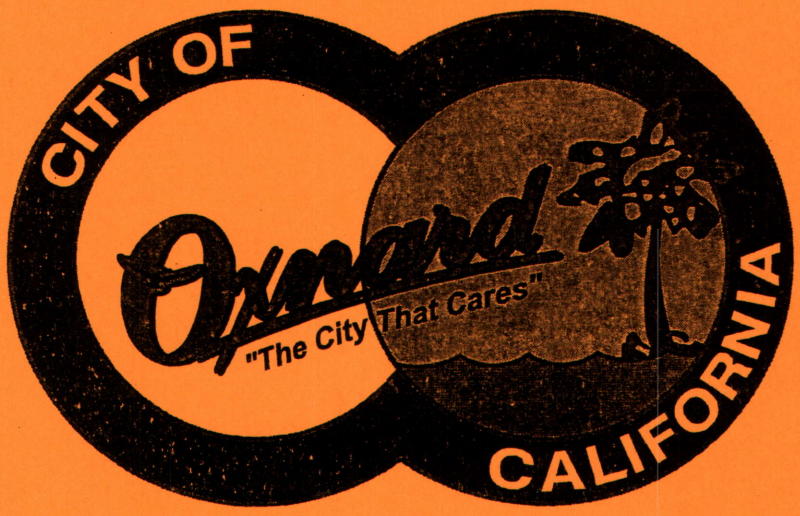

STANDARD PLATES AND DESIGN CRITERIA

FOR PUBLIC WORKS CONSTRUCTION

2002 EDITION

PREPARED, ADOPTED AND UPDATED BY
DEPARTMENT OF PUBLIC WORKS

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10 GENERAL ROAD DESIGN GOALS AND PROCEDURES

10 -1 All streets and roadways to be build within and made part of the City road system shall be designed to conform to these standards. Where standards are not definitive , design shall conform to good engineering practice approved by the Director of Public Works. The Caltrans Design Manuals generally provide guidance in " good engineering practice " of road design.

10 - 2 The Public Works Director may issue , modify , revise or cancel standards showing engineering and construction details for roadways and other construction.

10 - 3 Deviations from Right-of-Way and improvements of these standards shall be allowed only with the approval of the Public Works Director. Deviation from the technical requirements of the standards may be granted by the Public Works Director. Any request for deviation from the requirements of the standards must be accompanied by sufficient supporting data . The applicant requesting the deviations shall provide the supporting data well in advance and obtain the approval prior to utilizing the proposed deviation in his design.

10 - 4 Turning lanes at intersections and bicycle lanes may require Right - of - Way and improvement widths greater than those shown on the 100 - series standards.

10 - 5 Design loading for box culverts and bridges on all roadways shall be AASHTO H-20.

10 - 6 Vertical clearance on all roadways shall be 15' minimum .

10 - 7 Sight distance on all curvilinear roads shall be per Table-1.

11 GRADES

11 - 1 LONGITUDINAL GRADE :
All streets and roadways shall have minimum grade of 0.40% on straight reach. On curved alignment, minimum grade of 0.40% is required on outer radius of the curve. This will entail steeper grades along centerline.

11 - 1.1 Minimum grade of cross-gutter and spandrell flow line shall be 0.50% This grade will be required on centerline of the street parallel to the cross-gutter . Cross fall should not be adjusted to accomplish the required grades.

11 - 1.2 Minimum grade across " Knuckle " is 0.40% along outer curb. This will require steeper grades along centerline and inner curb

11 - 1.3 Minimum grade on flowline of a cul-de-sac shall be 0.40%. Adjust the centerline grade such that cross - fall ranges between 1.6% minimum and 3.6% maximum.

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11 - 2 **TRANSVERSE GRADE:**

More commonly known as cross fall shall be not less than 1.6%. Preferrable value of the cross fall is 2.0% . It shall not be more than 3.6% unless approval of higher value is granted by the Public Works Director.

11 - 3 **GRADE BREAKS:**

Grade breaks on all streets and roadways shall be limited to 0.5% maximum. Where grade differencial is greater than 0.5% vertical curve shall be required per table -2, section 12 - 2. A maximum of 1.0% grade break is allowed on curb-returns before a vertical curve is required. For the ease of plan-checking show your grade break points on profile. Also show tangent grades in parentheses when actual finish surface profile is a vertical curve. Grade breaks must not be closer together than the length of vertical curve for grade changes of 1.0%. See section 12-2, " vertical curves " in this text.

12 GEOMETRIC DESIGN STANDARDS

12 - 1 **HORIZONTAL CURVES:**

Minimum horizontal curve design criteria for street and roadways within the City jurisdiction shall be as summarized in Table-1.

TABLE - 1

MINIMUM HORIZONTAL CURVE DESIGN CRITERIA

DESIGN CRITERIA	RES. STREETS	COMM./ INDUSTR.	LOCAL/ SEC. ARTERIAL	PRIMARY ARTERIAL
Design Speed (m.p.h.)	30	35	45	55
Minimum Centerline Radius (feet)	200	300	850	1,150
Minimum horizontal Sight distance (feet)	200	250	370	510
Minimum reverse Curve tangent (feet)	100	200	300	500
Minimum approach tangent @ intersections (feet)	100	200	300	500

12 - 2 **VERTICAL CURVES:**

Minimum vertical curve design criteria for streets and roadways within the City jurisdiction shall be as summarized in Table-2.

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PLATE 2

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GENERAL REQUIREMENTS - STREETS

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TABLE - 2 VERTICAL CURVE DESIGN CRITERIA

Minimum lengths of vertical curves to maintain required sight distances and smooth riding characteristics.

A = Algebraic difference in grades , for values of "A " between tabulated values, use next higher value.
B = Length of vertical curve at bulb end of cul-de-sac.

DESIGN SPEED		25 M.P.H.		30 M.P.H.		35 M.P.H.		40 M.P.H.		45 M.P.H.		50 M.P.H.		55 M.P.H.	
STOPPING SIGHT DISTANCE		160 FT.		200 FT.		250 FT.		310 FT.		370 FT.		440 FT.		510 FT.	
A	B	SAG	CREST	SAG	CREST	SAG	CREST	SAG	CREST	SAG	CREST	SAG	CREST	SAG	CREST
≤ 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>0.5	10	10	10	10	10	10	10	10	10	20	20	20	20	30	30
1.0	10	10	10	20	20	20	20	20	20	30	30	30	30	50	50
1.5	10	20	20	20	20	30	30	30	30	40	40	50	50	70	100
2.0	10	20	20	30	30	40	40	40	40	60	80	80	200	100	330
3.0	20	30	30	40	40	80	50	130	160	180	280	240	420	300	570
4.0	20	80	30	130	70	190	170	250	270	320	400	400	560	480	760
5.0	30	130	60	180	130	250	230	330	350	410	500	500	700	600	950
6.0	30	160	100	220	170	300	270	390	420	490	600	600	840	720	1140
7.0	40	190	120	260	210	350	320	460	490	560	700	700	980	840	1330
8.0	40	220	150	300	230	400	360	520	550	650	800	800	1120	960	1520
9.0	50	240	180	330	260	450	410	580	620	730	900	900	1260	1080	1710
10.0	50	270	200	370	290	500	450	650	690	810	1000	1000	1400	1200	1900
11.0	60	300	220	400	320	550	500	720	760	890	1100	1100	1550	1350	2100
12.0	60	320	240	440	350	600	550	780	830	970	1200	1200	1700	1500	2300

12-3 **MINIMUM CURB RETURN AND PROPERTY LINE RADII SHALL BE AS FOLLOWS :**

TABLE-3 MINIMUM RADII AT INTERSECTIONS

Type of Intersection	Curb Return	Property Line
Residential - Residential	25 feet	12 feet
Residential - Comm./ Ind.	30 feet	17 feet
Comm./ Ind. - Comm./ Ind.	30 feet	17 feet
Comm./ Ind. - Local/ Sec. Art.	30 feet	15 feet
Residential - Local/ Sec. Art.	30 feet	15 feet
Residential - Primary Art.	30 feet	15 feet
Comm./ Ind. - Primary Art.	35 feet	20 feet
Local/ Sec. Art. - Local/ Sec. Art.	35 feet	20 feet
Local/ Sec. Art. - Primary Art.	40 feet	25 feet
Primary Art. - Primary Art.	40 feet	25 feet

12-4 **ROAD WIDTH TRANSITION TAPERS:**

When constructing a roadway that will directly connect with an existing roadway of less width, it is necessary to install a transition taper between the two. The length of taper depends upon the offset difference between the outside travelled edge of the two sections and the speed limit or design speed as shown in the taper formula below.

These values are not to be used in the design of speed change or left turn storage lanes

MINIMUM ROAD WIDTH TRANSITION TAPERS

TAPER FORMULA:

$L = S \times W$ For speeds greater than 40 mph

$L = \frac{WS^2}{60}$ For speeds of 40 mph or less.

WHERE:

L = Length of taper (min. 100')

S = Numerical value of posted speed limit or 85 percentile speed

W = Width of offset.

13 ASPHALT CONCRETE PAVEMENT DESIGN

13-1 **GENERAL PRINCIPLES**

The design of asphalt concrete pavement is based on the principle of layers of progressively decreasing strengths from the finished surface to the sub-grade. In each case, the finished surface consists of a layer of asphalt concrete pavement of the thickness computed by the design formulas, but not less than a specified minimum thickness.

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PLATE 4

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The design method provides a numerical solution to the thickness of any layer based on the following :

a. The Traffic Index, a measure of the amount and type of truck traffic that is expected over the 20-year period following construction.

b. The physical strength, measured by gravel equivalent , of the layer being designed.

c. The physical strength, measured by R-Value , of the layer immediately below the layer being designed.

d. The minimum physical strength, measured by R-Value, of the sub-grade material.

e. The thickness and physical strength , measured by gravel equivalent, of the material above the layer being designed, if any.

By varing the types of materials used, a number of different, acceptable pavements can be designed for each combination of Traffic Index and sub-grade R-Value.

13-2 **ECONOMIC CONSIDERATIONS:**

The relative costs of the materials making up the layers of pavement vary from time to time resulting in differing combinations of layers being the most economical at any given time.
In selecting a complete pavement design, the following should be taken into consideration:

a. Sub-grade soils can be improved in strength by several types of treatment which do not require the material to be removed from the site.

b. Base materials with R-Values less than that of Standard Specification Crushed Miscellaneous Base (C.M.B.) can be used economically with the lower Traffic Indices. A note on the plans or a special provision is needed.

c. Existing bases and surfacing can be reused. This may require treatment in place or removal and reprocessing.

d. Materials cannot be compared on cost per ton basis alone because:

(1) Higher strength materials require less thickness when used in place of lower strength materials.

(2) Elimination of a complete layer by thickening the layer above may result in savings in construction costs not reflected in per ton costs alone.

(3) Gravel equivalent of A.C. increases when thickness is over 0.4 feet.

e. Thinner overall thickness of the layered pavement sections results in less excavation and may avoid interference with or

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damage to utility and drainage facilities.

f. Current scarcity in the supply of any material used.

Several alternate sections should be designed, the overall cost of each estimated, and the most economical section specified. Where costs are nearly equal or where relative costs of materials are changing rapidly, it may be desirable to provide more than one acceptable design from which the contractor can choose the one to construct.

13-3 DESIGN METHOD

13-3.1 NOMENCLATURE

T= Thickness of layer in feet.
TI = Traffic index from standard drawings plates or a greater value indicated by a traffic engineering study.
GF = Gravel factor of material in a layer.
GE = Gravel equivalent of the pavement or a layer. The theoretical thickness of the pavement or layer if composed entirely of material with a GF of one.
SF = Safety factor. An additional thickness of A.C. expressed as gravel equivalent.
R = Minimum resistant R-Value of material.
AC = Subscript referring to Asphalt Concrete layer.
B = Subscript referring to Base layer.
SB = Subscript referring to Subbase layer.
SG = Subscript referring to Subgrade.
MIN = Subscript referring to Minimum Allowable Thickness of a layer.

13-3.2 CONSTANTS FOR AC

GF = 2.5 for TI $\leqslant$ 5
GF = $\frac{5.67}{\sqrt{TI}}$ for TI $>$ 5

T_{AC} min. over Base material or stabilized subgrade = 0.25 ft.

T_{AC} min. over unstabilized subgrade = 0.33 ft.

13-3.3 CONSTANTS FOR BASES AND SUBBASE

MATERIAL	R*	GF	SF_{AC} **	T Min., Ft.
Select subbase	60	1.0	0	0.33 (Subbase only)
~~CMB~~ CAB	80	1.1	0.16	0.33
Lime Treated Base	80	***	0.18	0.50
Soil Cement	80	1.2	0	0.50
Bituminous Stabilized Base	80	1.3	0	0.50
Cement Treated Base	80	1.2	0.18	0.50

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*Maximum R-Value , lesser values must be used if standard specifications are modified.

**For T.I. $<$ 8.0, $SF_{AC}=0$

***LTB GF = 0.9+(Unconfined compressive strength in PSI/1000)

13-3.4 CONVENTIONAL DESIGN

A layered system of A.C., base and sub-base over the subgrade. The material in each layer must have a higher R-Value than the material below it. The thickness of each layer is designed, starting with the A.C. surface layer and working down, as follows:

a. $GE_{AC} = 0.0032 \times TI \times (100-R_B) + SF_{AC}$

b. $T_{AC} = GE_{AC} / GF_{AC}$ If T_{AC} 0.25, use T_{AC}= 0.25ft.

c. $GE_B = 0.0032 \times TI \times (100 - R_{SB}) - (T_{AC} \times GF_{AC})$

d. $T_B = GE_B / GF_B$ If $T_B < T_{MIN}$, use $T_B = T_{MIN}$

e. $GE_{SB} = 0.0032 \times TI \times (100-R_{SG}) - (T_{AC} \times GF_{AC}) - (T_B \times GF_B)$

f. $T_{SB} = GE_{SB}$ If $T_{SB} < T_{MIN}$, then either
(1) $T_{SB} = T_{MIN}$ or
(2) $T_B = (GE_B + GE_{SB}) / GF_B$ and $T_{SB}=0$

13-3.5 THICK LIFT DESIGN

An A.C. surface layer , 0.3 feet or more in thickness , placed either directly on the subgrade (stabilized* or unstabilized) or over a layer of base material* designed as follows:

a. $GE_{AC} = 0.0032 \times TI \times (100 - R_{SG}) - T_B \times GF_B$

b. $T_1 = GE_{AC} / GF_{AC}$

c. If $T_1 \leq 0.4$ ft., $T_{AC} = T_1$

d. If $T_1 > 0.4$ ft., $T_2 = \left[GE_{AC} - (0.4 \times GF_{AC})\right] / (1.3 \times GF_{AC})$

e. If $T_2 \leq 0.4$ ft., $T_{AC} = 0.4\text{ft.} + T_2$

f. If $T_2 > 0.4$ ft., $T_3 = \left[GE_{AC} - (0.92 \times GF_{AC})\right] / (1.5 \times GF_{AC})$

g. Then $T_{AC} = 0.8$ ft. $+ T_3$

* Base or stabilized subbase shall be 0.5 ft. or thicker.

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GENERAL REQUIREMENTS – STREETS

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PLATE 7

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14 INTERSECTION

All at-grade intersections provide linkage between two or more streets. Design considerations should be such that intersections provide smooth riding characteristics and ample unobstructed sight distances. Minimize the use of cross-gutters, whenever possible. Also , all intersections and certain approach distances withstand greater acceleration and deceleration actions.
To help minimize the wear and tear of the pavement , increase the design value of traffic index by 0.5 and increase the structural section. If the intersection is formed by the junction of two or more roadways, then the entire intersection shall be designed for the upgraded T.I. of the street with higher T.I. .
The entire intersection means, full pavement width traversing along main street from the beginning of first curb return to the end of last curb return plus the maximum coverage of the secondary street by extending perpendicular lines from the farthest end of curb returns.
The approach distances shall be those sight distances given in Table I (sub-section 12-1) and measured beyond the limit of the intersection as defined above. The approaches on main street shall be designed for the T.I. = designated T.I. + 0.5 of the main street and similarly the approaches on secondary street shall be designed for T.I. = designated T.I. + 0.5 of the secondary street..
This could be accomplished by thickening asphalt and / or base section or any combination thereof . Also , it is desirable to bring up to pavement surface and reduce the curb height thereby. This helps in the design of the access ramps for physically handicapped and forces the drainage flow away from the intersection.

15 MATERIAL TESTING

15-1 ADMINISTRATIVE

15-1.1 All design for thickness of pavements, including soils testing , and all control testing during construction shall be performed by a Materials Engineer.

15-1.2 A Materials Engineer acceptable to the Director of Public Works shall be employed and paid by the developer of any land development project and by permittee on jobs requiring permits. The Materials Engineer , or a consulting Engineer employed by the City , shall be the Materials Engineer on City projects.

15-1.3 A materials Engineer shall be a Registered Civil Engineer knowledgeable in the field of soil mechanics and road materials.

15-1.4 Since A.C. (viscocity) varries from refinery to refinery , use of A.C. 4000 (as called on Std. Plates) may be substituted with A.R. 8000 by the Engineer.

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15-2 TEST METHODS AND REPORTS

15-2.1 Materials shall be tested in accordance with "City Standard Specifications" , as well as those supplementary test methods required by the Director of Public Works.

15-2.2 A soil classification survey (Unified Soil Classification System) shall be performed at appropriate intervals in the street areas of subdivisions to determine the areas with similar soils.
A limited number of soils tests shall be made, as required, prior to pavement design. Tests for pavement design shall not be done until rough grading has been completed to within one foot of final finish surface grade, nor until it is assured that the soils sampled are representative of those at the final grade.

15-2.3 The test report shall include the results of sampling and testing, work sheets for the subgrade strength tests, a plan showing material limits and areas represented by a given subgrade strength test and specific recommendations derived from the test data given. Any other test data not required but which will have an effect on the recommendations shall be included.

15-2.4 During construction a sufficient number of tests shall be made to assure that the quality of construction and component materials is equal to that required by specification. These specified requirements include, but are not limited to , fill densities and supporting qualities, subgrade and base quality and compaction, and asphalt concrete quality and compaction.
When treated soil or aggregate is used, a quality control plan must be submitted and approvedby the City of Oxnard.

15-2.5 Though materials may be tested for conformity to specification while stockpiled, final acceptance of these materials will be subject to their conformity to specification requirements when in final position on the work.

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20 GENERAL STREET LIGHTING, TRAFFIC SIGNALS, TRANSIT.

20-1 STREET LIGHTING GUIDELINES

TYPE STREET	LIGHTING
Local Residential	5800 Lumen High Pressure Sodium Vapor (HPSV) one side at 180 to 240 foot spacing.
Heavily - Traveled Collector street	9500 Lumen HPSV one side at 180 to 240 foot spacing
Thoroughfare	9500 Lumen HPSV in median at 180 - 240 foot spacing on staggered sides of pole except at intersections or along high pedestrian traffic areas where two lights per pole shall be placed. Where no median 9500 Lumen HPSV on one side at 180 to 240 foot spacing.

20-2 TRAFFIC SIGNALS

Caltrans standard plans and specifications are made a part of plans with following special provisions :

1. Conduits shall be rigid metallic. Min cover 36" over buried conduits.
2. Pedestrian signals shall be type A.
3. Detector loop wire shall be type 1. Lead in cable shall be type B.
4. Luminaires shall be 200 WHPSV (Watts High Pressure Sodium Vapor), cutoff type.
5. Internally illuminated street name signs shall be double-faced, type A.
6. At least one telephone drop must be provided to each isolated signal or each interconnected system. Signal interconnect conduit to be installed along all arterial highways.

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7. Electrical service enclosure shall be type III BF.

8. Concrete pullboxes shall be used.

9. Splices shall be insulated by Method B. Conductors # 8AWG or larger shall be spliced by use of "C" shaped compression connectors.

10. Type 170 signal controller equipment in type 332 cabinet (anodized aluminum) modified to provide 2 serial ports on 170 unit and 412/64 program module configured with 27-256 EPROM with 8K RAM and 4K zero power RAM.

11. Signal head reflectors shall be ALZAK.

12. Back plates shall be metallic . Signal heads may be plastic.

20-3 TRANSIT FACILITIES

Where required , bus pullouts shall be designed per Plate 200&201. When only a bus pad is required the pavement section shall be designed for T.I. = 10.5
The dimensions of the pad shall be 60 feet × 10 feet unless otherwise directed.

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DETAIL SPECIFICATIONS FOR WATER SYSTEM

The Public Works Department reserves the right to review, change or modify these specifications at any time. It shall be the responsibility of any person doing work under these specifications to obtain the most current issue and addendums.

30.0 GENERAL

Materials:

1. Any material or item installed in the water system will be of American origin. Materials and other products manufactured (from ore to finish) outside of the legal boundaries of the United States are not acceptable and will not be installed in the City's water system. A certificate of origin and/or specification compliance may be required.

