may be regarded as satisfactory. Results of tests shall be reported in writing.

### 3.6.2.13 Action Required

#### 3.6.2.13.1 Fine Aggregate

##### 3.6.2.13.1.1 Grading

When the amount passing any sieve is outside the specification limits, the fine aggregate shall be immediately resampled and retested. If there is another failure on any sieve, the fact shall immediately be reported to the Contracting Officer, and immediate steps shall be taken to rectify the situation.

##### 3.6.2.13.1.2 Moisture

Whenever the moisture content of the fine aggregate changes by 0.5 percent or more, the scale settings for the fine-aggregate batcher and water batcher shall be adjusted directly or by means of a moisture compensation device.

#### 3.6.2.13.2 Coarse Aggregate Grading

When the amount passing any sieve is outside the specification limits, the coarse aggregate shall immediately be resampled and retested. If the second sample fails on any sieve, that fact shall be reported to the Contracting Officer. Where two consecutive averages of five tests are outside specification limits, that fact shall be reported to the Contracting Officer, and immediate steps shall be taken to correct the grading.

#### 3.6.2.13.2 Deleterious Substances

When the results for a deleterious substance are outside the specification limit, the aggregate shall be resampled and retested for the deleterious substance that failed. If the second sample fails, that fact shall be reported to the Contracting Officer. When material finer than No. 200 sieve for coarse aggregate exceeds the specification limit, immediate steps, such as washing or other corrective actions, shall be initiated.

#### 3.6.2.13.3 Scales

Whenever either the weighing accuracy or batching accuracy is found not to comply with specification requirements, the plant shall not be operated until necessary adjustments or repairs have been made. Discrepancies in recording accuracies shall be corrected immediately.

#### 3.6.2.13.4 Concrete

##### 3.6.2.13.4.1 Air Content

Whenever points on the control chart approach the upper or lower control limits, an adjustment should be made in the amount of air-entraining admixture batched. If a single test result is outside the specification limit, such adjustment is mandatory. As soon as practical after each adjustment, another test shall be made to verify the correctness of the adjustment. Whenever a point falls above the upper control limit for range, the dispenser shall be calibrated to ensure that it is operating correctly and with good reproducibility. Whenever two consecutive points for either average or range are outside the control limits, the Contracting Officer shall be notified. Whenever the air content departs from the specified range, the concrete shall not be delivered to the forms.

##### 3.6.2.13.4.2 Slump

Whenever points on the control chart approach the upper or lower control limits, an adjustment should be made in the batch weights of water and fine aggregate. The adjustments are to be made so that the total free water does not exceed that amount specified in the approved mixture proportions based on the free water available with the fine aggregate and that amount of water batched. If the adjustments to the batch weights or water and fine aggregate do not satisfactorily produce the required slump, the mixture shall be reportioned to meet the specified criteria and resubmitted to the Contracting Officer for approval. When a single slump is outside the control limits, such adjustment is mandatory. As soon as practical after each adjustment, another test shall be made to verify the correctness of the adjustment. Whenever the slump exceeds the upper limit stipulated in paragraph: Mixture Proportioning, subparagraph Slump, the concrete shall not be delivered to the forms. Whenever two consecutive slump tests, made during a period when there was no adjustment of batch weights, produce a point on the control chart for range above the upper control limit, the slump shall be considered to be out of control, and the additional testing for aggregate moisture content required in paragraph: Inspection Details and Frequency of Testing shall be undertaken.

#### 3.6.2.13.5 Placing

The placing foreman shall not permit placing to begin until he has verified that an adequate number of acceptable vibrators in working order and with competent operators are available. Placing shall not be continued if any pile of concrete is inadequately consolidated. If any batch of concrete fails to meet the temperature requirements, immediate steps shall be taken to improve temperature controls.

#### 3.6.2.13.6 Curing

##### 3.6.2.13.6.1 Moist Curing

When a daily inspection report lists an area of inadequate curing, the required curing period for that area shall be extended by 1 day.

##### 3.6.2.13.6.2 Curing Compound

When the coverage rate of curing compound is less than that specified or when the coverage is not uniform, the entire surface shall be sprayed again.