2. Protective Coating:

   a. Cast Iron/Ductile Iron Fitting. Interior shall be cement lined and thermo epoxy lined to and including full flange face and/or push on joints.

   b. Exterior ferrous surfaces and manufacture supplied bolts shall be bituminous coated and PE wrapped.

3. Copper. All below grade copper pipe and fittings will be Polyethylene tube encased, completely sealed at joints and ends.

4. Silver solder. All below grade copper fittings and joints will be silver soldered. Silver Solder Grade 85-15 (15% Silver).

5. Flange Bolts. All below grade flange bolts and nuts will be stainless steel Grade 304.

6. Irrigation Service. All irrigation services will be copper per Plate 304.

7. Backflow Devices. All backflow piping 3/4" to 2" will be Type K Hard. All fittings shall be Silver Soldered. Control gate valve shall be Resilient Seat type, 3/4" to 2". Control valve shall be ball type. All devices shall be tested and approved by USC Foundation.

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8. Valves. All main line valves 6" to 12" shall be approved Resilient Seat Gate Style. Valves larger than 12" shall be Butterfly.

9. Fire Hydrants. All fire hydrants shall be of bronze construction and fluted body style with removable stem inserts.

10. Copper Wire. In continuous runs of PVC pipeline and polyethylene services, a 12 gauge insulated copper wire shall be laid above the pipeline. The wire shall be attached to all gate valves and extended up into valve box, refer to Plate 303. Copper wire shall be continuous. Breaks or joints shall be soldered and insulated.

11. Steel Pipe. Steel pipe used to cross sewer or storm drains shall have minimum thickness of .250 inches as required by Health Department.

12. Water Services. All services shall be the same size from corp stop to discharge point of tail piece. Example: 1" corp stop, 1" service line, 1" meter, 1" tail piece; if required, 1" backflow device.

    Services shall be installed at the locations shown on the plans, at right angles to the centerline of the main in public right-of-way within 18" of side property line, and shall be spaced a minimum of 10 feet from any sewer lateral. Services will be permitted in driveway areas only with special written approval.

13. Asbestos-Cement Pipe. The installation of ACP in the water system is not approved by City Council.

30.1 Bronze:

Whenever a part of the fitting is specified to be bronze, it shall be composed of what is known as Red Brass; for example, copper 85%, zinc 5%, and tin 5% with a tensil strength of 30,000 psi, yield strength of 14,000 psi and allowable elongation of 20% unless otherwise specified. In no case shall bronze parts or fittings contain more than 2% aluminum or more than 5% zinc. Certificate of compliance is required from the manufacturer.

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30.2 Ductile Iron Pipe:

1. General - Ductile iron pipe, Class C-52, 6" through 24" shall be furnished with tyton joint pipe or mechanical joint with a normal laying length of 18' in accordance with AWWA C151-76.

2. Joints - Mechanical joint and tyton joint accessories and dimensions shall conform to the applicable requirements of AWWA C110.77 unless otherwise specified. Mechanical joint glands shall be gray cast iron. Retaining gland/flange adapters with a set screw as a retaining device are not approved for use.

3. Coating and Lining - Ductile iron pipe shall be lined with cement mortar in conformance with AWWA C-104-74, minimum thickness as follows:
   6" to 12" = 1/16"
   14" to 24" = 3/32"
   The exterior coating for use under normal conditions shall be bituminous coating approximately one (1) mil thick. The finish coat shall be continuous, smooth, neither brittle when cold nor sticky when exposed to the sun and shall be strongly adherent to the pipe in accordance with AWWA C-106-75 and polyethylene encased AWWA C-105-72.

4. Marking Pipe - The weight, class or nominal thickness and sampling method shall be shown on each pipe. The manufacturer's mark, production year and the "DI" or DUCTILE shall be cast or stamped on the pipe. All required markings shall be clear and legible and all cast marks shall be on or near the bell, in accordance with AWWA C-106-75.

5. Fittings - Fittings for ductile iron pipe shall conform to AWWA C-110-77. All fittings shall be cement mortar lined and thermo epoxy coated, refer 33.1-1.

   Fittings for ductile iron pipe shall conform to AWWA specifications for Class "D" fittings.

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30.3 PVC PIPE

1. Pipe: PVC pipe shall conform to the quality and strength requirements of AWWA C-900 which cover PVC (Polyvinyl Chloride) pipe in sizes 4 - 12 inches. Each standard or random length of pipe shall be clearly marked with the following:
   a. Nominal size and OD base, i.e., 6" cast iron size.
   b. Material Code PVC1120.
   c. Dimentional rates, i.e., DR 25 where DR is equal to Diameter divided by Thickness.
   d. AWWA Pressure Class CL. 150/DR-18. CL200-DR-14.
   e. AWWA Designation "AWWA C-900."
   f. Manufacturer's Trade Name and Production Code.
   g. Seal (mark) of testing agency.

2. The standard laying length shall be 20' ± 1" in all classes and sizes. A maximum of 15% may be furnished in random lengths of not less than 10 feet each.

3. AWWA C-900 pipe has the same outside diameter (OD) as that of cast iron pipe (C.I.P.) in the sizes furnished.

4. One gasket shall be furnished with each length of elastomeric-gasket bell-end and two gaskets shall be furnished with each coupling where couplings are authorized. Prior approval is required for the use of coupling.

5. Pipe surfaces shall be free from nicks, scratches and other blemishes. The joining surfaces of pipe spigots and of integral bell and sleeve reinforced bell sockets shall be free from gouges or other imperfections that might cause leakage.

6. Trade names which are approved are Certainteed "Vinyl Iron Pipe," J.M. Mfg. "Blue Brute Pipe," and Pacific Western.

7. Joint Mechanisms: The joints shall be either of the following:

   a. Integral Wall Thickness Bell End. (Bell and spigot with Elastomeric gasket.)

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b. Integral sleeve reinforced bell end with elastomeric gasket.

PVC solvent joints, although allowed in the AWWA C-900 Standard, are not approved.

8. PHYSICAL TEST REQUIREMENTS:

Hydrostatic, Burst and Sustained Pressure and Crushing:

Test shall be conducted by a testing laboratory with such testing available for inspection by Water Division. If required, the manufacturer shall supply a Letter of Certification attesting to their pipe meeting these specifications.

1. The Hydrostatic Proof Test for every piece of pipe shall be as follows:

CLASS	SUSTAINED PSI
DR = 18 or Class 150	600
DR = 24 or Class 250	800

30.4 STEEL PIPE

1. Steel pipe shall conform to the quality and strength requirements of AWWA C-200 or as specified below - that standard pertains to electrically butt-welded straight-seam or spiral seam pipe and to seamless pipe 6" (150mm) in diameter or larger.

The steel shall conform to one of the following:

Specification	Grade	Minimum Yield Point (psi)
ASTM A 283	Grade C	30,000
	Grade D	33,000
ASTM S 570	Grade 30	30,000
	Grade 36	36,000
	Grade 40	40,000
	Grade 45	45,000

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The stress in the steel pipe shall not exceed the higher of 15,000 psi or one-half the designated working pressure that the following minimum thickness shall be used:

Normal Inside Diameter	Minimum Thickness	Maximum Pressure For Thickness Specified
Inches (mm)	Inches	PSI
8" (200 mm)	0.135 (10 gage)	394 psi
10" (250 mm)	0.135 (10 gage)	405 psi
12" (300 mm)	0.135 (10 gage)	338 psi
14" (350 mm)	0.135 (10 gage)	289 psi
16" (400 mm)	0.135 (10 gage)	253 psi
18" (450 mm)	0.179 (8 gage)	298 psi

Minimum thickness to conform to Health Department requirement is .250 inches.

Assuming 15,000 psi stress and the following below:

$P = \frac{2ST}{D}$ where

P = Pressure (maximum working)
S = Allowable stress (15,000 psi or one-half yield)
T = Pipe wall thickness (inches)
D = Outside diameter (inches)

The gage specified above considers the thickness required for external loads and a corrosion allowance.

The pipe shall be essentially round. The outside circumference shall not vary more than +/- 1.0 percent from the nominal outside circumference based upon the diameter specified (except for the ends which are discussed below).

The pipe shall not deviate by more than 1/8" from a 10' long straight edge held against the pipe.

The pipe lengths, generally 40' long, shall be furnished with a tolerance of +/- 2 inches. Random lengths shall be furnished in lengths averaging 29' or more, with a minimum length of 20 feet.

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2. PIPE ENDS - various end treatments can be supplied as discussed in AWWA C-400 and briefly listed below:

Ends for mechanical coupled field joints - these are either plain, grooved, or banded.

Ends for lap joints for field welding - these shall have a bell end pressed or rolled without hammering. The surfaces shall be ground smooth. Joints shall permit a lap, when the joint is assembled, of at least 1-1/2 inches.

Plain end pipe - these shall have a plain end right angle cut.

Beveled ends for field butt welding - these, where specified, shall have a bevel which is 30 degrees (+5 degrees -0 degrees) when measured from the pipe axis.

Ends fitted with butt straps for field welding - the butt straps may be made in halves or as complete cylinders.

Bell-and-spigot ends with rubber gaskets - these shall have bell ends which are made without hammering. Spigot ends shall be formed or fabricated to the required shape to retain the gasket. The gasket shall be designed and fitted as the sole element dependent upon to make the joint watertight. The gasket shall meet the requirements of AWWA C-400.

Plain ends fitted with flanges.

The allowable tolerance at pipe ends is discussed in AWWA C-400 and summarized below:

For bell and spigot - clearance between O.D. of spigot and I.D. of bell shall be between 0.2 - 0.06 inches.

For lap joint - I.D. of bell shall be 1/32 - 3/16 inches greater than O.D. of spigot.

For plain ends (incl. beveled or butt straps or flanges) O.D. within 4" of end shall be +1/16" or +1/8" from specified O.D.

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3. HYDROSTATIC TESTS - each pipe shall be tested by the manufacturer to a pressure not less than that determined by:

$$P = \frac{2ST}{D}$$

where S = 0.75 times the minimum yield strength of the steel and the other items are as discussed earlier.

30.5 CEMENT MORTAR LINING

Cement mortar lining shall be uniform in thickness except at joints or other discontinuities. Ends of lining shall be left square and uniform and the lining holdback shall be as specified for the particular type or joint.

1. Mortar lining and coating (ML & C) - unless otherwise approved or as revised below, all steel pipe shall be mortar lined and coated in accordance with AWWA C-205 which covers shop applied lining and coating. Cement shall be Type II, ASTM C150.

Cement Mortar Lining Thickness

Normal Pipe Size Inches	Lining Thickness Inches	Tolerance Inches
6"-10"	1/4	-1/32 + 1/32
12"-16"	3/8 5/16	-1/32 + 1/32
18" and larger	3/8	-1/16 + 1/8

It should be noted that no wire fabric reinforcement is required for any lining of special fittings less than 24" in diameter.

30.6 CEMENT MORTAR COATING

Cement mortar coating shall be reinforced over all outside surfaces of the pipe and special fittings. The coating shall be a uniform thickness except at joints or other discontinuities in the pipe. Ends of coating shall be left square and uniform and the coating holdback shall be as specified for the particular type of joint.

Cement Mortar Coating Thickness

1. Nominal Pipe Size Inches	Coating Thickness Inches	Tolerance Inches
6"-10"	1/2	-0 + 1/8
12"-16"	5/8	-0 + 1/8
18" and larger	3/4	-0 + 1/8

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2. Reinforcement for the coating of pipe section shall be one of the following as specified by the supplier:

   Spiral wire - 15 gage @ max. 1-1/4" spacing with wire meeting ASTM A82.

   Wire fabric - 2x4 steel wire mesh, 13 gage each way meeting ASTM A185.

   Ribbon mesh - 1x1 mesh of 18 gage wire or 1-1/2 x 1-1/4 mesh of 17 gage wire all meeting ASTM A82.

30.7 FIELD JOINTS

1. ELECTRICALLY BONDED CONNECTIONS. Two metal jumper rods are required to form an electrically bonded connection between all steel pipe joints that are not welded, except at insulating couplings called for on the plans. The jumper rods shall be either 3/8" diameter rods or 1/4" x 1/2" bars. They shall be at least 7" long with an offset of 1/4" in the middle 3-inches. No welding shall take place in the middle 3" section.

2. FACTORY TESTS AND INSPECTION. All materials shall be inspected and tested in a normal air-dry condition by the manufacturer prior to shipment for conformance to the stated requirements. The Water Division shall at all times have the right to inspect the work and materials in the course of manufacture and to make or witness such tests as required in these specifications, or as deemed advisable. In lieu of the preceding, the manufacturer shall upon request submit a certificate stating that the materials meet the requirements of this specification. All testing shall be done in recognized testing laboratories within the State of California, approved by the Public Works Director.

3. WELDED JOINTS. One of each section shall be swaged out to form a female or bell end which permit the male or spigot end to enter approximately one-inch with a clearance of approximately 1/32-inch. The spigot end shall be "sized" to permit it to enter the bell end of the adjacent section and the weld bead shall be ground flush for the distance it is to enter the bell end.

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4. BUTT STRAP CLOSURES. The butt straps shall be the same thickness as the pipe wall but not less than 10 gage, at least 10" wide and rolled to fit the the outside cylinder diameter and shall be centered over the ends of the pipe sections they are to join. A standard 5" pipe half coupling shall be shop welded to the top section of the butt strap to permit access for mortar lining the inside of the joint. The coupling shall be sealed with a standard 5" plug field welded to the coupling.

30.8 Gate Valves (4" - 12"):

1. General - Gate valves, including tapping valves 4" or larger shall conform to AWWA Standard Specification C-509-80 or latest revision for resilient seat gate valves for ordinary water works service. Mueller RS or approved equal. Gate valves shall be used on all main line installation and shall be FLxMJ unless otherwise specified.

2. Resilient wedge - Cast iron wedge or disc shall have sealing surface of wedge permanently bonded or with self-locking stainless steel screws with resilient materials. Disc shall have an integrally cast ASTM B-62 bronze stem nut to prevent twisting or angling of the stem or loose stem nut on wedge or disc with non-coated disc guides. The disc coating shall be open on one side or open bottom disc so as to form no cavities or receptacles for accumulation of solids and possible stem binding.

3. Direction of operation - All valves shall open by turning the wrench to the left (counter clockwise).

4. Stuffing Box - Stuffing boxes shall be O-ring seal type.

5. Stem - Non-rising stems shall have Acme thread only. Stem thrust collars are made an integral part of stem.

6. Unobstructed waterway - Each valve shall have a smooth unobstructed waterway free from any sediment pockets.

7. Painting and coating - Exterior shall be asphalt varnish per Federal Specification TT-V-51-E or fusion bonded Epoxy. Interior ferrous surfaces shall be coated with epoxy type coating equal to Kordell 600.

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8. Valve stem extension - A valve stem extension shall be provided for each valve having an operating nut more than 40" below finished grade. Extension stem either of standard manufacture or shop fabricated shall bring the operating nut within 12" of the surface.

   The extension stem shall be made of solid round steel bar of a diameter equal to the valve stem diameter with a minimum of 1" diameter or extra heavy steel pipe of diameter equal to one and one-fourth (1-1/4) times the valve stem diameter with a minimum of one and one-fourth (1-1/4) inch diameter.

   Solid steel plate having a diameter approximately one-half (1/2) inch less than the valve cover inside diameter which will allow smooth stem operation. Standard Plate 303.

30.9 Butterfly valve installation is permitted only when specifically called for in the plans and approved by the Water Manager.

30.10 Valve Boxes:

Valve boxes shall be Brooks Product Number 3RT.

31.0 Fire Hydrants:

Fire hydrants shall conform to AWWA C-503-75 Sec. 2.6 unless otherwise specifed. Hydrant bodies will be all bronze construction. Fluted design.

1. Bury shall have a minimum inlet size of 6" with mechanical joint. Hydrant mounting flange shall be six-hole pattern on 9.44 centers.

2. Hydrant bodies shall have mounting flange with six-hole pattern on 9.44 centers. Required nozzles shall be individually controlled with rubber disc, compression type valve and shall be fitted with threaded protecting caps. Nozzle threads shall conform to ANSI (ASA) B 26 National Standard fire hose coupling screw threads.

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3. Spools - Break-Away. A spool shall be installed between bury and hydrant body. Spool to be cement mortar and Thermo Epoxy lined, refer 30.0-2. Six-bolt pattern to be same as hydrant body. Break-away bolts to be installed per Plate 300.

4. Coating. Interior ferrous surfaces of the bury and spool shall be cement mortar and Thermo Epoxy lined, refer 33.1. Exterior painting - all fire hydrants shall be surface prepared to receive paint by scraping and wire brushing, and shall be painted with one coat of surface primer and two coats of finish paint. Refer to section 33.1-4.

5. Fire hydrants shall have a 6" barrel unless otherwise noted. The sizing and type of City Oxnard approved hydrants are as follows:

Type Residential R-1	4" x 2-1/2" Jones J-3700 or approved equal
Type II R-2 or greater	4" x 2-1/2" x 2-1/2" Jones J-3765 or approved equal
Type III Industrial and Manufacturing	4" x 4" x 2-1/2" Jones J-3775 or approved equal

Written approval before installation of other types, makes, and models will depend on but not limited to availability and interchangeability of repair parts as determined by the Water Division.

6. Minimum Hydrant and Water Flow Requirements

A. General - A sufficient number of hydrants shall be installed to concentrate the required fire flow within 400' of any structure.

Hydrants shall be placed at least 50' from the structure protected. Where this is not possible, they shall be placed where the possibility of injury from building collapse is limited.

* The flows indicated below are minimum. Additional fire flow may be required based on the types of building construction, distance to exposures, number of stories, type of hazard presented by the proposed use and the ground floor area of the building.

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B. Residential

* Fire flow 2500 GPM @ 20 PSI
Hydrant spacing
500' for single-family residential with no structure more than 300' from a hydrant.
300' multiple-family residential with no structure more than 200' from a hydrant.

C. Industrial and Commercial Areas

* Fire flow 4500 GPM @ 20 PSI
Hydrant spacing
300' and so located that no structure is more than 150' from multiple hydrants. (On-site included.)

D. On-site Hydrants

Location - as designated by the Fire Department.
Refer: EASEMENT 2.11 A.

No portion of a structure shall be more than 150' from a hydrant.

Fire flow - multiple occupancy residential - 1250 GPM @ 20 PSI minimum individual hydrant flow.

Industrial - 1500 GPM @ 20 PSI minimum individual hydrant flow.

Heavy industrial - 1750 GPM @ 20 PSI minimum individual hydrant flow.

Fire Sprinkler System

Fire Department to determine location of Fire Department connection.

31.1 COUPLINGS AND FITTINGS:

1. Valves shall be Mueller Resilient Gate Valve FL X MJ or approved equal.

2. Couplings shall be FLEXIBLE or FULL CIRCLE. PVC coupling shall meet the requirements of AWWA C-900 and will require prior approval for use.

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3. Cast Iron/Ductile Iron Fittings shall meet AWWA C-110-79 Joint Style Mechanical Joint - Short short body style not approved.

4. All external ferrous surfaces and bolts shall be Bitumimous coated and PE wrapped. All internal ferrous surfaces shall be cement mortar lined and Thermo Epoxy Coated with Kordell 600 or approved equal, refer 30.0-2.

5. Flange bolts shall be stainless steel.

6. Main line and aperture specifications are listed throughout Water System Detail Specs, as applicable.

32.0 SERVICE MATERIAL

32.1 Copper Water Service Tubing

Materials - all 3/4" and 1" copper tubing shall be seamless copper water tubing Type K, soft temper or approved equal.

All 1-1/2" or 2" copper tubing shall be seamless copper water tubing Type K, soft temper or approved equal and shall be delivered in approximately 20 feet straight lengths. No coiled copper shall be used in sizes 1-1/2" or larger. All sweat joints are to be silver soldered, 15% silver. (85-15)

32.2 Polyethylene Water Service Pipe

1. General - All polyethylene pipe shall conform to all applicable requirements in the latest revisions of the following standards unless otherwise specified:

   ASTM D-148 standard specifications for polyethylene molding and extrusion materials.

   ASTM D-2239 standard specification for polyethylene (PE) plastic pipe (SDR-PR).

2. Material - Polyethylene extrusion compound from which the polyethylene is extruded shall comply with the applicable requirements for PE-3408.

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3. Rating Dimensions and Tolerance - The PE pipe shall be rated for use with water 200 PSI at 73 degrees F.

The dimensions and tolerances shall comply with iron pipe size (SDR-7) - ASTM for 3/4" and 1" service lines. For 1-1/2" and 2" service lines, the dimensions and tolerances shall comply with copper tubing, size SDR-9 ASTM D2737.

4. Minimum Burst Pressure - The minimum burst pressure at 73 degrees F as determined in accordance with ASTM D-1599 shall be 630 PSI.

5. Marking - PE pipe or tubing shall be permanently indent branded indicating size, manufacturer's name, pressure rating, NSF logo, material designation code, applicable ASTM Specification, date code and any other appropriate code designation.

6. Protection - PE pipe or tubing shall be protected for outdoor storage with suitable wrapping material.

7. Workmanship - The PE pipe or tubing shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions or other defects. It shall be uniform in color, capacity, density and other physical properties.

32.3 Angle Meter Stops - All 3/4" and 1" angle meter stops should be Ford pack joint with insert and wing lock, part number KV-63 or approved equal.

All 1-1/2" and 2" angle meter stops shall be Ford pack joint wing lock with meter flange part number KV-43 with insert for PE services. 1-1/2" and 2" angle meter stops shall be Ford FIP X meter flange wing lock part number FV13 or approved equal for copper service. Bolts and nuts shall be red brass.

32.4 Corporation Stop - All corporation stops shall be Ford valve number FB1001 for PE and FB 800 for copper service or approved equal.

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32.5 Branch Connection (Manifold) - All two branch connections shall be Ford UV-63-42-W. Two branch or manifolds are not allowed automatically for use. Locations and use are to be performed by Water Division upon approval.

32.6 Service Saddles - As listed or approved equal. C-900 PVC shall be single unit iron pipe tap. Ford Cat. No. S71 IP TAP.

AC Pipe. Flat double strap bronze. Ford Cat. No. 202B IP TAP.

Cast Iron/Ductile Iron. Flat double strap ductile or malleable iron. Ford Cat. No. 202B IP TAP.

All service connections 4" or larger connection shall consist of a tee or tapping tee with a flanged outlet and a flange RS gate valve, as specified on plans.

33.0 Miscellaneous Materials:

1. Curb Stops for Blowoffs, etc. - All curb stops for blowoffs, air valves, etc., shall be bronze, as specified in Section 1.01, flatway with tee head. Both inlet and outlet shall be female IPT.

2. Bolts and Nuts - Bolts and nuts for all below ground flanged connections shall be stainless steel, grade 304 - except when attaching hydrants to buries in which case they shall be Cadmium Plated breakaway type.

3. Gaskets - Gaskets for all flanges shall be full face, cloth inserted rubber, with a minimum thickness of one-eighth-inch.

Special Purpose Valves:

4. Air Release Valves - Air release valves shall be APCO #65 or #200A, or approved equal. Valve shall be designed to exhaust air which accumulates in the line while operating under pressure. See Plate W-8 for installation.

5. Size of Valves - Size of valves shall be shown on Water Plan. Tap and service pipe will be same size as valve.

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33.1 Protective Coating

1. Cast iron/ductile iron fittings.

   a. Interior shall be cement lined per AWWA C-104-74 and thermo epoxy coated to and including full flange force and/or push-on joints.

   b. Exterior ferrous surfaces and M.J. retaining bolts shall be bituminous coating per AWWA C-106-75 and polyethylene wrapped.

2. Copper tubing and below grade fitting shall be polyethylene encased per Uniform PLumbing Code.

3. Valves, gate and butterfly.

   a. Interior ferrous surfaces shall be coated with thermo epoxy equal to Kordell 600.

   b. Exterior shall be asphalt varnish per Federal Specification TT-V-51-E or fusion bonded epoxy.

4. Fire hydrants.

   a. Exterior painting. One coat of primer, Dunn-Edwards 42-44 and two coats of Dunn-Edwards Hi-Visibility Yellow, Syn-Lustro #10-14.

   b. Bury and spool. Refer to Section 33.1-1. Delete polyethylene wrap at bury flange.

5. Air-Vac valve cans.

   a. Exterior galvanized surfaces shall be etched with one coat of GE 123 and one coat of Dunn-Edwards 43-7 Galv-Alum primer and two coats of Water Valve Blue, Dunn-Edwards Syn-Lustro #10-50. Formula 1 gal. 10-50; B2Y24 E-Y24.

   b. Services with backflow assemblies. Exterior surface shall be painted with one coat of Dunn-Edwards 43-4 Bloc-Rust primer and two coats of Dunn-Edwards Machinery Green #10-6 Syn-Lustro.

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36.0 CONSTRUCTION DETAILS

A. General

1. A Plot Plan or Water Plan with proposed service locations will be submitted to the Water Division for approval of service locations.

2. All services will be installed at location as shown on approved plans. Location will be in public-right-of-way within 18 inches of side property line.

3. Earthwork - The contractor is referred to Plate 4D or 5D of Public Works Standards. Earthwork of the detailed technical specifications of these specifications.

4. Water service connections shall be installed in conformance with standard drawing number 304 and 305 and other applicable standard drawings.

5. All copper services will be Polyethylene encased.

6. All pipes, valves and fittings shall have a minimum working pressure rating of 160 PSI. Pipe ends, where joining special fittings, shall be sweat fittings for adaption to copper tube.

7. Irrigation services will be copper.

8. Service size will be same from water main through meter, tailpiece and backflow device (if device required).

9. Copper service pipes and fittings of two-inches or less in diameter shall be Type K Soft or Type K Hard. All joints will be silver solder 85-15 and polyethylene encased.

10. Polyethylene pipe 3/4" and 1" PE OD will be iron pipe size. 1-1/2" and 2" PE OD will be copper tube size. Fitting will be pack joint style with seamless steel insert.

11. Services or laterals larger than two-inches shall be C900 PVC CL 200 (DR-14). Three-inch meters will be connected to four-inch service per standard plate.

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36.1 Pipe Depth to Bottom of Trench from Finished Grade

Size of Pipe	Depth of All Pipe
6"	49"
8"	50"
10"	51"
12"	52"

36.2 Handling and Laying Pipe:

1. General - All foreign matter or dirt shall be removed from the inside of the pipe before it is lowered into its position in the trench, and it shall be kept clean by approved means during and after laying. All openings in the pipeline shall be closed with watertight expandable type sewer plugs or PVC C-900 test plugs at the end of each day's operation or whenever the pipe openings are left unattended. The use of burlap, wood or other similar temporary plugs will not be permitted.

   At times when pipe laying is not in progress, the open ends of pipe shall be closed by approved means, and no trench water shall be permitted to enter the pipe.

   Whenever water is excluded from the interior of the pipe, adequate backfill shall be deposited on the pipe to prevent floating. Any pipe which has floated shall be removed from the trench and be re-laid as directed by engineer.

   Neither PVC or ductile iron pipe shall be deflected vertically or horizonally in excess of the recommendation by the manufacturer of the coupling.

2. Sewer Crossings - (See Department of Health Requirements, Section Three.)

3. Casings - Casings shall be installed where dedicated on the plans by jacking or boring. Casings shall be of smooth steel, coat tar enamel coated with diameter and cylinder thickness as shown on the plans. Installations of the water main within the casing shall comply with the applicable pipe manufacturer's recommendations. Wooden skids used to convey the pipe through the casing shall be sized to maintain a uniform space between the pipe and casing, which shall be filled with a material

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designated by the Engineer. If deemed necessary to fill voids outside the casing well, holes shall be provided at four feet intervals, staggered longitudinally for injection of cement mortar grout. The ends of the casings shall be sealed with Portland cement concrete or approved flexible material. If a rigid connection is made between the casing and PVC pipe, a flexible joint shall be made at a point not more than two feet from each end of the casing.

Pipe installed in casing and offset shall be ductile iron. Joints shall be U.S. pipe TR Flex restrain joint or approved equal.

4. Relocation or offsetting of water main, fire hydrant laterals and large services.

   a. Offset section shall be welded steel cement mortar lined, mortar coated. Refer to Section 30.4.

   b. Offset section will include blow-off valve and air-vac breaker.

   c. Thrust blocks are required at each elbow.

36.3 Installing Valves and Boxes:

1. Gate Valves - All resilient gate valves shall be anchored in concrete in the manner shown on standard Plate 302. Care shall be taken to prevent concrete from running over the valve bells against the pipe or into the bells, and to keep the bonnet bolts accessible. Any concrete on the operating nut, stem packing glands or bonnets shall be removed.

2. Butterfly Valves - All butterfly valves shall be anchored in concrete in the manner shown on standard Plate 302. Care shall be taken to prevent the concrete from running over the valve bells against the pipe or into the bells, and to keep the valve operator bolts accessible. Any concrete on operating nut, stem spading glands or bonnets shall be removed.

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3. Valves Boxes - Valve boxes shall be installed by the contractor at each valve location, with or connected to the work. The boxes shall be so placed that they will just cover the packing glands of the valves, and so that settlement of one and one-half inches will not bring the bottom of the boxes into contact with the valves. Boxes shall be set plumb and centered over operating nut of valve. See standard Plate 303.

36.4 Installing Fire Hydrants:

1. Standard Fire Hydrant - The location of hydrants shall be approximately as shown on the plans. Where hydrants are to be placed at corners, they shall be located five feet before the beginning of the curb curve. At locations other than corners, they shall be placed as close to property lines between lots as field conditions permit, except that they shall not be within five feet of the driveway. Fire hydrant lateral shall be perpendicular to main.

   The complete hydrant installation will include a main line MJ tee with a six-inch flanged outlet, and a six-inch flange by MJ valve. A six inch MJ bury and 6x6 breakaway spool. In parkways, the bury and spool shall be set so that its flanged outlet is approximately three-inches above the top of the curb. Where no parkway exists, the centerline of the bury shall be approximately 18-inches behind the face of the curb. The hydrant body shall be set on the bury so that the outlets are aligned to the curb as shown on standard Plate 300. Acceptable breakaway bolts shall be used with nuts on the underside of the flange. Upon completion of the installation, the hydrant shall be cleaned of all concrete, dirt, and debris, and all exposed iron or steel parts, including bolts, painted in accordance to Section 33.1 of these specifications.

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36.5 Thrust Devices:

All fittings, hydrants, reducers, caps and line valves subject to thrust action from line or test pressure shall be chocked against thrust by "poured in place" concrete blocks of sufficient size as determined by the engineer. Thrust blocks shall consist of concrete developing a compressive set strength of 2,000 psi in 28 days, poured against undisturbed earth, in such a manner that all joints are exposed. Socket clamps shall be protected with a coating of mortar or bituminous material.

36.6 Air and Vacuum Valves:

Air release and vacuum valves shall be installed where indicated on the plans and where directed by the engineer. Installation shall consist of a corporation stop, service saddle, copper tubing, curb stop, air-vac valve with return bend, and housing. Valve assembly shall be installed above ground and in accordance with standard Plate 308.

36.7 Services:

1. All services unless otherwise indicated on the plans or specified in the special conditions, of new water services from three-quarters inch to two inches in size shall be as shown on standard Plate 304 and 305 or applicable plates and shall include excavation and backfill furnishing, installing, testing, and disinfecting of service tubing, tube fittings, corporation stops, and curb or angle stops with an appropriate fitting for meter connection. Services 4" and larger shall include a tee, valve, thrust block, cast iron pipe, and cap or plug. All service runs shall be perpendicular to the main for their entire length.

2. Services - General:

   a. Meter type shall be approved by Water Division.

   b. All polyethylene services shall be perpendicular to the main, with 12 gauge locating wire installed.

   c. Services shall not be installed on private property without public utilities easement.

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d. Contractor shall install double meter stop, meter box and copper tailpiece to property line.

e. Meter boxes subject to traffic shall have cast iron or steel lids.

f. Close keyways in meter box with steel shingle.

g. Jumper will be provded by City. To be picked up at Meter Shop by contractor. Service tapping card must be on file for each service.

h. Construction water bibs must be connected at at the coupling on customer side of service.

i. If straight copper tubing is installed, then sweat 90 degree elbow with silver solder 85-15.

j. 1-1/2" and 2" services will have flanged angle meter stops. Ford FV-13 or FV-43, as applicable.

k. Service pipe and tailpiece will be same size as meter.

l. Service clamp and corporation stops - asbestos-cement pipe and PVC pipe. Service saddle will be used for all service connections. Corp Stop Type F 101, 1P inlet threads outlet connection 1P pack joint with stainless steel insert. For 1-1/2" and 2" corporation stop. Ford Type F100 for copper service.

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m. Ductile iron pipe - 3/4" and 1" corporation stops shall be installed directly into mains of all sizes except four-inch. 1-1/2" and 2" services shall be installed with service saddles on all size mains. Corporation stops shall not be located within 12" (measured longitudinally along pipe) of each other.

Service pipes - All copper service pipes and fittings of 2" or less in diameter shall be copper Type K soft or copper Type K hard with silver solder sweat joint.

Polyethylene pipe fittings of pack joint style with stainless steel inserts. 3/4" and 1" PE to be iron pipe size, 1-1/2" and 2" PE to be copper tube size. Services or laterals larger than 2" shall be PVC AWWA C900 CL200. Three-inch meters will be connected to four inch service laterals. (All services shall be tested prior to back-filling. A minimum separation of 5' shall be maintained between water services and sewer laterals to 207A.)

36.8 New Services:

1. Location: All services 3/4" to 4" or larger shall be located at side property line. Services include domestic, irrigation and fire sprinkler or any other type of water service from City water system to private property.

2. Service types:

   a. Single domestic. Refer to standard Plate 304/305.

   b. Single irrigation. Refer to Plate 304.

   c. Two (2) service manifold. Refer to standard Plate 321.

   d. Industrial manifold. Refer to standard Plate 322.

   e. Four (4) service manifold. Refer to standard Plate 319.

   f. Cross-Connection (backflow) services. Refer Section 39.0.

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3. Irrigation service:

All irrigation services shall be copper/polyethylene encased. Per Plate 304.

4. Two (2) service manifold:

Two (2) service manifold shall be copper. The installation of manifold service requires approval. Water demand calculation shall be included on water plan as submitted by registered engineer.

5. Industrial manifold:

a. Industrial manifold will be installed at property line between two properties.

b. Fire sprinkler connection requires double check detector check valve assembly and Fire Department connection.

c. Domestic and irrigation take-off shall be 2" copper 5 feet long to serve each property. If meter size and water demand cannot be served with 2" pipe, a 4" service lateral 5 feet long shall be installed.

d. A reduced pressure principal backflow assembly shall be installed on irrigation and domestic services.

e. Street service lateral size shall be determined by estimated total demand. Material shall be C900 CL200 PVC.

f. Exact location of backflow assemblies shall be determined by Water Division.

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36.9 Existing Water Services:

1. Transferring Services - If an existing service meets the requirements of these specifications and is deemed acceptable by the Water Manager, it need not be renewed or replaced. It may be disconnected from the existing main and reconnected to the main, all additional material and labor required being furnished by the contractor, unless otherwise specifically provided in the special condition.

2. Replacing Services - Galvanized black iron or PVC services not meeting the requirements of these specifications or services acceptable to the Water Manager shall be replaced by new material conforming to the requirements of these specifications. Where an existing service is on flat rate and does not include a meter, the replacement shall consist of connection to the main (with service clamp, if required), service line, meter stop, an idler of approved size and construction, meter box and connection to the customer's service at property line. Unless specifically provided in the special conditions, the contractor shall furnish all necessary labor and materials for the replacement with the approval of the Water Manager.

36.10 Sterilization

After the pipe, services, hydrants and appurtenances have been completely installed, the contractor shall sterilize the installation with a solution of 20 to 50 ppm chlorine to the satisfaction of the County Health Department. He shall furnish all materials required and shall provide any necessary tape for introduction of the chlorine into the line and for flushing out after chlorination. The contractor may use chlorine tablets in place of liquid or gas chlorine. Application of liquid or gas chlorine shall be done through calibrated device which indicates rate of injection and mixing with the water.

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When tablets are used, they shall be affixed to the pipe on the day the pipe is installed in the ground. The contractor shall furnish the City Inspector with an approved chlorine testing device. The minimum number of chlorine tablets to be used per each 13' of pipe will be two for 6" or less diameter pipe, three for 8" pipe, four for 10" pipe, and four for 12" pipe. The chlorine tablets will be attached with #1 Permatex or approved equal to the crown of each section of pipe in order to distribute the chlorine solution evenly. Chlorine and testing of the new installation shall be done prior to making a final connection. This should be done according to State Health Standards.

37.0 Testing and Installation:

When the pipe has been satisfactorily sterilized, flushed, and bled of air, the entire installation, including water main, services, and fire hydrants, shall be subjected to 200 psi pressure for a minimum period of 15 minutes and two hours at 150 pounds, visible leaks in joints repaired. All asbestos-cement pipe shall be filled with water for at least 24 hours prior to testing, and pipe with cement joints shall not be tested until the final joints have cured for 36 hours. The maximum allowable leakage per one inch inside diameter for each 100' of pipe over a 2 hour test at 150 psi shall be as follows:

a. Welded Steel Pipe	.0118 gal.
b. Concrete Cylinder Pipe	.0118 gal.
c. Polyvinyl Chloride	refer to Mfg. test
d. Ductile Iron Pipe	
1) Caulked Joints	.0424 gal.
2) Rubber Ring Joints	.0212 gal.

All joints which show leakage in excess of the above mentioned table shall be remade or recaulked according to the direction of the engineer. The amount of actual leakage shall be metered with an acceptable calibrated tank. New valves which prove to be leaking will be replaced by the contractor. The installation shall be tested in sections. Each section being defined as the length of pipe between valves.

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38.0 Easements:

1. Where a fire line or a water main crosses private property, a licensed surveyor or registered civil engineer shall stake such line and submit 8-1/2" x 11" copies of the alignment staking notes and grade sheets to the Water Manager for approval prior to the start of any construction. Each sheet is to bear the seal and signature or responsible person. Alignment staking notes shall show and reference all existing monuments used in the survey and all distances set off or measured and all angles set off or measured. The information shown shall be done in a legible professional manner and shall be sufficient for retracement of the survey without any further research. Grades shall be staked a minimum of every 25' with the offset and the cut indicated for each station.

   An inclusive water easement will be required for such lines unless it is determined by the City that it is beneficial to both parties involved to allow the water line to be private (see Section 2.118). The easement will be a minimum of 15' wide, with the water line located 5' from one side to allow a 10' work area. The easement will be recorded in the tract or parcel map and will be indicated on the water plans prior to approval by the City. If no map is recorded, the easement shall be recorded on a Grant Deed and registered. All lines from the main up to and including the meter box will be within the easement.

   Private property with exclusive easement shall be classified as special application allowed only for supplying on site fire hydrants. Fire line on private property with an exclusive water easement will not be classified as a point of service connection.

2. If the City allows a water line to be private, the line will have a backflow prevention device located so as to prevent possible contamination of the public water from the private line. The location and type of backflow device will be subject to the City's approval prior to installation. Refer standard Plate 311.

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39.0 Cross-Connection Backflow

The water supplier shall protect the public water supply from contamination by implementation of a Cross-Connection Control program.

The purpose of this section is to protect the public water supply against actual or potential cross-connections by isolating within the premise. Contamination or pollution may occur because of some undiscovered or unauthorized cross-connection on the premises.

Minimum requirements for cross-connection/backflow protection are contained in Title 17 of California Administration Code, USC Foundation for Cross-Connection Control and Hydraulic Research. Manual of Cross-Connection latest edition and Chapter 33 Article 4 of City Code.

39.1 Approval of Backflow Preventers:

Backflow preventers shall be approved by a recognized testing organization. Refer to Title 17, Section 7601.

Backflow preventers required by this Chapter shall have passed laboratory and field evaluation tests performed by a recognized testing organization which has demonstrated their competency to perform such tests to the Department.

Location of Backflow Preventers:

1. Air-gap Separation. An air-gap separation shall be located as close as practical to the user's connection and all piping between the user's connection and the receiving tank shall be entirely visible unless otherwise approved in writing by the water supplier and the health agency.

2. Double Check Valve Assembly. A double check valve assembly shall be located as close as practical to the user's connection and shall be installed above grade, if possible, and in a manner where it is readily accessible for testing and maintenance.

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3. Reduced Pressure Principle Backflow Presention Device. A reduced pressure principle backflow prevention device shall be located as close as practical to the user's connection and shall be installed a minimum of twelve inches (12") above grade and not more than thirty-six (36") above grade measured from the bottom of the device and with a minimum of twelve inches (12") side clearance.

4. Location, size, and type of backflow prevention shall be approved by water supplier. Protection shall be as close to the service connection as practical with a maximum of five feet from street right-of-way and within three feet of side property line. An exclusive easement from City right of way to a maximum of five feet beyond device and two and a half feet on each side of device.

5. All backflow preventers shall be visible from City right of way to allow visual inspection and access at all times. If at any time visual inspection or access is obstructed by fences or any other obstruction, water service will be discontinued per City Code, Chapter 33.