##### 3.6.2.13.6.3 Impervious-Sheet Curing

When a daily inspection report lists any tears, holes, or laps of joints that are not completely closed, the tears and holes shall promptly be repaired or the sheets replaced, the joints closed, and the required curing period for those areas shall be extended by 1 day.

##### 3.6.2.13.7 Protection

When any concrete temperature during the period of protection or protection removal fails to comply with the specifications, that fact shall be reported to the Contracting Officer, and immediate steps should be taken to correct the situation.

##### 3.6.2.13.8 Mixer Uniformity

When a mixer fails to meet mixer uniformity requirements, either the mixing time shall be increased or adjustments shall be made to the mixer until compliance is achieved.

#### 3.6.2.14 Reports

All results of tests shall be reported as required. Each report shall include the updating of control charts covering the entire period from the start of the

construction season through the current week. During periods of cold-weather protection, reports of pertinent temperatures shall be made daily. These requirements do not relieve the Contractor of the obligation to report certain failures immediately as required in preceding paragraphs. Such reports of failures and the action taken shall be confirmed in writing in the routine reports. All concrete reports, including compressive strength, concrete temperatures, ambient temperatures, slump, air content, mix design number, test number and location of concrete placement shall be submitted in a spreadsheet format and in a computer disk(s) to the Contracting Officer. The Contracting Officer has the right to examine all Contractor quality control records.

-- End of Section -

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## SECTION 03361

## SHOTCRETE

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## ACI INTERNATIONAL (ACI)

ACI 506.3R (1991) Certification of Shotcrete Nozzlemen

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 820 (1990) Steel Fibers for Fiber Reinforced Concrete

ASTM C 33 (1993) Concrete Aggregates

ASTM C 42 (1990) obtaining and Testing Drilled Cores and Sawed Beam of Concrete

ASTM C 136 (1993) Sieve Analysis of Fine and Coarse Aggregates

ASTM C 150 (1995) Portland Cement

ASTM C 171 (1992) Sheet Materials for Curing Concrete

ASTM C 266 (1989) Time of Setting of Hydraulic-Cement Paste by Gillmore Needles

ASTM C 309 (1993) Liquid Membrane-Forming Compounds for Curing Concrete

ASTM C 566 (1989) Total Moisture Content of Aggregate by Drying

ASTM C 595 (1994a) Blended Hydraulic Cements

ASTM C 618 (1994a) Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete

ASTM C 685 (1994) Concrete Made by Volumetric Batching and Continuous Mixing

ASTM C 881	(1990) Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C 1018	(1994b) Flexural Toughness and First-Crack Strength of Fiber-Reinforced Concrete (Using Beam with Third-Point Loading)
ASTM C 1077	(1995a) Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C 1140	(1989) Preparing and Testing Specimens from Shotcrete Test Panels
ASTM C 1141	(1994) Admixtures for Shotcrete
ASTM C 1240	(1993) Silica Fume for Use in Hydraulic-Cement Concrete and Mortar

#### CORPS OF ENGINEERS (COE)

COE CRD-C 400	(1963) Requirements for Water for Use in Mixing or Curing Concrete
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### 1.2 QUALITY ASSURANCE

The Contractor shall provide facilities and labor as may be necessary for obtaining and testing representative test samples. Shotcrete shall be sampled and tested by the method given in paragraph STRENGTH TESTING.

### 1.3 MIXTURE PROPORTIONS

Mixture proportions and test data from prior experience within five(5) years, if available, may be submitted for approval. If test data from experience are not available or accepted, specimens shall be made and tested from mixtures having three or more different proportions. The recommended mixture proportions, sources of materials, and all test results shall be submitted for acceptance. Mixture proportions for fiber-reinforced shotcrete shall be selected on the basis of flexural strength of 4 by 4 by 14 inch beams sawed from test panels which are fabricated in accordance with ASTM C 1140 and having minimum dimensions of 30 by 30 by 4 inches. Beams shall be continuously moist cured until testing at seven(7) days age. For mixture acceptance purposes, the average flexural strength of at least three beams shall be not less than the flexural strength specified in paragraph FLEXURAL STRENGTH.