39.2 Basic Service Type Requiring Backflow Preventer:

1. Commercial and industrial manifold services.

2. Non-residential irrigation services.

3. Restaurant services.

4. Fire sprinkler system with Fire Department connection.

Service not listed above may require backflow devices and shall be determined on a case by case basis per Title 17 and Manual of Cross-Connection Control.

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39.3 Service piping:

Service pipe from City main to meter backflow preventer and to point shall be:

1. 3/4 inch to 2 inch shall be copper tubing Type K hard.

2. 4 inch and large shall be C900 PVC CL200 to first 90 degree ell per standard Plate 310.

39.4 Inspection and Testing:

1. All installations of backflow preventers shall be inspected by Cross-Connection Control personnel.

2. Water service to unapproved devices or installations will be discontinued until device or installation is approved.

3. Testing shall be per Title 17.

39.5 Non-Approved Backflow Preventers:

1. Pressure vacuum breaker (PVB) and atmospheric vacuum breakers (AVB) are not approved for use at user's connections.

39.6 Fire Sprinkler Systems:

1. All fire sprinkler systems are required to have a double check detector check valve assembly and a Fire Department connection.

2. Bypass meter type and manufacture shall be approved by Water Division. Refer approved water system materials.

3. Installation shall be at location shown on plans. Other details refer to standard Plate 311.

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40 GENERAL SEWER SYSTEM DESIGN GOALS AND ACCEPTABLE PROCEDURES

40-1 GENERAL REQUIREMENTS

The design and construction of sanitary sewers in the City of Oxnard shall be in accordance with good engineering practice. The work shall comply with these design goals except where specific modifications have been approved by the Public Works Director in writing. The Director shall decide all questions of interpretation of " Good Engineering Practice ". All work on sewers and sewer service laterals outside of City right - of - way or sewer easements will be governed by the provisions of the Uniform Plumbing Code. Where City requirements and standards are more restrictive than U.P.C., the City requirements shall govern. Where purveyor's requirements are more restrictive than these standards, the purveyor's requirements shall govern.

40-2 SPECIFIC REQUIREMENTS

40-2.1. VELOCITY :

The velocity of flow (averaged over the wetted cross-section) for sanitary sewers flowing part-full or full should be between 2.0 f.p.s. and 10.0 f.p.s. The most commonly used formula is Manning's , which is :

$$V = \frac{1.486}{n} R^{2/3} S^{1/2} \quad \text{in f.p.s.}$$

Where n is roughness coefficient (see sect. 40-4)
R is hydraulic radius
S is energy gradient . For open channels, uniform flow condition it is equal to invert slope.

Discharge $Q = V A$ in c.f.s.

Where V = Velocity of flow in f.p.s.
A = Wetted cross-sectional area in sq.ft.

Also

Q g.p.m. = (Qc.f.s.) ×(448.83)

40-2.2 FLOW DEPTH

a) For pipe 10" or less in diameter :

Design pipe so that peak flow rate will be carried when pipe is flowing at one-half (1/2) depth. Discharge at one-half depth equals one-half discharge when full and velocity equals velocity when full.

b) For pipe 12" and larger in diameter :

Design pipe so that peak flow rate will be carried when pipe is flowing at two-third (2/3) depth. Discharge at 2/3 depth equals 3/4 discharge when full and velocity equals 1.16 times velocity when full.

In no case gravity sewer lines will be designed to flow full or pressurize the system.

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40-3 MINIMUM STREET SEWER SIZE

40-3.1 Minimum street sewer size shall be 8", except that 6" pipe may be used where all of the following conditions are met :
(a) The minimum invert slope shall be 0.008.
(b) The length shall not exceed 200' with no possibility of future extension.
(c) No more than 10 house laterals contribute to the 6" diameter reach.
(d) Minimum cover of line shall be 5.0feet.

40-4 MINIMUM INVERT SLOPE :
Slope of sewer invert shall equal or exceed those set forth in the following table. For case of checking maximum flow capacity at these minimum slope is given for V.C.P. (n= 0.013) and P.V.C. (n=0.011) in c.f.s. and g.p.m.

TABLE - 1

PIPE DIAMETER	MINIMUM SEWER INVERT SLOPE	MAXIMUM FLOW CAPACITY IN c.f.s. (g.p.m.)	
		V.C.P.	P.V.C.
6"	0.0060	0.218 (97.7)	0.257 (115.5)
8"	0.0040	0.383 (171.8)	0.452 (203.0)
10"	0.0028	0.581 (260.6)	0.686 (308.0)
12"	0.0020	1.250 (561.0)	1.477 (663.0)
14"	0.0020	1.885 (846.2)	2.228 (1000.0)
15"	0.0016	2.027(909.8)	2.396 (1075.2)
16"	0.0016	2.408 (1080.6)	2.845 (1277.0)
18"	0.0016	3.296 (1479.4)	3.895 (1748.4)
20"	0.0012	3.781 (1696.8)	4.468 (2005.3)
21"	0.0012	4.306 (1932.6)	5.089 (2284.0)
24"	0.0012	6.148 (2759.2)	7.265 (3260.9)
27"	0.0012	8.416 (3777.4)	9.946 (4464.1)
30"	0.0012	11.146(5002.7)	13.173 (5912.3)
33"	0.0012	14.372(6450.4)	16.985 (7623.2)
36"	0.0012	18.125 (8135.0)	21.420 (9614.0)

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STANDARD PLAN

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Substandard slopes below the minimum slopes listed in table -1 may be used in order to avoid pumping only upon specific approval of the City Engineer . Such approval should be solicited well in advance of completion of design.

41 DESIGN CRITERIA

41-1 AVERAGE SEWAGE FLOW RATES

The average flow rate shall be determined by the developer's Engineer based on good engineering practice . Sewage flows shall be determined from the potential land use of the tributary area. Average sewage flow rates were developed for various land use and anticipated population density and given in term of G.P.M./Acre The currently accepted values are given in Table on Plate 44 These flow rates should be used for new development and determining effects of future land use per general plan. Acreage in table is gross acreage including roads , yards, parking , etc. For estimating the sewage flows for specific land use the flow rate value given in Table on Plate 43.

41-2 PEAK SEWAGE FLOW RATES

The rates between peak flow to average flow shall be determined by using following information

41-2.1 For average flow up to 1C.F.S.

$$(\text{Peak flow , c.f.s.}) = 2.0 \times (\text{Average flow , c.f.s.})^{0.822}$$

41-2.2 For average flow greater than 1 C.F.S.

$$\text{Peaking factor} = 2.0 \times (\text{Average flow, c.f.s.})^{-0.1}$$

The graphical representation of above equations is given on plate 45 . This should be used in designing sewer system in the City of Oxnard.

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STANDARD PLAN PLATE 42 SHEET OF

AVERAGE SEWAGE FLOW RATES

TYPE OF DEVELOPMENT	GALLONS/PERSON/DAY	
Airport	15	per employee
	4	per passenger
Factories.... No showers	20	per employee
With showers	30	per employee
Cafeteria - Add industrial waste and BOD load		
Offices	20	per employee
Stores (Not including food & laundry waste)	100	per 1000 Sq.Ft. space
	400	per toilet
(Per shift)	15	per employee
Laundries (Coin operated).	300	per machine
Per customer....	50	per wash
Service Station	1000	for first bay
....	500	for each additional
....	10	per car served
Swimming Pools	10	per employee
....	4	per swimmer
With hot water.....	8	per swimmer
Theaters.....	5	per seat
Drive in	5	per space
Assembly & Dance Halls....	2	per seat or customer
Church - Small	4	per seat
Large & with kitchen	6	per seat
Bowling Alleys - Pool Parlors	75	per lane or table
Country Clubs	75	per member
Add	25	per non-member
Camps - Resort (Limited Plumbing)....	50	per person
(Luxury)...	120	per person
Youth & Recreation	50	per camper
Tent Campground (toilets only)	25	per camper
Central stations w/showers..	35	per camper
Vacation cottages..	200	per cottage
Picnic Parks (toilets only)...	10	per person
(w/bath house & flush toilets)	15	per person
Camper & Travel Trailers		
Without hook up..	50	per space
w/water and sewer hook up...	120	per space
Camps - Summer and Seasonal	50	per person
Construction	50	per person
Day Camps no meal served	20	per person

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PLATE 43

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AVERAGE SEWAGE FLOW RATES

TYPE OF DEVELOPMENT	GALLONS/PERSON/DAY
Mobil Home Parks (Average)	180 per space
(Delux)..	225 per space
Overnight & Travel Trailer	150 per space
Restaurants - Cafeterias..	15 per employee
Add Kitchen Waste..	7 per meal served
Add Garbage Grinder	1 per meal served
Toilet & Kitchen Waste	10 per customer
Day time Operation	70 per seat space
24-hr. Operation...	100 per seat space
Curb Service	50 per car
With Tavern, add...	2 per customer
Schools and Colleges	
Staff and Office...	20 per person
Elementry students.	15 per student
Intermediate and High	20 per student
Day Schools w/cafeteria only....	15 per student
w/showers	20 per student
Boarding school....	80 per student
College Dormitories	85 per student
Hospitals	100 per bed
....	150 per patient & Staff
Institutions (Resident)	100 per person
Nursing homes	100 per person
Rest homes	100 per person
Convalescent	85 per bed
Hotel/Motels - No private bath	100 per room (2 persons)
with Private bath	150 per room (2 persons)
Apartment Buildings:	
Bachelor or Single Dwelling units (Studio)	100 per dwelling unit
1 bedroom dwelling unit	150 per dwelling unit
2 bedroom dwelling unit	200 per dwelling unit
3 bedroom dwelling unit	250 per dwelling unit

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GENERAL REQUIREMENTS – SEWER

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STANDARD PLAN

PLATE 43

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SEWAGE GENERATION FACTOR AND LAND USE

BASED ON CURRENT PLANNING DESIGNATION

SIMBOL	LAND USE DESCRIPTION	ASSUMED UNIT/ AC.	FLOW RATE		
			GPM / AC.	GPD / AC.	GPD/ UNIT
R1	SINGLE FAMILY RESIDENTIAL	4.0	0.853	1,228.32	307.1
R2	DUPLEX (MULTI FAMILY RESIDENTIAL)	11.2	1.751	2,521.44	225.2
R3	GARDEN APTS. (TRI & QUADPLEX)	20.0	3.143	4,525.92	226.3
R4	HIGH RISE RESIDENTIAL	38.3	6.000	8,640.00	225.6
RPD	RESIDENTIAL PLANNED DEVELOPMENT	11.2	1.751	2,521.44	225.2
MHP	MOBIL HOME PARK	4.0	----	612.00	153.0
		ASSUMED T.S.F./AC.			GPD/ T.S.F.
CO	COMMERCIAL OFFICE	10.0	2.083	3,000.00	300.0
C1	NEIGHBORHOOD COMMERCIAL	13.6	1.042	1,500.00	110.0
C2	GENERAL COMMERCIAL	19.8	1.042	1,500.00	76.0
C3	HEAVY COMMERCIAL	10.0	4.167	6,000.00	600.0
CB	CENTRAL BUSINESS DISTRICT	10.0	3.125	4,500.00	450.0
CPD	COMMERCIAL PLANNED DEVELOPMENT	11.0	2.083	3,000.00	300.0
TP	TRAILER PARK	13.0	1.391	2,003.00	153.0
M1	LIGHT MANUFACTURING	11.75	2.244	3,232.00	275.0
M2	HEAVY MANUFACTURING	19.38	2.065	2,974.00	153.5
M3	HEAVY MANUFACTURING AND GROUP HOUSING	19.38	2.065	2,974.00	153.5
MPD	MANUFACTURING PLANNED DEVELOPMENT	19.38	2.065	2,974.00	153.5
CR	COMMUNITY RESERVE	---	0.449	646.60	----
AO	AGRICULTURAL - OIL DRILLING	---	0.449	646.60	----

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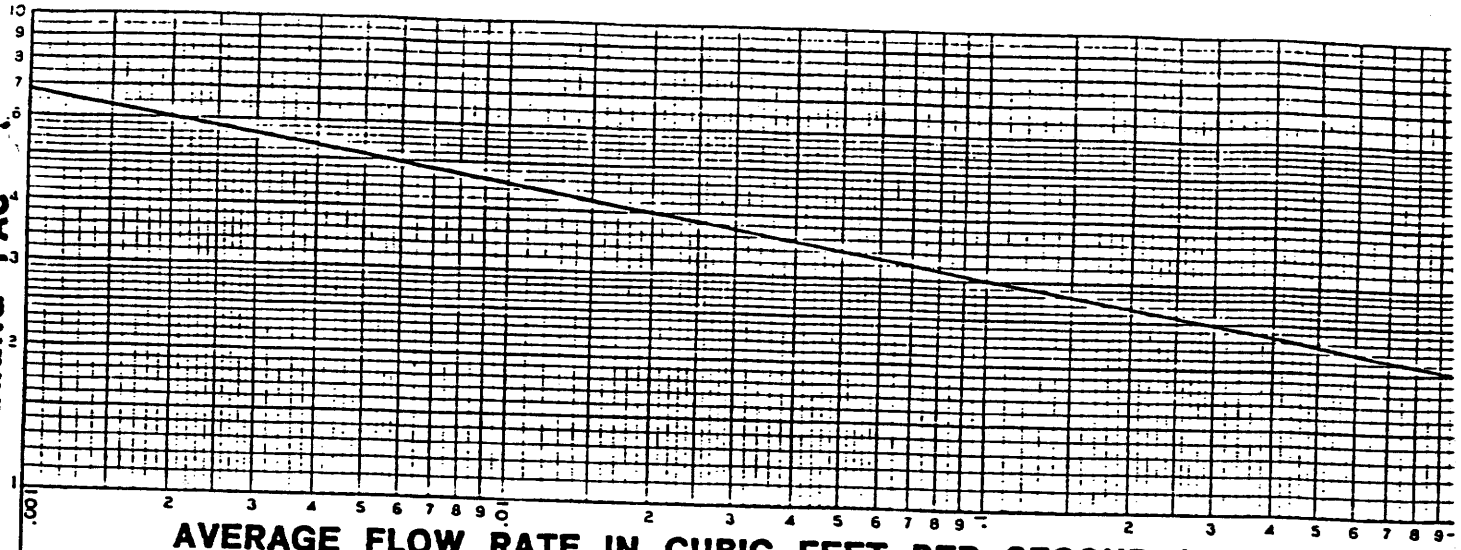
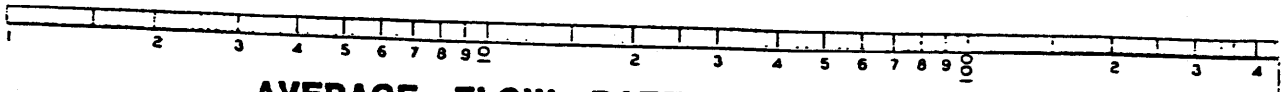
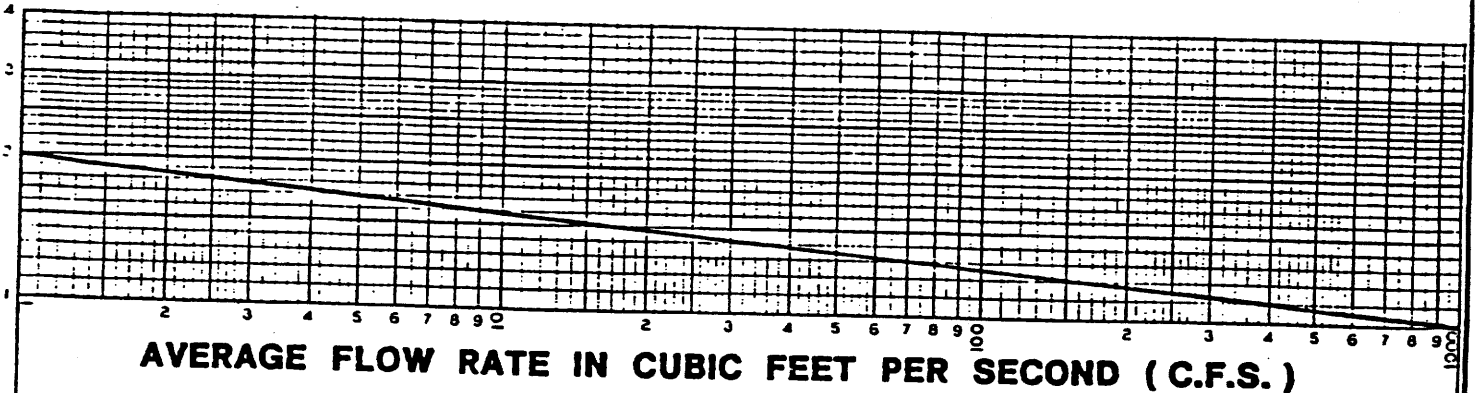
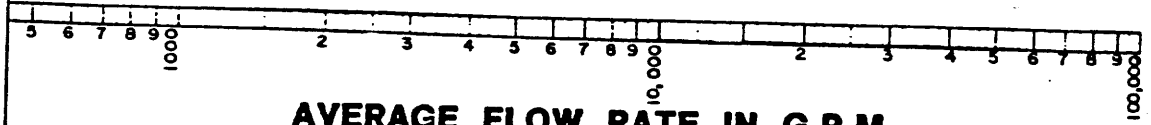




(PEAK FLOW, c.f.s.) = 2.0 x (AVERAGE FLOW, c.f.s.)$^{0.822}$

A. FOR AVERAGE FLOW UP TO 1.0 C.F.S.





PEAKING FACTOR = 2.0x (AVERAGE FLOW, c.f.s.)$^{-0.10}$

B. FOR AVERAGE FLOW GREATER THAN 1.0 C.F.S.

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42 GENERAL REQUIREMENTS

42-1 SEWER CONNECTION PERMIT

No person shall connect any sewer system on private property, within or outside the City limits, to the City's Sewer System without first procuring a permit from the City of Oxnard to make such connection. Any person desiring to obtain such a permit shall submit to the City- Public Works Development section the following:

1) Completed application
2) Accurate estimate of quantity and quality of sewage flow to be discharged in the existing system.
3) Variation in sewage discharges on daily basis and seasonal basis.
4) Sewer connection fees as determined based on above facts.

42-2 ENCROACHMENT PERMIT

Oxnard City Code, Section 26, requires all persons to obtain an enchroachment permit for all works within Public right-of-way within the City. Upon request by the contractor, the Public Works Department will issue the permit without charge on City project contracts.

42-3 PLANS AND CONSTRUCTION

Plans are required for the construction of main line sewers and service laterals. They shall conform to the City of Oxnard , Department of Public Works requirements. All design calcs. and field information pertaining to tie-in point shall be submitted for review and approval. All construction shall conform to the plans unless a change is approved in writing by the Public Works Director and noted on revision block.

⚠ All sewers shall be videotaped in VHS. Tapes to be delivered to the inspector at the time of taping.

42-4 CITY INSPECTION

All new construction shall be subject to inspection by the City - Public Works inspectors. Major projects are required to pay for such inspection as required by the Public Works department. Therefore, keep your field changes to a minimum by putting more efforts in the design phase and resolving utility conflicts at early stage.

42-5 OVERSIZING AND EXTRA DEPTH

Oversizing and extra depth of certain tract sewers may be required where such sewers can logically serve an upstream tributary area.

42-6 PROTECTION OF ACTIVE SEWERS

When new sewer lines are to be connected to an existing manhole which is in active use, the designer shall call for such protections as is necessary to prevent construction debris from being washed into the active sewers. Plugged inlets or other suitable protection shall be called for in the active manhole before beginning manhole modifications or tract sewer cleaning.

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⚠ 7/17/89

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43 SEWER LOCATION

43-1 STREETS AND ROADWAYS

Street sewer main shall be 5 feet north or west of and parallel to the centerline of undivided street (see plate 120).
In divided roadways, it shall be 10 feet north or west of and parallel to the centerline of the roadways (see plate 121)*.
Exception to these location requirements may be made only on approval of the Public Works Director.

* Sewer mains in public alleys shall be north or west of and parallel to centerline of the alleys per Plate 122.

43-2 EASEMENTS

43-2.1 Sewer easements shall be not less than 12feet wide for 5' deep sewer line. The easement width shall be increased by one foot increment for every additional one foot depth . (i.e. for 10' deep sewer main , the easement width shall be 17' minimum).

43-2.2 Where easements follow common lot lines, the full easement width shall be on one lot, in such a manner that access to manholes will not be obstructed by walls, trees , or permanent improvements. Where this requirement can not be met without interfering with existing buildings, easements may straddle lot lines.

43-2.3 Deeds for easements shall provide for restrictions of permanent construction within easement to provide ingress and egress for maintenance.

43-3 FUTURE EXTENSIONS :

When an area outside the tract can be logically served by future extension of a tract sewer, the tract sewer shall extend to the tract boundary or to the end of a paved street or alley in a manner to facilitate the future extension without removing permanent facilities.

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44 ALIGNMENT

44-1 Sewer mains shall be laid on a straight alignment and grade between manholes.

44-2 Minimum horizontal radius of curvature is as follows:

P.V.C.	or	V.C.P.	6" thru 12"	200' Radius
P.V.C.	or	V.C.P.	15" thru 24"	300' Radius
P.V.C.	or	V.C.P.	27" thru 36"	400' Radius
P.V.C.	or	V.C.P.	39" thru 42"	600' Radius

Minimum grade of horizontally curved sewer shall be at least same as straight sewers and preferably higher . Reverse curves are not permitted between manholes . All curved lines to be inspected by T.V. camera before acceptance by the City at Contractors expense.

44-3 Vertical curves may be used in combination with horizontal curves where invert slopes exceed 1.0% throughout the reach between the manholes.

44-4 The arithmetic sum of all horizontal and vertical deflection in curved sewers between adjacent manholes shall not exceed 60°.

44-5 WATER-SEWER SEPARATION

State Department of Health Requirements shall be met for Water-Sewer separation. (See Section 49)

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APPR. BY Benjamin Y. Wong

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45 DEPTH OF SEWERS

45-1 BASIC REQUIREMENT

Sewers shall be installed at a depth which will provide suitable service to the properties connected and will allow subsequent installation of water lines in accordance with the Water Sewer Separation Ordinance with a minimum of special construction of the water lines other than joint spacing.

45-2 STANDARD DEPTHS

Compliance with Subsection 45-1 will usually be assured if :
The main sewer is located at a depth of 7' to top of pipe below the flow line of the existing or proposed gutter , or where no gutter exists , from the elevation of the outermost edge of the traveled way , and the house laterals are located either ,
(1) 6' to top of pipe below the ground surface at the property line, or
(2) at a depth below the ground surface at the property line that will provide for the construction of a straight run of private sewers at a slope of 0.02 from one foot below the surface at any point within the established building setback lines, excluding any areas steeper than 5 horizontally to one vertically , whichever depth is greater.

45-3 EXCEPTIONS

Designs not in accordance with Subsection 45-2 shall be submitted to the Engineer for approval together with evidence that it complies with subsection 45-1.

46 STRUCTURES

46-1 MANHOLES

46-1.1 LOCATIONS

a. Manholes shall be located at all abrupt changes in alignment or grade and at all junctions.

b. Manholes shall be located at least every 350 feet along lines smaller than 12" in diameter. Spacing of manholes on lines 15" in diameter and larger will usually be at 400 feet but may be extended subject to the approval of the Engineer.

c. The center of upper most (last) manhole for sewers on "Thru" streets shall be a minimum of 8 feet upgrade from the sewer lateral of the last lot served (laterals to be perpendicular to sewer main). Manholes at the end of cul-de-sac streets shall end (depending on available space) 10' to 15' before the curb face at the end of the street.

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46-1.2 DROP MANHOLES

Drop manholes shall be used wherever sewers enter manholes at more than 32 inches above the outlet elevation of the manhole. Vertical curves may be used to eliminate drop manholes in accordance with the requirements of section 44

46-1.3 DESIGN

Manholes shall be constructed generally in accordance with Plates 400, 408, 411 & 412.
Manhole designs, which , in the opinion of the Engineer, provide access to the sewers, a stable working platform and freedom from splash and turbulence , equivalent to or better than the design shown herein will be approved.

46-1.4 PROTECTION

Where new tract sewers are to be connected into a manhole which is in active use, the designer shall call for such protection as is necessary to prevent construction debris from being washed into the active sewers. Plugged inlets or other suitable protection shall be called for in the active manhole before beginning manhole modifications or tract sewer cleaning.

46-1.5 RIM ELEVATIONS

In paved areas , the manhole rim elevation shall match the finished grade . In other than paved areas or travelled ways, the height of the manhole rim will normally be 18" above the finished grade, high water mark, or above the top of future fill areas. In areas where the top of the manhole will need to be below the surface , such as fields that are being farmed, a water tight frame and cover will be required. The elevations shown for the tops of manholes on the design plans shall not relieve the contractor from making final adjustments to match street surfaces.

46-2 CLEANOUTS

46-2.1 REQUIREMENTS

Dead end sewers not over 200 feet in length shall terminate in standard manholes or cleanouts. Dead ends over 200 feet long shall terminate in standard manholes unless future extension of said dead end will include a manhole within 350 feet of the upper most manhole, in which case a temporary cleanout is permitted. Where dead ends are on a slope of 0.01 or greater, the length for use of a cleanout may be extended to 275 feet.

46-2.2 LOCATION

End structures shall be located Five (5) feet up grade from the down grade lot line of the last lot served unless greater length is necessary to serve the property. Cleanouts at the end of cul-de-sac streets shall end 10' to 15' (depending on available space) before the curb face at the end of the street.

46-2.3 DESIGN

Cleanouts shall be constructed generally in accordance with Plate 407.

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46-3 SERVICE LATERALS

46-3.1 REQUIREMENTS

Wherever it is known or can be reasonably assumed that a building sewer connection is required, a service lateral shall be shown on the plans and installed a minimum of 5' inside the property line as a part of the street sewer construction, prior to paving . Service laterals shall be installed whenever possible during construction of the sewer main using prefabricated fittings . All laterals shall be perpendicular to the sewer main , with the exception in cul-de-sac area and knuckle area. Sewer laterals shall not be located within driveways.

46-3.2 SIZE

Service laterals for single dwellings and small single stores or offices shall be 4" or larger provided the plumbing Code does not require the building sewer to be larger than 4". All other service laterals shall be 6" or larger and at least equal to the size of the building sewer.

46-3.3 DEPTH

Service laterals shall be at the minimum depths herein provided and in addition such depth shall be sufficient to provide a connection to any point on the lot within the established building setback lines (excluding any area steeper than 5 horizontally to one vertically) with a cover of one foot and a slope on not less than 0.02. Any exception to this requirement may be madeonly upon approval by the Director of Public Works.

46-3.4 FUTURE CONNECTIONS

Unused openings shall be tightly sealed and supported in a manner to facilitate their future location and use. Developer's engineer shall select appropriate service lateral locations and shall instruct contractor to locate laterals according to the design elevations and locations.

46-3.5

Sewers shall be designed to preclude the backflow of sewage into laterals except when this is economically infeasible. Backflow of sewage into laterals may occur in any building that has waste receiving inlets which are lower than the rim elevation of the next upstream manhole or other structure providing hydraulic relief. While the Plumbing Code provides for the customer to install check valves under certain conditions, the conditions stated do not cover all possibilities of backflow and check valves frequently fail to operate properly. Causes of sewer stoppage include : the introduction of foreign objects into manholes , the buildup of grease in the sewer crown at locations where hydraulic jumps occur , high flow rates due to ground or surface water entering the sewer, difficulties while balling sewers ; and undersized sewers.

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46-3.6 CONNECTION TO CESSPOOLS OR SEPTIC TANKS

A person shall not connect or cause to be connected any cesspool seepage pit or septic tank to any main line sewer or to any service lateral leading thereto .

46-3.7 CURB MARKINGS

The location of all sewer service laterals shall be marked on the curb at completion of construction .

46-3.8 LATERAL ABANDONMENT

An inspection fee , of the amount approved by City Council , shall be collected and a written permit shall be issued. A public works inspector shall inspect the exposed sewer lateral to see that it has been plugged or capped to insure that any future infilteration shall be eliminated . The inspector shall determine whether the on-site lateral shall remain intact or be crushed in place or removed .

47 STRUCTURAL

47-1 ROADS

All structures and pipe placed under public roads shall be of sufficient strength to support with (an adequate factor of safety) the backfill , road surfacing and H-20 truck loading with impact.

47-2 OTHER PIPES AND STRUCTURES

Sewers under other pipes and structures shall be protected from damage and shall be constructed so as not to endanger the other pipe or structure . Minimum clearance between outside of pipes or between pipes and other structures is 6" unless approved by the Engineer.

47-3 FLEXIBLE JOINTS

Flexible joints which will allow for differential settlements or other movement of sewer pipe , sewer structures , adjacent pipe and adjacent structures shall be provided where sewer lines enter encasements , manholes or other structures. Flexible joints shall be within 4 feet of such structures.

47-4 STEEP GRADES

Sewers laid on grades steeper than 10%, which are not under pavements, shall be anchored in place and protected from erosion in a manner approved by the Engineer.

48 FORCE MAINS AND LIFT STATIONS

48-1 REQUIREMENTS

All sewage shall reach the system by gravity flow, in a fresh condition susceptible to conventional sewage treatment processes. Where extreme hardship conditions prevail, and a substantial area cannot be sewered by gravity sewers in accordance with these requirements, a sewage pumping station may be installed. No pumping facilities shall be incorporated in sewer plans without approval of the Engineer.

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48-2 LIFT STATIONS DESIGN

Lift stations, where allowed, shall be of the dry-pit type incorporating the following features :

a) Pumps or other devices shall be provided in duplicate, arranged for positive priming .

b) Capacity shall be provided to handle ultimate peak flow from the tributary area with the largest pump out of service. Stage installation of pumps is allowed providing space is provided for future installations.

c) Access shall be provided to site for removal and repair of equipment .

d) A means for dewatering force mains shall be provided.

e) An overflow to natural channel or storm drain shall be provided or an alternate method of protection approved by the Engineer.

f) The lift station shall not be in CITY road right of way except with permission from the Engineer.

48-3 FORCE MAIN DESIGN

Force mains need not comply with the requirements for gravity sewers. Force mains shall be designed in accordance with good engineering practice.

49 WATER – SEWER SEPARATION – HEALTH REQUIREMENTS

See plate 53 sheet 2 thru 10.

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GENERAL REQUIREMENTS – SEWER

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STATE OF CALIFORNIA
DEPARTMENT OF HEALTH

Revised Jan. 1963

CRITERIA FOR THE SEPARATION OF WATER MAINS AND SANITARY SEWERS

A. PUBLIC HEALTH CONSIDERATIONS

Waterborne disease outbreaks attributed to the entry of sewage-contaminated groundwater into the distribution systems of public water supplies continue to be a problem in the United States. A community with its buried water mains in close proximity to sanitary sewers is vulnerable to waterborne disease outbreaks.

Sanitary sewers frequently leak and saturate the surrounding soil with sewage. This is caused primarily by structural failure of the sewer line, improperly constructed joints, and subsidence or upheaval of the soil encasing the conduit. A serious public health hazard exists when the water mains are depressurized and no pressure or negative pressures occur. The hazard is further compounded when, in the course of installing or repairing a water main, existing sewer lines are broken. Sewage spills into the excavation and, hence, enters into the water itself. Additionally, if a water main fails in close proximity to a sewer line, the resultant failure may disturb the bedding of the sewer line and cause it to fail. In the event of an earthquake or man-made disaster, simultaneous failure of both conduits often occurs.

The water supplier is responsible for the quality of the water delivered to consumers and must take all practical steps to minimize the hazard of sewage contamination to the public water supply. Protection of the quality of the water in the public water system is best achieved by the barrier provided by the physical separation of the water mains and sewer lines.

The document sets forth the construction criteria for the installation of water mains and sewer lines to prevent contamination of the public water supplies from nearby sanitary sewers.

B. BASIC SEPARATION STANDARDS

The "California Waterworks Standards" set forth the minimum separation requirements for water mains and sewer lines. These Standards, contained in Section 64630, Title 22, California Administrative Code, specify:

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(a)

(b)

(c) (1) Parallel Construction: The horizontal distance between pressure water mains and sewer lines shall be at least 10 feet.

(2) Perpendicular Construction (Crossing): Pressure water mains shall be at least one foot above sanitary sewer lines where these lines must cross.

(d) Separation distances specified in (c) shall be measured from the nearest edges of the facilities.

(e) (2) Common Trench: Water mains and sewer lines must not be installed in the same trench.

C. EXCEPTIONS TO BASIC SEPARATION STANDARDS

Local conditions, such as available space, limited slope, existing structures, etc., may create a situation where there is no alternative but to install water mains or sewer lines at a distance less than that required by the Basic Separation Standards. In such cases, alternative construction criteria as specified in Section B should be followed, subject to the special provisions in Section D.

Water mains and sewers of 24 inches diameter or greater may create special hazards because of the large volumes of flow. Therefore, installations of water mains and sewer lines 24 inches diameter or larger should be reviewed and approved by the health agency prior to construction.

D. SPECIAL PROVISIONS

1. The Basic Separation Standards are applicable under normal conditions for sewage collection lines and water distribution mains. More stringent requirements may be necessary if conditions, such as, higher groundwater exist.

2. Sewer lines shall not be installed within 25 feet horizontally of a low head (5 psi or less pressure) water main.

3. New water mains and sewers shall be pressure tested where the conduits are located ten feet apart or less.

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GENERAL REQUIREMENTS – SEWER

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4. In the installation of water mains or sewer lines, measures should be taken to prevent or minimize disturbances of the existing line. Disturbance of the supporting base of this line could eventually result in failure of this existing pipeline.

5. Special consideration shall be given to the selection of pipe materials if corrosive conditions are likely to exist. These conditions may be due to soil type and/or the nature of the fluid conveyed in the conduit, such as septic sewage which produces corrosive hydrogen sulfide.

6. Sewer Force Mains

   a. Sewer force mains shall not be installed within ten feet (horizontally) of a water main.

   b. When a sewer force main must cross a water line, the crossing should be as close as practical to the perpendicular. The sewer force main should be at least one foot below the water line.

   c. When a new sewer force main crosses under an existing water main, all portions of the sewer force main within ten feet (horizontally) of the water main shall be enclosed in a continuous sleeve.

   d. When a new water main crosses over an existing sewer force main, the water main shall be constructed of pipe materials with a minimum rated working pressure of 200 psi or equivalent pressure rating.

E. ALTERNATE CRITERIA FOR CONSTRUCTION

The construction criteria for sewer lines or water mains where the Basic Separation Standards cannot be attained are shown in Figures 1 and 2. There are two situations encountered:

Case 1 -- New sewer line -- new or existing water main.

Case 2 -- New water main -- existing sewer line.

For Case 1, the alternate construction criteria apply to the sewer line.

For Case 2, the alternate construction criteria may apply to either or both the water main and sewer line.

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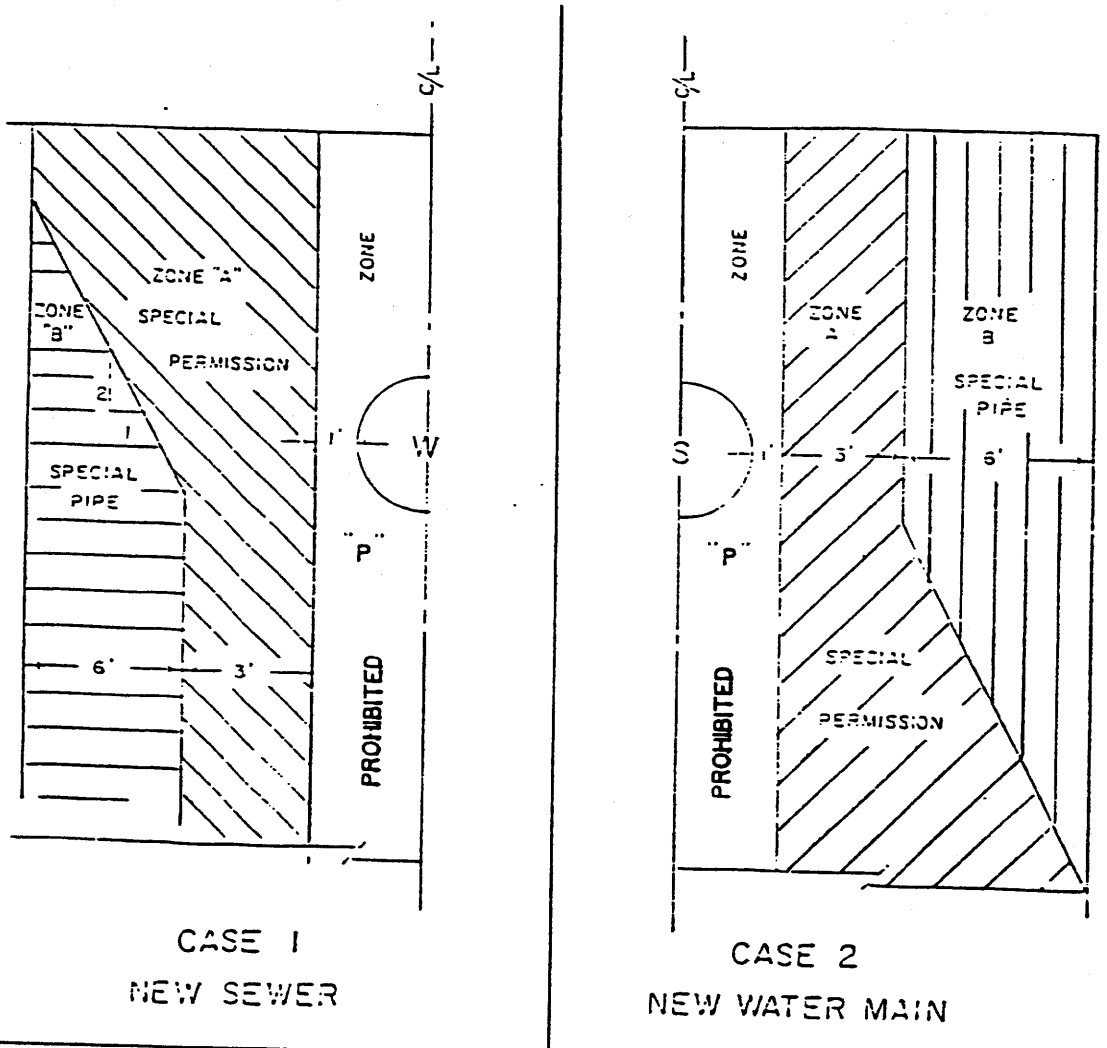
The construction criteria should apply to the house laterals that cross above a pressure water main but not to those house laterals that cross below a pressure water main.

FIGURE 1

PARALLEL CONSTRUCTION



CASE 1
NEW SEWER

CASE 2
NEW WATER MAIN

NOTE :
ZONES IDENTICAL ON EITHER SIDE OF CENTER LINES.

ZONES "P" IS A PROHIBITED ZONE SECTION 64630 (E) (2) CALIFORNIA ADMINISTRATIVE CODE , TITLE 22.

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GENERAL REQUIREMENTS – SEWER

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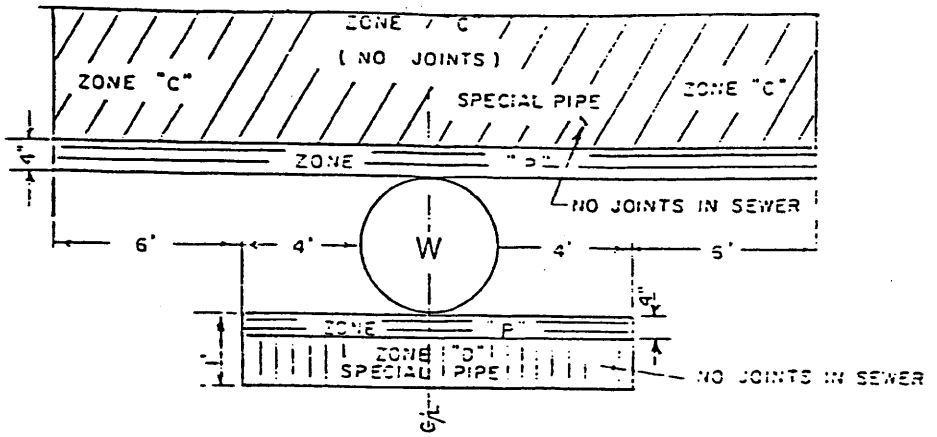
FIGURE 2

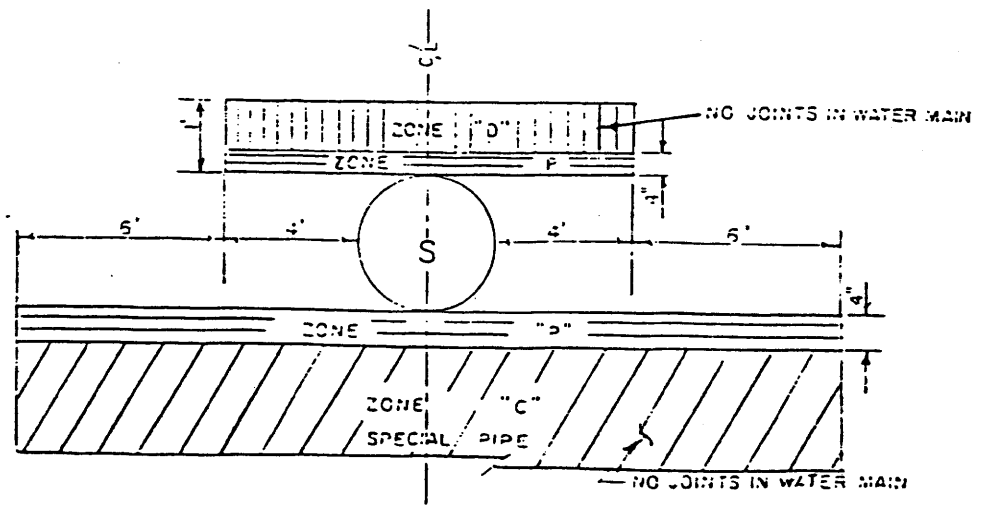
CROSSINGS



CASE 1

NEW SEWER

NOTE:
"D" IS A PROHIBITED CONSTRUCTION ZONE.