### 1.4 EVALUATION AND ACCEPTANCE

#### 1.4.1 Strength

Final acceptance of the shotcrete will be based on flexural strength results

obtained from beams.

#### 1.4.1.1 Flexural Strength

Fiber-reinforced shotcrete beams shall be obtained and tested in accordance with ASTM C 1140 and shall have a flexural strength of not less than 2000 psi at seven(7) days age.

#### 1.5 SUBMITTALS

Government approval is required for all submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

##### SD-01 Data

Mixture Proportions; GA.

The recommended mixture proportions, sources of materials, and all test results shall be submitted for approval.

##### SD-09 Reports

Aggregates; FIO.

Supplier's test reports for aggregates showing the materials meet the requirements of this specification.

Accelerator Compatibility; GA.

The Contractor shall establish the compatibility of the job cement and the proposed accelerators.

Preconstruction Test Panels; FIO.

Sawed concrete beams shall be taken from test panels and tested.

##### SD-13 Certificates

Portland Cement; FIO.

Portland cement shall be certified for compliance with all specification requirements.

Pozzolan<sup>3</sup>; FIO.

Fly ash and other pozzolans shall be certified for compliance with all specification requirements.

Silica Fume; FIO.

Silica fume shall be certified for compliance with all specification requirements.

Accelerating Admixtures; FIO.

Accelerating admixtures shall be certified for compliance with all specification requirements.

Curing Materials; FIO.

Curing materials shall be certified for compliance with all specification requirements.

Steel Fiber Reinforcement; FIO.

Fiber reinforcement shall be certified for compliance with all specification requirements.

Qualifications; GA.

Qualifications of each nozzleman shall be certified.

#### 1.6 QUALIFICATIONS

The Contractor shall submit a resume for each nozzleman certifying that each has not had less than 1 year's experience for the particular type of shotcrete to be applied. The resume shall include company name, address, and telephone number, name of supervisor, and detailed description of work performed. All nozzlemen shall be certified in accordance with ACI 506.3R. Qualifications of additional nozzlemen throughout the job shall be similarly submitted for approval.

#### 1.7 PRECONSTRUCTION TEST PANELS

Specimens of the preconstruction test panels shall be made by each application crew using the equipment, materials, mixture proportions, and procedures for each mixture being considered, and for each shooting position to be encountered in the job. The test panels shall be fabricated to the same thickness as the structure, but not less than, 4 inches. Three 4 by 4 by 14 inch beams shall be obtained in accordance with ASTM C 1140 from the test panels when fiber-reinforced shotcrete is used. The flexural strength of the fiber-reinforced shotcrete beams shall meet the requirements specified in paragraph FLEXURAL STRENGTH.

### PART 2 PRODUCTS

#### 2.1 MATERIALS

##### 2.1.1 Cementitious Materials

Cementitious materials shall be portland cement, blended hydraulic cement, portland cement in combination with pozzolan or portland cement in combination with silica fume and shall conform to appropriate specifications listed below.

#### 2.1.1.1 Portland Cement

Portland cement shall meet the requirements of ASTM C 150 Type I.

#### 2.1.1.2 Blended Hydraulic Cement

ASTM C 595 Type IS, IP.

#### 2.1.1.3 Pozzolan Other Than Silica Fume

Pozzolans shall conform to ASTM C 618, Class C, with the optional requirements for multiple factor, drying shrinkage, and uniformity of Table 2A.

#### 2.1.1.4 Silica Fume

Silica may be furnished as a dry, densified material or as a slurry. Silica fume, unprocessed, or before processing into a slurry or a densified material, shall conform to ASTM C 1240.

#### 2.1.2 Aggregates

Aggregates shall conform to ASTM C 33 with the combined grading of coarse and fine aggregates conforming to the grading shown below.