CASE 2

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Case 1: New Sewer Being Installed (Figures 1 and 2)

Zone	Special Construction Required for Sewer
A	Sewer lines parallel to water mains shall not be permitted in this zone without approval from the responsible health agency and water supplier.
B	A sewer line placed parallel to a water line shall be constructed of: 1. Extra strength vitrified clay pipe with compression joints. 2. Class 4000, Type II, asbestos-cement pipe with rubber basket joints. 3. Rubber gasketed pressure rated plastic pipe (per ASTM 2241), class rated plastic water pipe (per AWWA C900) or equivalent. 4. Plastic sewer pipe with fused joints (per ASTM D3034) or equivalent. 5. Cast or ductile iron pipe with compression joints. 6. Reinforced concrete pressure pipe with compression joints (per AWWA C302-74).
C	A sewer line crossing a water main shall be constructed of: 1. Ductile iron pipe with hot dip bituminous coating and mechanical joints. 2. A continuous section of Class 200 (DR 14 per AWWA C900) plastic pipe or equivalent, centered over the pipe being crossing. 3. A continuous section of reinforced concrete pressure pipe (per AWWA C302-74) centered over the pipe being crossed. 4. Any sewer pipe within a continuous sleeve.
D	A sewer line crossing a water main shall be constructed of: 1. A continuous section of ductile iron pipe with hot dip bituminous coating.

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2. A continuous section of Class 200 (DR 14 per AWWA C900) plastic pipe or equivalent, centered on the pipe being crossed.

3. A continuous section of reinforced concrete pressure pipe (per AWWA C302-74) centered on the pipe being crossed.

4. Any sewer pipe within a continuous sleeve.

5. Any sewer pipe separated by a ten-foot by ten-foot, four-inch-thick reinforced concrete slab.

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Case 2: New Water Mains Being Installed (Figures 1 and 2)

Zone

A — No water mains parallel to sewers shall be constructed without approval from the health agency.

B — If the sewer paralleling the water main does not meet the Case 1, Zone B, requirements, the water main shall be constructed of:

1. Ductile iron pipe with hot dip bituminous coating.
2. Dipped and wrapped one-fourth-inch-thick welded steel pipe.
3. Class 200, Type II, asbestos-cement pressure pipe.
4. Class 200 pressure rated plastic water pipe (DR 14 per AWWA C900) or equivalent.
5. Reinforced concrete pressure pipe, steel cylinder type, per AWWA (C300-74 or C301-79 or C303-70).

C — If the sewer crossing the water main does not meet the Case 1, Zone C, requirements, the water main shall have no joints in Zone C and be constructed of:

1. Ductile iron pipe with hot dip bituminous coating.
2. Dipped and wrapped one-fourth-inch-thick welded steel pipe.
3. Class 200 pressure rated plastic water pipe (DR 14 per AWWA C900) or equivalent.
4. Reinforced concrete pressure pipe, steel cylinder type, per AWWA (C300-74 or C301-79 or C303-70).

D — If the sewer crossing the water main does not meet the requirements for Zone D, Case 1, the water main shall have no joints within four feet from either side of the sewer and shall be constructed of:

1. Ductile iron pipe with hot dip butuminous coating.
2. Dipped and wrapped one-fourth-inch-thick welded steel pipe.
3. Class 200 pressure rated plastic water pipe (DR 14 per AWWA C900) or equivalent.

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GENERAL REQUIREMENTS – SEWER

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4. Reinforced concrete pressure pipe, steel cylinder type, per AWWA (C300-74 or C301-79 or C303-70).

NOTES AND DEFINITIONS

1. HEALTH AGENCY -- The Department of Health Services. For those water systems supplying fewer than 200 service connections, the local health officer shall act for the Department of Health Services.

2. WATER SUPPLIER -- "Person operating a public water system" or "supplier of water" means any person who owns or operates a public water system.

3. LOW HEAD WATER MAIN -- Any water main which has a pressure of five psi or less at any time at any point in the main.

4. Dimensions are from outside of water main to outside of sewer line or manhole.

5. COMPRESSION JOINT -- A push-on joint that seals by means of the compression of a rubber ring or gasket between the pipe and a bell or coupling.

6. MECHANICAL JOINTS -- Bolted joints.

7. RATED WORKING WATER PRESSURE OR PRESSURE CLASS -- A pipe classification system based upon internal working pressure of the fluid in the pipe, type of pipe material, and the thickness of the pipe wall.

8. FUSED JOINT -- The jointing of sections of pipe using thermal or chemical bonding processes.

9. SLEEVE -- A protective tube of steel with a wall thickness of not less than one-fourth inch into which a pipe is inserted.

10. GROUND WATER -- Subsurface water found in the saturation zone.

11. HOUSE LATERAL -- A sewer connecting the building drain and the main sewer line.

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Public Works Department

APPR. BY Benjamin Y. Wong

50 GENERAL DRAINAGE DESIGN GOALS AND ACCEPTABLE PROCEDURES

The following general drainage design criteria are applied to the development design to assure consistent performance meeting the requirements of drainage standards.

50-1 All development will be required to accept the storm runoff from the upstream tributary watershed, and convey it, with the additional runoff, generated from said development, to the nearest watercourse.

When required, new facilities within the development will be sized to accept runoff from a fully developed watershed. In addition, the development will be required to upgrade or provide adequate facilities to convey the existing Q_{10} from the existing watershed together with the additional runoff from the development, through the development and to the nearest watercourse.

50-2 Ditches, channels, drains, road improvements and all other storm water carrying facilities shall be designed and constructed to the standards established by the Public Works Department, generally at 10%- storm for roads, and 2% - storm for red-line channels.

50-3 Ventura County Flood Control District standards shall be observed for all facilities within this jurisdiction, and the approval of the District shall be obtained on all improvement plans for such facilities.

50-4 Storm water acceptance deeds must be obtained whenever diversion or concentration of waters is involved.

50-5 Overland flow shall be intercepted at the boundaries and conveyed through or around said development.

50-6 Manholes will generally be required (for access for inspection and maintenance) at angle points greater than 10 degrees, at junctions, at intervals not exceeding 400 feet, at locations where the conduit changes in size, and points where an abrupt flattening or steepening of the grade occurs.

50-7 Drainage calculations, signed or sealed by a registered civil engineer in California, shall be clearly and completely presented, and that there be a clear determination that design standards have been met.

50-8 The Cook's Method shall be used in Hydrology calculations on City's street and drainage facilities.

50-9 15' wide access road shall be provided for all open channel and ditches. The surface of access road shall be paved with 4 inches agg. base and oil penetration tretment.

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CITY OF Oxnard	GENERAL REQUIREMENTS – DRAINAGE	STANDARD PLAN
	DRAWN: SOHER CKD Jay Patel APPR. BY Benjamen Y. Wong	PLATE 54
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51 STREET DRAINAGE CRITERIA

51-1 Street cross-sections are not to be designed for use as a substitute for storm drains in conveying drainage water from offsite area to disposal channels.
They may be used to convey water originating from the street and from adjoining lots or unimproved areas, providing that vehicle and pedestrian use of the streets is not unreasonably restricted.
Flow from unimproved areas shall have facilities to remove debris and/or silt from the flow before entering the street.

51-2 The storm runoff to be used in calculating the capacity of street drainage facilities will be Q_{10} providing the adjacent lot pads shall not be flooded by the storm runoff from Q_{50}
Wherever the road forms a sump, the drainage facilities at this location shall be designed for Q_{50} in such a manner that the water level will not encroach on building pads even at times of plugging of the facilities.
Drainage facilities in sumps may be designed for Q_{10} only if it is constructed with an overflow channel(s) for exess flow approved by the city.

51-3 In computing design capacity of the street, a provision of A.C. overlay of 0.10 feet thickness over the entire travelled and parking lanes should be made. This will provide the capacity which represents the actual condition subsequent to the overlay.

51-4 To prevent undue hazard, restriction, and interference with vehicular and pedestrian traffic on local, collector and arterial streets, the Q_{10} runoff shall be conveyed in the following manner :

51-4.1 RESIDENTIAL STREET (PLATE 100), LOCAL COMMERCIAL / INDUSTRIAL STREET (PLATE 101) INCLUDING SERVICE ROAD AND ALLEY.
Flow shall be contained between curb faces. Cross-gutter will be allowed only on these streets and service roads and where the traffic would normally stop.

51-4.2 COLLECTOR COMMERCIAL / INDUSTRIAL STREET (PLATE 101)
Shall be designed to maintain 24 feet of pavement nearest the centerline of the travelled way free of longitudinally flowing drainage water. No cross-gutter will be allowed on collector streets.

51-4.3 LOCAL AND SECONDARY ARTERIALS
Shall be designed to maintain 14 feet of pavement in each direction free of longitudinal flowing drainage water. No cross-gutter will be allowed on local and secondary arterials.

51-4.4 PRIMARY ARTERIALS
Shall be designed to maintain 26 feet of pavement in each direction free of longitudinal flowing drainage water. No cross-gutter will be allowed on primary arterials.

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GENERAL REQUIREMENTS – DRAWING

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Public Works Department

STANDARD PLAN PLATE 55 SHEET OF

51-5 Where the design storm runoff exceeds the permitted hydraulic capacity of the street section, the design storm runoff must be removed from the street and conveyed in an underground storm drain to a drain outlet or natural watercourse. Minimum size of drain shall be 18 inches in diameter.

51-6 When in the opinion of the City a serious silt or debris deposition on the streets or property will result, the debris hazard shall be eliminated by providing a debris basin, outlet works and/or trash rack as directed by the City.

51-7 For design plans, hydraulic grade lines shall be at least 8" below the furnished grade over underground conduits and at least 12" below the top of bank for open channels. Freeboard of 0.5'+0.1×flow depth for open channels will be required.

51-8 For all drainage facilities located outside of Ventura County Flood Control District's jurisdiction, the quantity of Q_{10} shall be based on the Cook's Method and latest VCFCD isohyetal and soil maps issued by the District.

51-9 Capacity of all inlets shall be based on the design runoff.
At public school sites, catch basins shall be located at the near or far street gutter to collect the storm flow prior to the pedestrian walk.
Catch basins shall be located prior to pedestrian cross-walk in the urban, commercial, or industrial street system.
Side opening inlets are preferable in urban areas in order to minimize hazard to pedestrians and bicycle riders from grate basins and debris unsightliness.

51-10 Deviations from the street drainage criteria may be made only upon the approval of the Public Works Director subsequent to the review and approval of sufficient supporting data furnished by the person requesting the deviations, or upon approval of the City Council.

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CITY OF Oxnard

GENERAL REQUIREMENTS – DRAINAGE

STANDARD PLAN

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52 MODIFIED RATIONAL FORMULA – COOK'S METHOD

52-1 BACKGROUND

This method was adopted for use for the hydrologic design of City drainage facilities in the City of oxnard on March, 1977.

The method was originally prepared for use in Ventura County. It was adapted by the County from a similar presentation for nationwide use published in the U.S. Navy Manual, " Soil Conservation - NAVDOCKS TP -Pw- 5 ". The presentation was originally prepared by the U.S. Soil Conservation Service.

The method takes into account the drainage area, relief and surface storage of the area, type of soil, extent of vegetal cover, shape of the watershed, rainfall intensity to be expected, and the frequency of occurrence.

The adapted method was verified by the County by comparing the computed runoffs with the available runoff data and was found to give reasonable results. The City has analytically compared this method with other known methods and found it to yield relatively reasonable answers.

52-2 REFERENCE COUNTY MAPS

The following County maps shall be used with this method :

1) "Hydrologic Soil-Type Map " - Ventura County Flood Control District's Hydrology Manual, August, 1966, Figures 5,6,&7.
2) " Isohyetal Map - 24 Hour Rainfall with probable 50-Year Frequency ", Ventura County Flood Control District, March, 1966, Dwg. No. D-3-3d.

52-3 ASSUMPTIONS

On the basis that a) the City of Oxnard area consists primarily of type B soil and flat terrain, b) the average 24-hour 50-year frequency rainfall is six (6) inches, and c) the effect of the differences in vegetal cover between various types of residential development, as well as between commercial and industrial developments , is minor, the following simplifying assumptions may be made in using this method:

1) Rainfall-intensity correction factor of 123% may be used throughout the City.
2) The types of development may be grouped into three (3) major categories with the corresponding "C" factor shown.

TYPE OF DEVELOPMENT	"C"- FACTORS
Undeveloped	40 - 45*
Residential	60
Commercial & Industrial	70

* Depends on soil-type

52-4 LIMITATIONS

This method shall be used only in the hydrologic design of City facilities with watershed area of not larger than 100 acres. (Ventura County Flood Control District's hydrology method shall be used in all District's facilities).

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52-5

COMPUTATION PROCEDURE

(Refer to computation form and appropriate charts & graphs)

1) Delineate and measure the drainage area in acres.
2) Measure travel length , L, in feet.
3) Compute average width of watershed in feet.
4) Compute length to width ratio and determine the shape correction factor from the given chart.
5) Determine soil type from hydrologic soils map, vegetal cover from field observation , relief and surface storage from topographic map and/or field observation, as required.
6) Compute "C" factor from given chart.
7) Using computed "C" factor and measured drainage area obtain the uncorrected Q_{10} from the graph.
8) Multiply the Q_{10} in item (7) by both the shape correction and rainfall intensity correction factor to obtain corrected Q_{10} peak runoff.
9) For other frequencies , multiply the corrected Q_{10} by the appropriate frequency correction factor from the chart.

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GENERAL REQUIREMENTS – DRAINAGE

STANDARD PLAN

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MODIFIED COOKS – HYDROLOGIC CALCULATIONS

Project _____ Job No. _____ Sheet _____ Of _____

Watershed _____ Designed _____ Date _____

Concentration Point _____ Checked _____ Date _____

Watershed Constants :

Drainage Area _____ Acres

Length _____ feet Fall _____ feet Slope _____ %

Width = $\frac{\text{Area} \times 43560}{\text{Length}}$ = _____ feet

$\frac{\text{Length}}{\text{Width}}$ = _____ Shape Correc. Factor = _____

Soil Type _____ RI-Correc. Factor _____

Computation of "C"

Type of Development	"C" Factor	Present	Future
Undeveloped	40-45	_____	_____
Residential	60	_____	_____
Commercial & Industrial	70	_____	_____

Composite "C" Factor

Runoff : Q from curve = _____ × $\frac{L}{W}$ Factor _____ × RI-Corr. Factor _____

Frequency	Frequency Factor	Q
20%	65%	_____ cfs
10%	100%	_____ cfs
4%	135%	_____ cfs
2%	170%	_____ cfs
1%	200%	_____ cfs

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CITY OF Oxnard

GENERAL REQUIREMENTS – DRAINAGE

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MODIFIED RATIONAL FORMULA

"C" FACTORS*

ITEMS	RUNOFF PRODUCING CHARACTERISTICS			
RELIEF	40 Steep, slopes exceed 30%	30 Hilly, slopes 10% to 30%	20 Rolling, slopes 5% to 10%	10 Flat, slopes 0 to 5%
SURFACE STORAGE	20 Negligible, surface depressions few and shallow. Drainageways steep & small, no ponds or marshes.	15 Low, well defined system of small drainageways, no ponds or marshes.	10 Normal, considerable surface depression storage, lakes and ponds less than 2% of drainage area.	5 High, surface depression storage high, drainage system not sharply defined.
SOIL SCS CLASS	20 Rock or thin soil mantle. Negligible infiltration capacity. D	15 Clay or other soil of low infiltration capacity. C	10 Normal, deep permeable soils. B	5 High, sands, loamy sands & other loose open soils. A
VEGETAL COVER	20 No effective soil cover, bare or very sparse cover.	15 Clean cultivated crops or poor natural cover, less than 10% of drainage area under good cover.	10 50% of drainage area in good grassland or woodland, 50% of area in clean cultivated crops.	5 About 90% of drainage area in good grassland woodland or equivalent cover.

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"C" FACTOR
(FOR CITY OF OXNARD)

C =40 - 45	FOR UNDEVELOPED
C = 60	FOR RESIDENTIAL
C = 70	FOR COMMERCIAL AND INDUSTRIAL

NOTE:

In hydrologic Calculations, use values of "C" given in lower table.
Use of values of "C" given in upper table have to be approved by the City Engineer.

CITY OF Oxnard

GENERAL REQUIREMENTS – DRAINAGE

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STANDARD PLAN

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FREQUENCY FACTORS – %

RETURN FREQUENCY	RETURN PERIOD	FACTOR
50%	2	25
20%	5	65
10%	10	100
4%	25	135
2%	50	170
1%	100	200
0.1%	1,000	400

RAINFALL INTENSITY CORRECTION FACTOR

OXNARD AREA	=	123%

SHAPE CORRECTION FACTORS – %

L/W \ AREA	0.01 S.M.	0.1 S.M.	1 S.M.	10 S.M.	100 S.M.	1,000 S.M.
1	115	125	132	141	154	172
1.5	112	115	119	124	131	141
2	108	110	110	113	117	122
3	100	100	100	100	100	100
4	98	95	94	91	89	86
5 or greater	95	91	88	85	82	78

1 S.M. = 1 Square Mile = 640 Acres

Just for information only

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Public Works Department

GENERAL REQUIREMENTS – DRAINAGE

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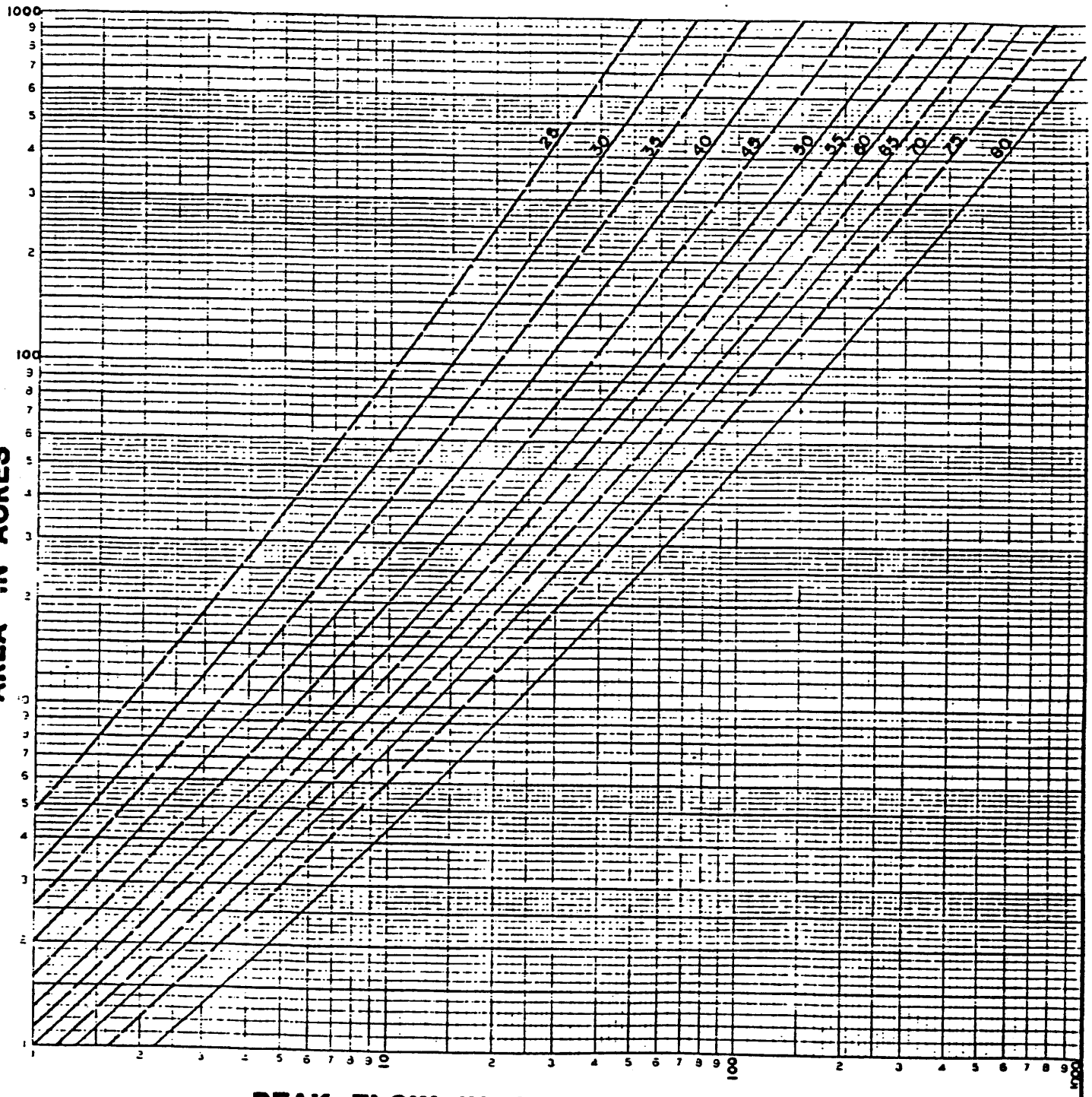