SIEVE SIZE	PERCENT BY MASS PASSING INDIVIDUAL SIEVES		
	GRADING NO. 1	GRADING NO. 2	GRADING NO. 3*
3/4 in.	--	--	100
1/2 in.	--	100	80-95
3/8 in.	100	90-100	70-90
No. 4	95-100	75-85	50-70
No. 8	80-100	50-70	35-55
No. 16	50-85	35-55	20-40
No. 30	25-60	20-35	10-30
No. 50	10-30	8-20	5-17
No. 100	2-10	2-10	2-10

\* Fine and coarse aggregates shall be batched separately to avoid segregation.

#### 2.1.3 Water

Fresh, clean, potable mixing water or nonpotable water which meets the requirements of COE CRD-C 400 shall be used.

#### 2.1.4 Admixtures

Admixtures to be used, when required or approved, shall comply with the appropriate sections of ASTM C 1141. Except as otherwise accepted, soluble admixtures shall be dissolved in water before introduction into the shotcrete mixture.

#### 2.1.4.1 Accelerators

When accelerating admixtures complying with ASTM C 1141, Type II, Grade 1, are to be used, the Contractor shall establish the accelerator compatibility of the job cement and the proposed accelerators using ASTM C 266, except as modified herein. The powdered accelerator shall be blended with 50 grams of cement until uniform and 15 milliliters of water shall then be added. The liquid accelerator shall first be mixed with 15 milliliters of water and then added to 50 grams of cement. Three percent of the proposed accelerator by mass of cement shall be used as a starting point. Mixing shall be accomplished within 15 seconds. The specimen shall be molded within 1 minute of adding the mixing water. If initial set is 2 minutes or less and a final set is 10 minutes or less, the accelerator is considered compatible. If these values are not achieved in the first test, additional tests shall be run using 2 percent and 4 percent of accelerator.

#### 2.1.5 Curing Materials

Curing materials shall meet the following requirements.

##### 2.1.5.1 Impervious Sheet Materials

ASTM C 171, type optional except polyethylene film, if used, shall be white opaque.

##### 2.1.5.2 Membrane-Forming Curing Compound

ASTM C 309, Type 1-D or Type 2.

#### 2.1.6 Reinforcement

##### 2.1.6.1 Steel Fiber Reinforcement

Steel fiber reinforcement shall meet the requirements of ASTM A 820.

### PART 3 EXECUTION

#### 3.1 PRODUCTION OF SHOTCRETE

The shotcrete shall be produced by dry-mix process.

##### 3.1.1 Dry Mix Process

###### 3.1.1.1 Batching and Mixing

Aggregate and cementitious materials may be batched by mass or by volume. Equipment for batching by mass shall be capable of the accuracy specified in ASTM C 94. Volumetric equipment shall be capable of batching with the accuracy specified in ASTM C 685. The mixing equipment shall be capable of thoroughly mixing the materials in sufficient quantity to maintain placing continuity and be capable of discharging all mixed material without any carryover from one batch to the next.

#### 3.1.1.2 Delivery Equipment

The equipment shall be capable of discharging the aggregate-cement mixture into the delivery hose and delivering a continuous smooth stream of uniformly mixed material to the discharge nozzle. The discharge nozzle shall be equipped with a manually operated water injection system (water ring) for directing an even distribution of water through the aggregate-cement mixture. The water valve shall be capable of ready adjustment to vary the quantity of water and shall be convenient to the nozzleman. The water pressure at the discharge nozzle shall be sufficiently greater than the operating air pressure to ensure that the water is completely mixed with the other materials. If the line water pressure is inadequate, a water pump shall be introduced into the line. The water pressure shall be steady (nonpulsating). The delivery equipment shall be thoroughly cleaned at the end of each shift. Equipment parts, especially the nozzle liner and water ring, shall be regularly inspected and replaced as required.

#### 3.1.2 Air Supply

The Contractor shall provide a supply of clean, dry air adequate for maintaining sufficient nozzle velocity for all parts of the work and, if required, for simultaneous operation of a suitable blowpipe for clearing away rebound.

### 3.2 PREPARATION OF SURFACES

#### 3.2.1 Earth

Earth shall be compacted and trimmed to line and graded before placement of shotcrete. Surfaces to receive shotcrete shall be dampened.

#### 3.2.2 Existing Concrete

All unsound and loose materials shall be removed by sandblasting, grinding, or high-pressure water jets before applying shotcrete. Any area to be repaired shall be chipped off or scarified to remove offsets which would cause an abrupt change in thickness without suitable reinforcement. Edges shall be tapered to leave no square shoulders at the perimeter of a cavity. The surface shall be dampened but without visible free water.

### 3.2.3 Rock

Rock surfaces shall be cleaned to remove loose or dry material, mud, running water, and other foreign matter that will prevent bond of the shotcrete. The rock surface shall be dampened prior to placement of shotcrete.

### 3.2.4 Shotcrete

When a layer of shotcrete is to be covered by a succeeding layer at a later time, it shall first be allowed to develop its initial set. Then all laitance, loose material, and rebound shall be removed by brooming or scraping. Hardened laitance set shall be removed by sandblasting and the surface thoroughly cleaned.

### 3.2.5 Construction Joints

Unless otherwise specified, construction joints shall be tapered to a shallow edge form, about 1 inch thick. If nontapered joints are specified, special care shall be taken to avoid or remove trapped rebound at the joint. The entire joint shall be thoroughly cleaned and wetted prior to the application of additional shotcrete.

## 3.3 PLACEMENT OF SHOTCRETE

### 3.3.1 General

Shotcrete shall be placed using suitable delivery equipment and procedures. The area to which shotcrete is to be applied shall be clean and free of rebound or overspray.

### 3.3.2 Placement Techniques

#### 3.3.2.1 Placement Control

Thickness, method of support, air pressure, and water content of shotcrete shall be controlled to preclude sagging or sloughing off. Shotcreting shall be discontinued or suitable means shall be provided to screen the nozzle stream if wind or air currents cause separation of the nozzle stream during placement.

#### 3.3.2.2 Corners

Horizontal and vertical corners and any area where rebound cannot escape or be blown free shall be filled first.

### 3.3.3 Placement Precautions

The following precautions shall be taken during placement.

- a. Placement shall be stopped if drying or stiffening of the mixture takes place at any time prior to delivery to the nozzle.
- b. Rebound or previously expended material shall not be used in the shotcrete mixture.

### 3.4 REPAIR OF DEFECTS

#### 3.4.1 Defects

Defective areas larger than 48 square inches or 2 inches deep shall be removed and replaced with fresh shotcrete. These defects include honeycombing, lamination, dry patches, voids, or sand pockets. Defective areas shall be removed in accordance with the procedures described in paragraph EXISTING CONCRETE and replaced with fresh shotcrete.

##### 3.4.1.1 Repairs

All repairs shall be made within 1 week of the time the deficiency is discovered. All unacceptable materials shall be removed and repaired by the procedures described in the following two paragraphs. Voids and holes left by the removal of tie rods in all permanently exposed surfaces not to be backfilled and in surfaces to be exposed to water shall be reamed and completely filled with dry-patching mortar as specified below.

##### 3.4.1.2 Minor Patching

Minor patching may be accomplished with a dry-pack mixture, or with materials as approved by the Contracting Officer. Patches that exceed 0.1 cubic foot in volume shall receive a brush coat of approved epoxy resin meeting ASTM C 881, Type II, as a prime coat. Care shall be taken not to spill epoxy or overcoat the repair surface so that the epoxy runs or is squeezed out onto the surface which will remain exposed to view. Epoxy resin shall be used in strict conformance with manufacturer's recommendations with special attention paid to pot life, safety, and thin film tack time.

### 3.5 FINISHING

#### 3.5.1 Natural Gun Finish

Unless otherwise specified, undisturbed final layer of shotcrete as applied from nozzle without hand finishing shall be provided.

#### 3.5.2 Fiber-Reinforced Shotcrete

The Contractor shall finish the outer surface of the structure with a layer of nonfiber-reinforced shotcrete and provide an appropriate finish as denoted.