PEAK FLOW IN CUBIC FEET PER SECOND

CITY OF Oxnard

GENERAL REQUIREMENTS – DRAINAGE

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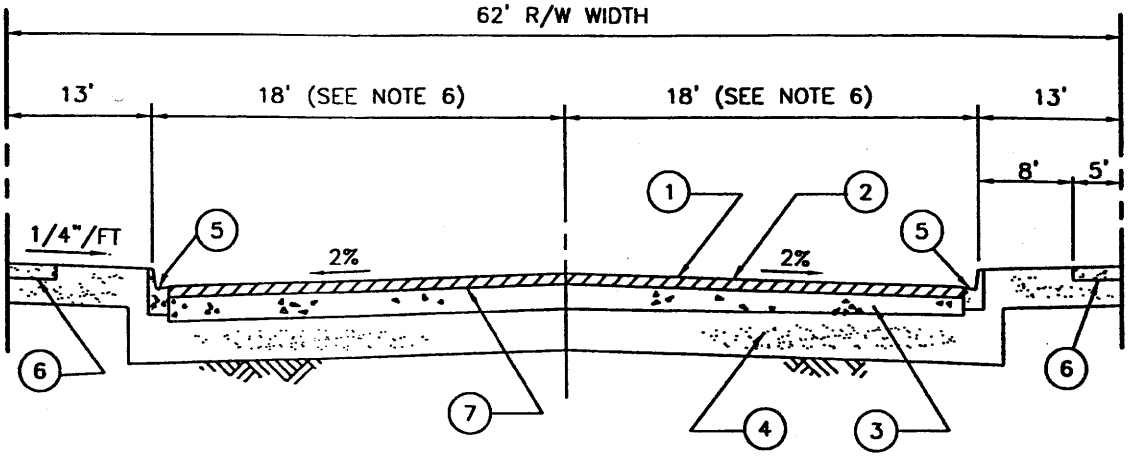
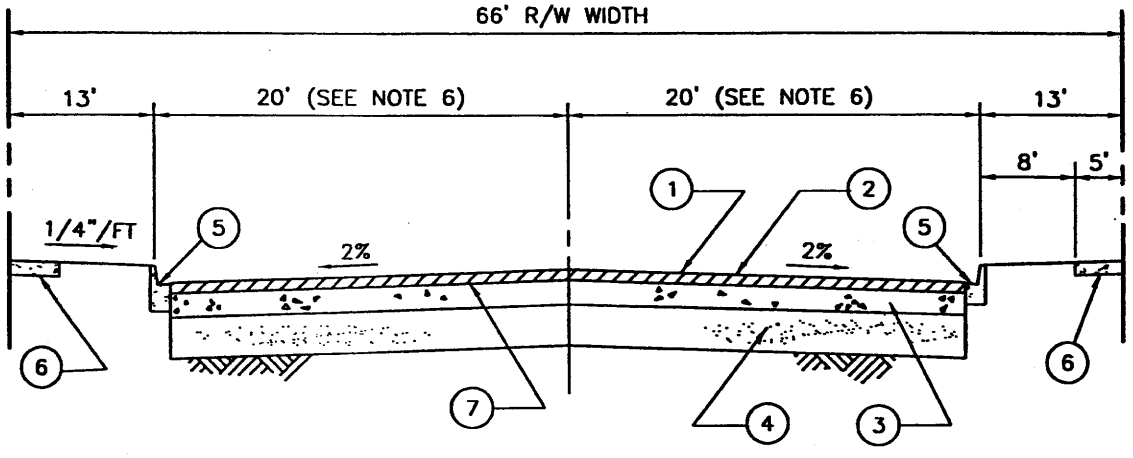


MINOR RESIDENTIAL STREET



RESIDENTIAL COLLECTOR

(1.)	FOG SEAL:	SS-1H; RATE=0.10 GAL/SY. ALSO SEE SECTION 203-3 OF S.S.P.W.C.
(2.)	ASPHALT CONCRETE:	BASE COURSE-TYPE III, B2-AR 4000 OR AR 8000; MIN., 1 3/4" THICK. FINISH COURSE-TYPE III, C2-AR 4000 OR AR 8000; MIN., 1 1/4" THICK. TOTAL THICKNESS 3" MINIMUM, ACTUAL THICKNESS PER SOILS ANALYSIS (SEE NOTES)
(3.)	CAB, CMB, CL2, OR RECYCLED PMB WITH CL2 GRADATION:	MIN. 4" THICK; ACTUAL THICKNESS AS DETERMINED BY SOILS ANALYSIS. SEE BELOW FOR REQUIRED TRAFFIC INDEX. MINIMUM 95% RELATIVE COMPACTION (SEE NOTES)
(4.)	ZONE OF SUBGRADE:	MIN. 12" THICK; MIN. 95% RELATIVE COMPACTION.
(5.)	CONC. C & G:	TYPE "A2-6" PER PLATE 111.
(6.)	CONC. SIDEWALK:	MIN. 4" THICK AND 5' WIDE PER PLATE 112 OR AS SHOWN ON APPROVED IMPROVEMENT PLANS.
(7.)	PRIME COAT:	SC-70; RATE=0.20 TO 0.40 GAL/SQ. YD. ALSO SEE SECTION 302-5.3 OF S.S.P.W.C. (REQUIREMENT FOR PRIME COAT MAY BE WAIVED BY CITY ENGINEER BASED ON FIELD CONDITIONS)

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CITY OF Oxnard

Department of Public Works

RESIDENTIAL STREET

DRAWN: STAFF | CKD.: STAFF CB

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 100

SHEET 1 OF 2

DESIGN CRITERIA	TRAFFIC INDEX DESIGN VALUE
ANTICIPATED BUS ROUTES	7.0
TRAFFIC INDEX > 151 LOTS SERVED	6.5
TRAFFIC INDEX 51 – 150 LOTS SERVED	6.0
TRAFFIC INDEX 21 – 50 LOTS SERVED	5.5
TRAFFIC INDEX < 21 LOTS SERVED	5.0

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NOTES:

1. APPLY WEED KILLER AT ALL COLD JOINTS, BETWEEN ASPHALT AND GUTTER, AND BETWEEN CURB AND SIDEWALK. WEED KILLER SHOULD STOP 6' FROM DRIP LINE OF TREES.
2. IN NEW DEVELOPMENT, FINISH COURSE OF AC SHALL BE PLACED PRIOR TO ANY BUILDING OCCUPANCY.
3. ACTUAL ASPHALT AND BASE THICKNESSES TO BE DETERMINED BY SOILS ANALYSIS WITH MINIMUM THICKNESS AS NOTED.
4. SLURRY SEAL IN LIEU OF FOG SEAL MAY BE REQUIRED IF FINISH COURSE IS DAMAGED DURING CONSTRUCTION.
5. ALL STREET CUTS OCCURING AFTER FINISH COURSE PAVING SHALL BE REPAVED IN ACCORDANCE WITH PLATE 602 SHEET 3 OF 5 (NEWLY IMPROVED STREETS).
6. ADDITIONAL PAVEMENT WIDTH MAY BE REQUIRED AT INTERSECTIONS.

CITY OF Oxnard

Department of Public Works

RESIDENTIAL STREET

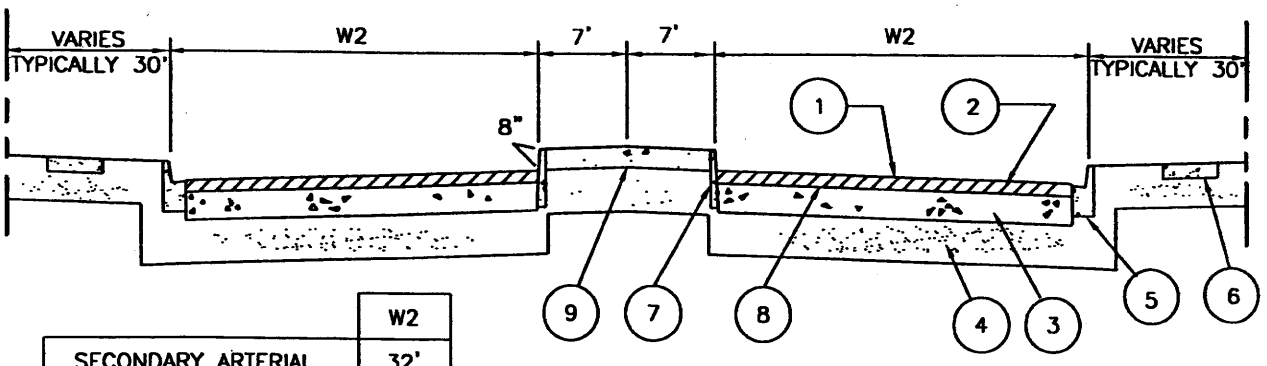
DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 100

SHEET 2 OF 2



	W2
SECONDARY ARTERIAL	32'
PRIMARY ARTERIAL	42'

T.I. = 10.5 MINIMUM

(1) FOG SEAL:	SS-1h; RATE = 0.10 GAL/SY ALSO SEE SECTION 203-3 OF S.S.P.W.C.
(2) ASPHALT CONC:	MINIMUM 4" THICK, TYPE III B-2 AR 4000 OR AR 8000 – 2 1/2" BASE COURSE AND TYPE III C2 AR 4000 OR AR 8000 – 1 1/2" FINISH COURSE. ACTUAL THICKNESS PER SOILS ANALYSIS.
(3) CAB, CMB, CLASS 2, OR PROCESSED PMB WITH CL2 GRADATION:	MINIMUM 8" THICK; ACTUAL THICKNESS DETERMINED BY SOIL ANALYSIS FOR REQUIRED TRAFFIC INDEX MINIMUM 95% RELATIVE COMPACTION.
(4) ZONE OF SUBGRADE:	MINIMUM 12" THICK; MINIMUM 95% RELATIVE COMPACTION.
(5) CONCRETE C & G:	TYPE "A2-6" PER PLATE 111. 6" CURB ONLY
(6) CONC. SIDEWALK:	MINIMUM 4" THICK AND 5' WIDE PER PLATE 112 OR AS SHOWN ON APPROVED IMPROVEMENT PLANS.
(7) MEDIAN CURB:	TYPE "A1-8" PER PLATE 111, 8" CURB FACE UNLESS OTHERWISE SHOWN.
(8) PRIME COAT :	SC-70; RATE=0.20 TO 0.40 GAL/SQ. YD. ALSO SEE SECTION 302-5.3 OF S.S.P.W.C. (REQUIREMENT FOR PRIME COAT MAY BE WAIVED BY CITY ENGINEER BASED ON FIELD CONDITIONS).
(9) MEDIAN:	PROVIDE STAMPED CONCRETE IN ALL AREAS OF MEDIAN 6' (BACK OF CURB TO BACK OF CURB) WIDE OR LESS. PATTERN AND COLOR OF STAMPED CONC. TO BE PER PLATE 128 UNLESS OTHERWISE APPROVED BY PARKS DEPARTMENT. MEDIAN WIDER THAN 6' (BACK OF CURB TO BACK OF CURB) SHALL BE LANDSCAPED AND IRRIGATED PER PARK DEPARTMENT'S REQUIRMENTS. THEIR REVIEW AND APPROVAL IS MANDATORY. STREET LIGHTING IN THE MEDIAN SHALL BE REVIEWED & APPROVED BY THE CITY TRAFFIC ENGINEER. STREET NAME & OTHER TRAFFIC SIGNS SHALL BE AS REQUIRED BY THE TRAFFIC ENGINEER. REFERENCE: PLATE 203. PROVIDE 4" SLEEVE FOR ALL IRRIGATION LINES UNDER CONCRETE OR BETWEEN MEDIANS.

REV. APPR. BY DATE

REV. APPR. BY DATE

NOTES:

1. APPLY WEED KILLER AT ALL COLD JOINTS, BETWEEN ASPHALT AND GUTTER, AND BETWEEN CURB AND SIDEWALK. WEED KILLER SHOULD STOP 6' FROM DRIP LINE OF TREES.
2. IN NEW DEVELOPMENT, FINISH COURSE OF AC SHALL BE PLACED PRIOR TO ANY BUILDING OCCUPANCY.
3. ACTUAL ASPHALT AND BASE THICKNESSES TO BE DETERMINED BY SOILS ANALYSIS WITH MINIMUM THICKNESS AS NOTED.
4. SLURRY SEAL IN LIEU OF FOG SEAL MAY BE REQUIRED IF FINISH COURSE IS DAMAGED DURING CONSTRUCTION.
5. ALL STREETS CUTS OCCURING AFTER CONSTRUCTION AFTER FINISH COURSE PAVING SHALL BE REPAVED IN ACCORDANCE WITH PLATE 602 SHEET 3 OF 3 (NEWLY IMPROVED STREETS)
6. ADDITIONAL PAVEMENT WIDTH MAY BE REQUIRED AT INTERSECTIONS.