### 3.6 CURING AND PROTECTION

### 3.6.1 Initial Curing

Immediately after finishing, shotcrete shall be kept continuously moist for at least 3 days. One of the following materials or methods shall be used:

- a. Ponding or continuous sprinkling.
- b. Absorptive mat or fabric, sand, or other covering kept continuously wet.
- c. Curing Compounds. On natural gun finish, use the coverage application requirement of 100 square feet per gallon or twice the manufacturer's requirement, whichever is less. Curing compounds shall not be used on any surfaces against which additional shotcrete or other cementitious finishing materials are to be bonded unless positive measures, such as sandblasting, are taken to completely remove curing compounds prior to the application of such additional materials.

### 3.6.2 Final Curing

Additional curing shall be provided immediately following the initial curing and before the shotcrete has dried. One of the following materials or methods shall be used:

- a. Continue the method used in initial curing.
- b. Application of impervious sheet material conforming to ASTM C 171.

### 3.6.3 Formed Surface

If forms are to be removed during curing period, one of the curing materials or methods listed in paragraph INITIAL CURING shall be used immediately. Such curing shall be continued for the remainder of the curing period.

### 3.6.4 Duration of Curing

Curing shall be continued for the first 7 days after shotcreting or until the specified flexural strength of the in-place shotcrete as determined by specimens obtained and tested in accordance with ASTM C 42 is achieved.

### 3.6.5 Temperature Considerations

The air temperature in contact with the shotcrete shall be continuously maintained at a temperature above 40 degrees F for at least 3 days after placement. No shotcrete shall be applied when the concrete surface or air in contact with the concrete surface is below 40 degrees F.

## 3.7 TESTS

### 3.7.1 Strength Testing

Test specimens shall be initially cured onsite, then shall be transported in an approved manner to an approved testing laboratory meeting the requirements of ASTM C 1077 within 48 hours of scheduled testing time.

#### 3.7.1.1 Test Panel

One test panel shall be made for every 50 cubic yards of shotcrete placed but not less than one per each shift during which any shotcrete is placed. Panels shall have minimum dimensions of 18 by 18 by 4 inches and shall be gunned in the same positions as the work represented during the course of the work by the Contractor's regular nozzleman. Panels shall be field-cured in the same manner as in the job. Two 4 by 4 by 14 inch beams shall be saw cut from the test panels when fiber-reinforced shotcrete is used. The fiber-reinforced shotcrete beams shall be tested in accordance with ASTM C 1140. If the quality of shotcrete is questionable, the Government may saw or core the panel specimens to determine the shotcrete quality and if remedial action is necessary.

#### 3.7.1.2 Flexural Strength

The flexural strength of the shotcrete shall be determined from the average of two test specimens obtained from a test panel and tested on the seventh day after panel fabrication.

#### 3.7.2 Aggregate Moisture

Prior to batching the shotcrete and at least once during a shift in which shotcrete is being batched, the coarse and fine aggregate moisture content shall be determined in accordance with ASTM C 566. The batch weights of both the aggregates and mixing water shall be appropriately adjusted to account for the available free moisture in the aggregates. The amount of free moisture in the aggregates, expressed as pounds of water per cubic yard, shall be recorded on the batching ticket and delivered to the Contracting Officer prior to placement during the shift. The Contracting Officer will have the option to request additional aggregate moisture content tests for each of the required tests.

#### 3.7.3 Grading

The grading of the coarse and fine aggregate shall be determined in accordance with ASTM C 136. The fine and coarse aggregate grading shall be determined prior to batching the shotcrete and at least once during a shift in which shotcrete is being batched. The Contracting Officer will have the option to require one additional sieve analysis test for aggregate type.

#### 3.7.4 Thickness

The minimum shotcrete thickness shall be as shown in the drawings. The unhardened shotcrete shall be checked for thickness using a probe by the

nozzleman or laborer at the time of placement. These thickness checks shall be at 15-minute intervals and all low or thin areas shall be corrected by applying additional shotcrete.

#### 3.7.5 Mixture Proportions

Record and check mixture proportions at least once per shift for weigh batching. Record and check mixture proportions as recommended by ASTM C 685 at least once per shift for volumetric batching and continuous mixing plants.

#### 3.7.6 Preparations

Prior to each placement of shotcrete, the Contractor's inspector shall certify in writing or by an approved checkout form that cleanup and preparations are in accordance with the plans and specifications.

-- End of Section --