CITY OF Oxnard

Department of Public Works

ARTERIAL ROADWAY

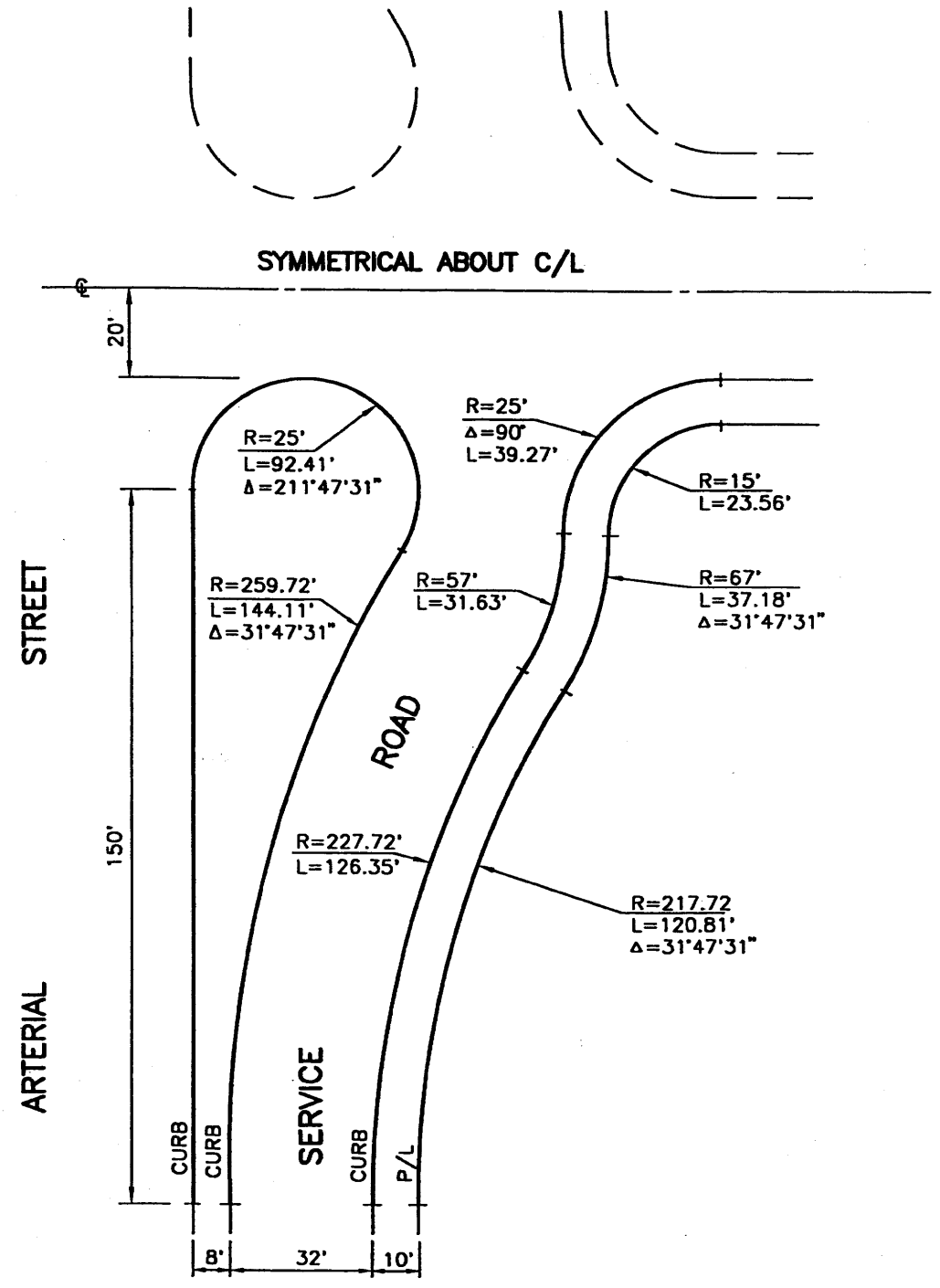
DRAWN: STAFF CKD.: STAFF

APPR. _____ DATE _____

STANDARD PLAN 2002

PLATE 102

SHEET 1 OF 1



NOT FOR NEW DEVELOPMENT
ONLY FOR IMPROVING EXISTING CONNECTIONS

REV. APPR. BY DATE

REV. APPR. BY DATE

CITY OF Oxnard

Department of Public Works

RESIDENTIAL SERVICE ROAD BULB CONNECTION

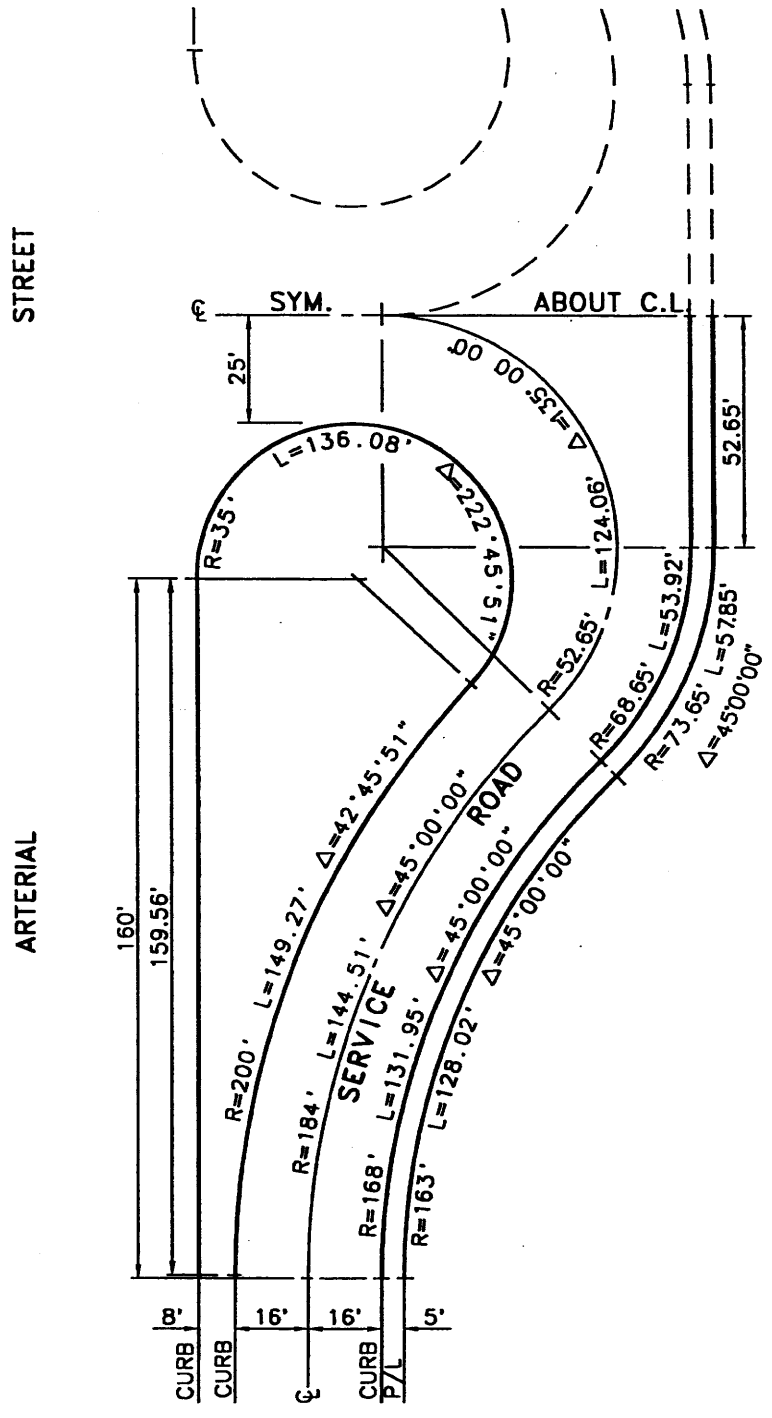
DRAWN: STAFF CKD.: STAFF B

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 104

SHEET 1 OF 1



NOT FOR NEW DEVELOPMENT
ONLY FOR IMPROVING EXISTING CONNECTIONS

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

INDUSTRIAL SERVICE ROAD BULB CONNECTION

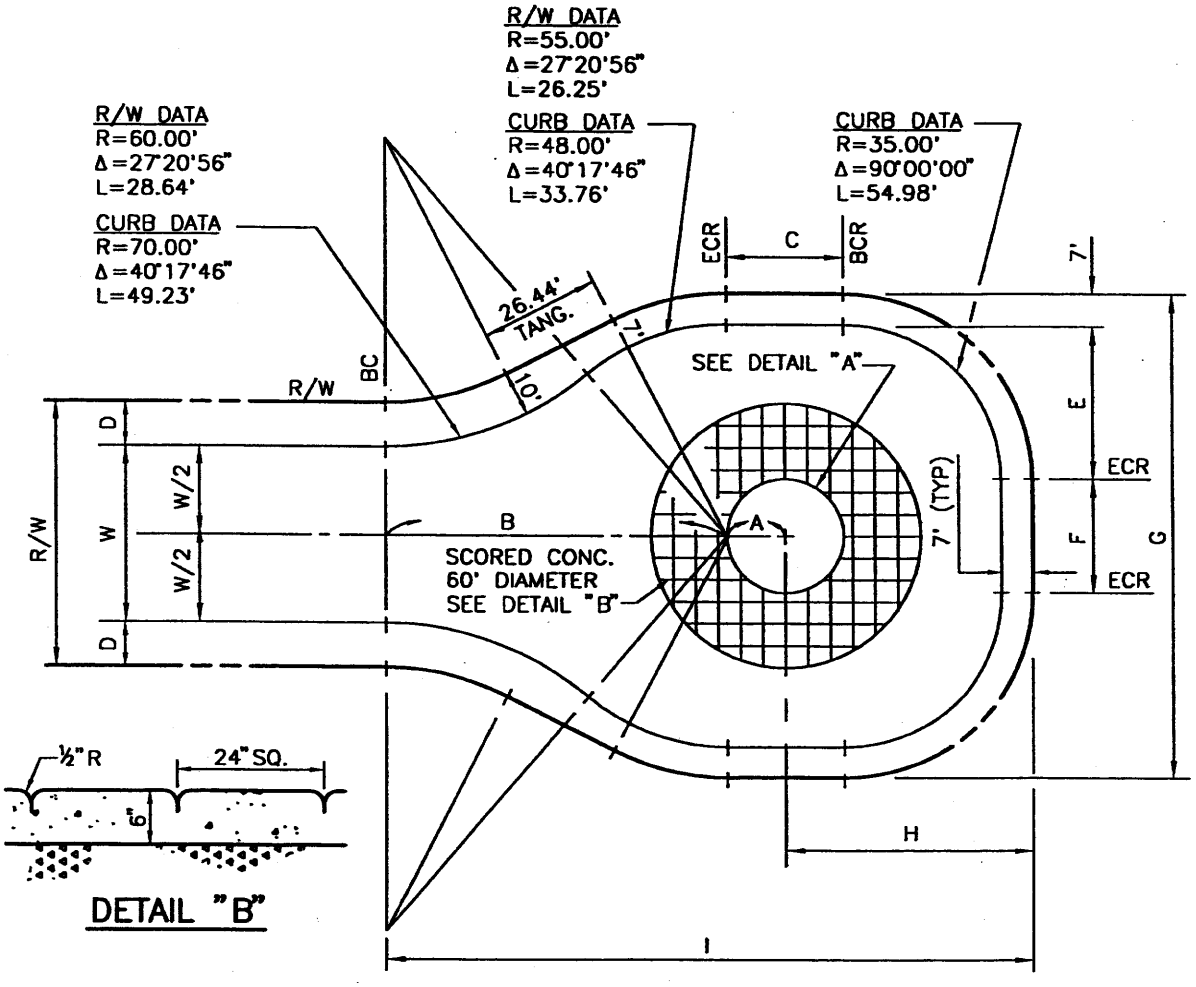
DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

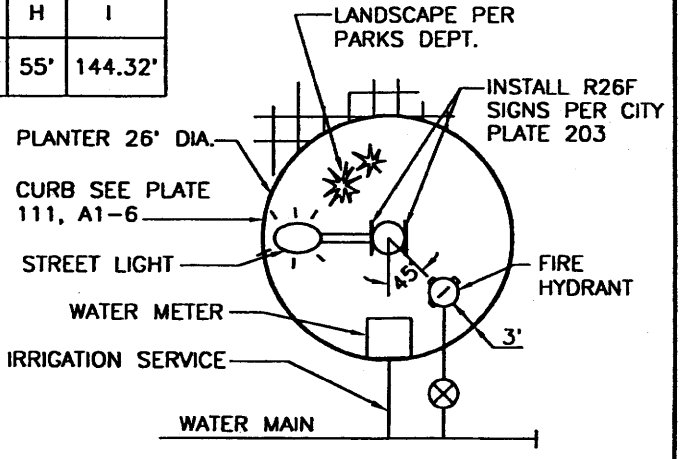
PLATE 105

SHEET 1 OF 1



DETAIL "B"

R/W	W/2	W	A	B	C	D	E	F	G	H	I
60'	20'	40'	13'	76.32'	26'	10'	35'	26'	110'	55'	144.32'



DETAIL "A"

NOTES:

1. APPLY WEED KILLER AT ALL COLD JOINTS, BETWEEN ASPHALT & CURB AND CURB & SIDEWALK.
2. SIDEWALK AT ALL DRIVEWAYS MUST MEET DISABLED ACCESS REQUIREMENT OF 2% MAX. CROSSFALL.

REV. APPR. BY DATE

REV. APPR. BY DATE

CITY OF Oxnard
Department of Public Works

RESIDENTIAL CUL-DE-SAC PADDLE TYPE

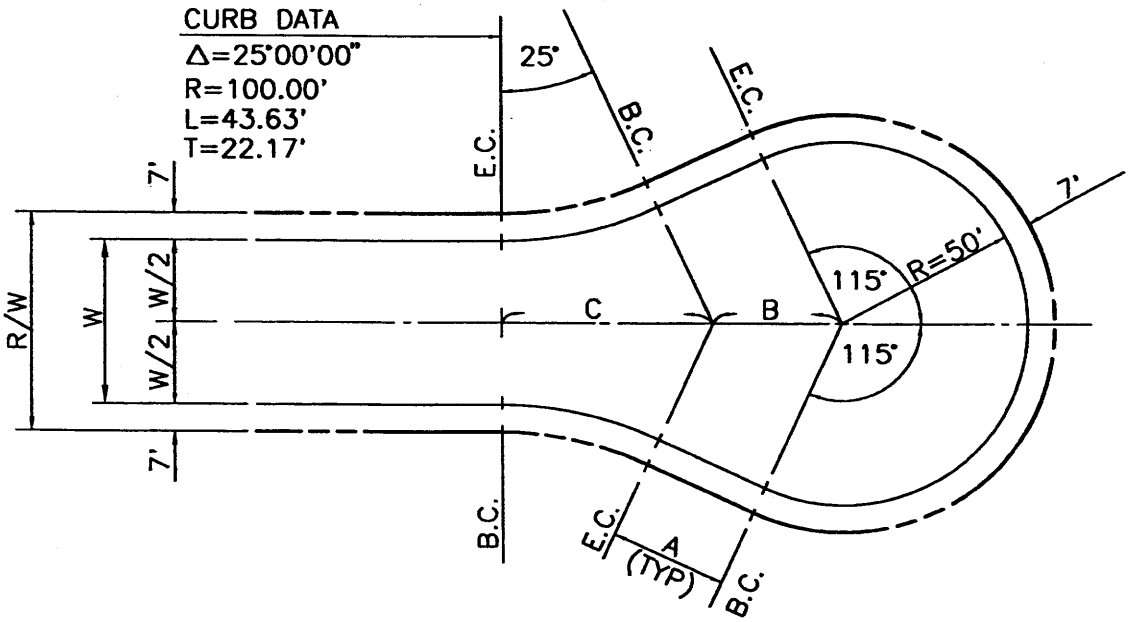
DRAWN: STAFF CKD.: STAFF LB

APPR. Granville M. Bowman

STANDARD PLAN 2002

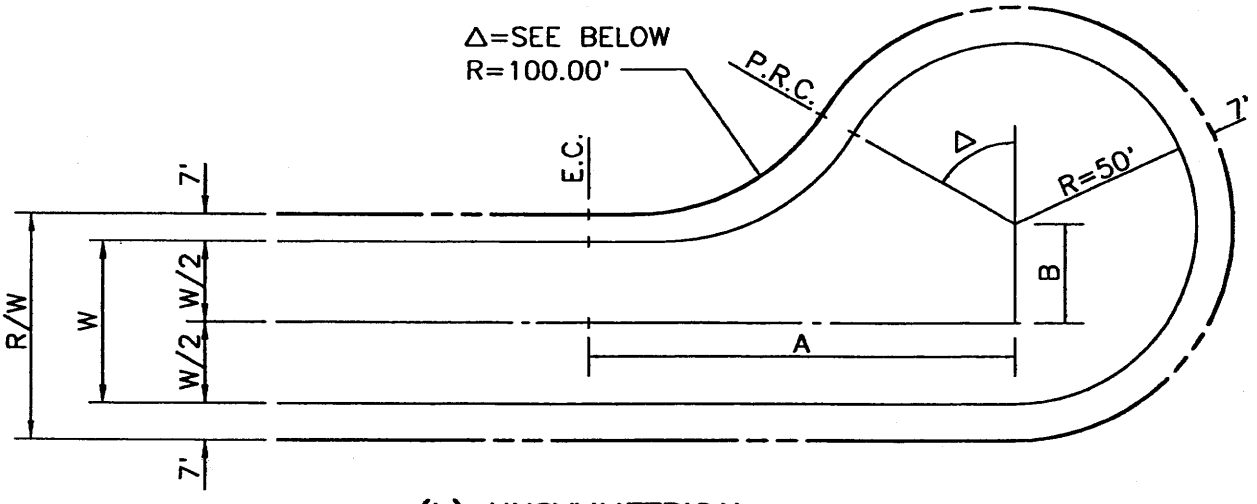
PLATE 107

SHEET 1 OF 1



(a) SYMMETRICAL

R/W	W	W/2	A	B	C
60'	46'	23'	30.63'	33.80'	57.36'
80'	66'	33'	6.98'	7.7'	62.02'



(b) UNSYMMETRICAL

R/W	W	W/2	A	B	Δ
60'	46'	23'	115.26'	27'	50°12'29"
80'	66'	33'	101.98'	23'	42°50'00"

REV. APPR. BY DATE

REV. APPR. BY DATE

CITY OF Oxnard

Department of Public Works

INDUSTRIAL CUL-DE-SAC

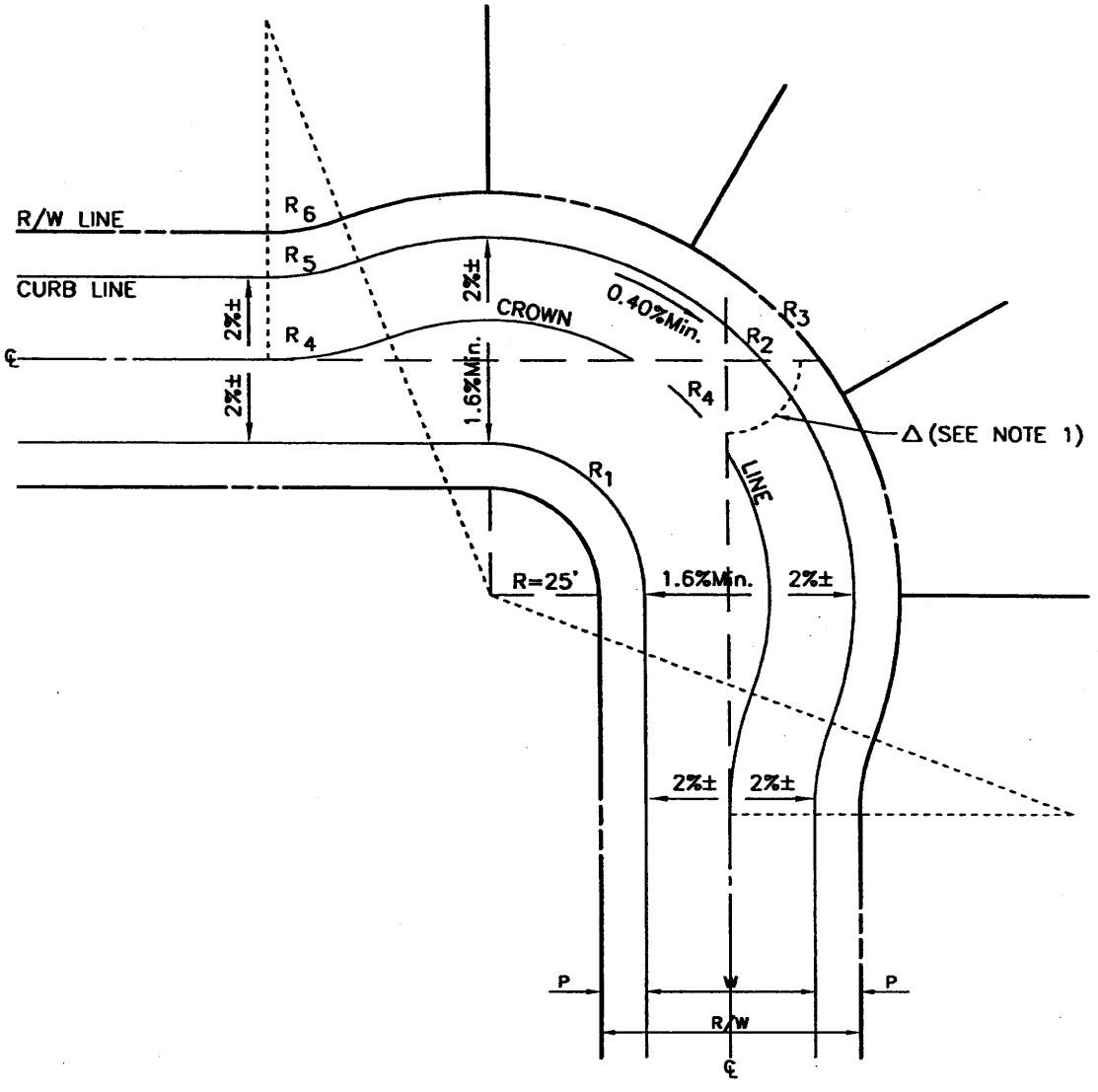
DRAWN: STAFF CKD.: STAFF LB

APPR. Granville M. Bowmon

STANDARD PLAN 2002

PLATE 108

SHEET 1 OF 1



NOTE:

1. When Δ is less than 72° a smooth curve with a minimum radius conforming with the standards for the particular geometric section shall be used.
2. Sidewalk at all driveways must meet disabled access requirment of 2% max. crossfall.

R/W	W	R_1	R_2	R_3	R_4	R_5	R_6	P
60	40	35	80	90	60	40	30	10
49	36	35	78	84.5	60	42	35.5	6.5
45	32	35	76	82.5	60	44	37.5	6.5

REV. APPR. BY DATE

REV. APPR. BY DATE

CITY OF Oxnard

Department of Public Works

KNUCKLE INTERSECTION

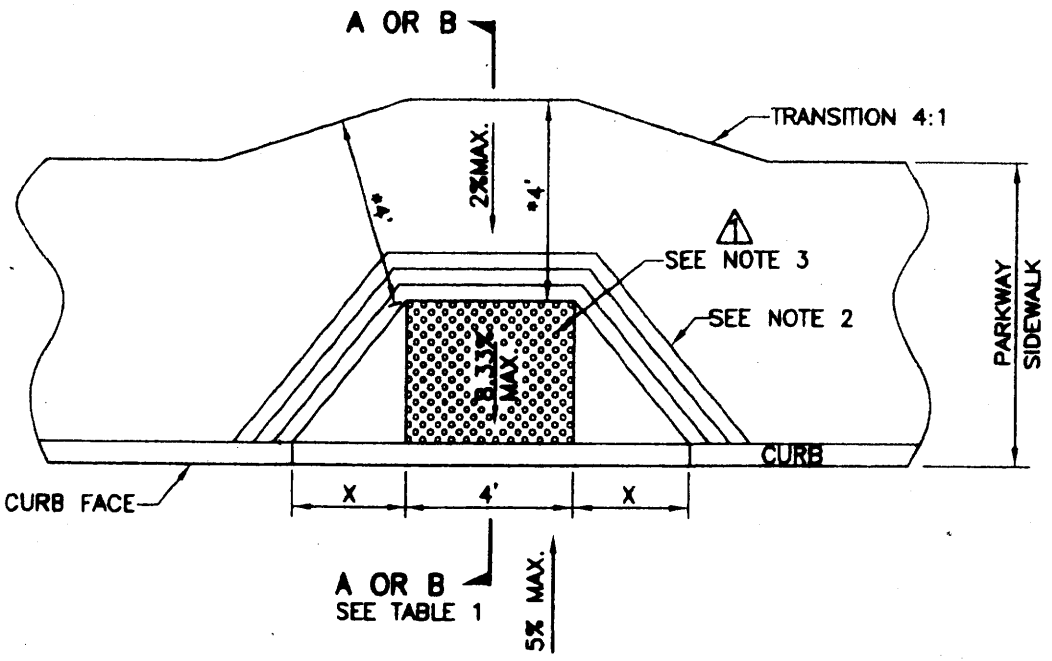
DRAWN: STAFF CKD.: STAFF LB

APPR. Granville M. Bowman

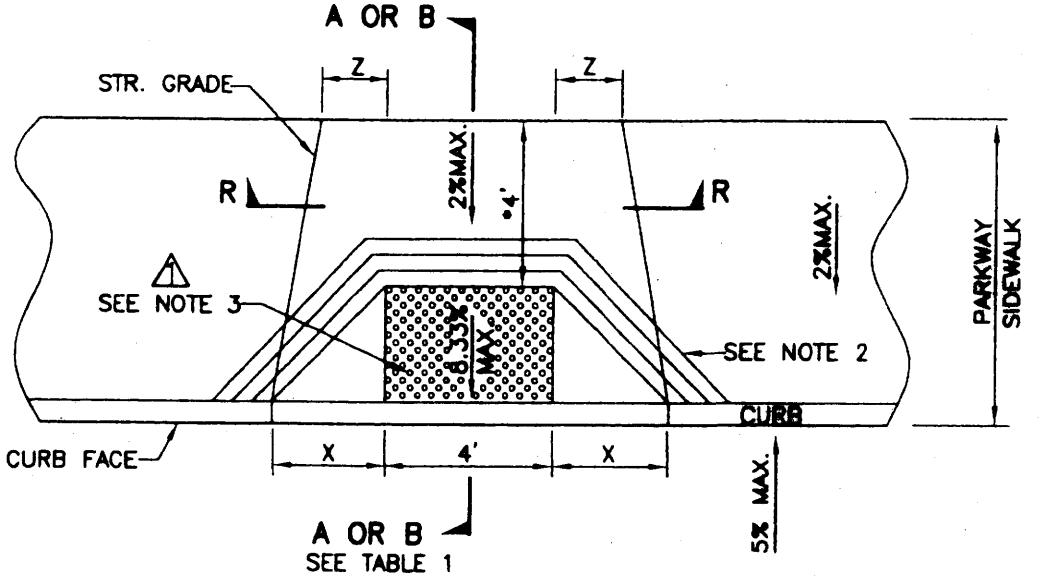
STANDARD PLAN 2002

PLATE 109

SHEET 1 OF 1



TYPE 1



TYPE 2

SEE TABLES 1 AND 2 FOR
X AND Z VALUES (SHT. 9)

*3' MIN. ALLOWED WHERE EXISTING
RIGHT-OF-WAY CONFLICTS

CASE A

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE
1	L. Balderrama	11-27-07

CITY OF ORANGE CALIFORNIA

CURB RAMP

DRAWN: A. ROQUE | CKD.:

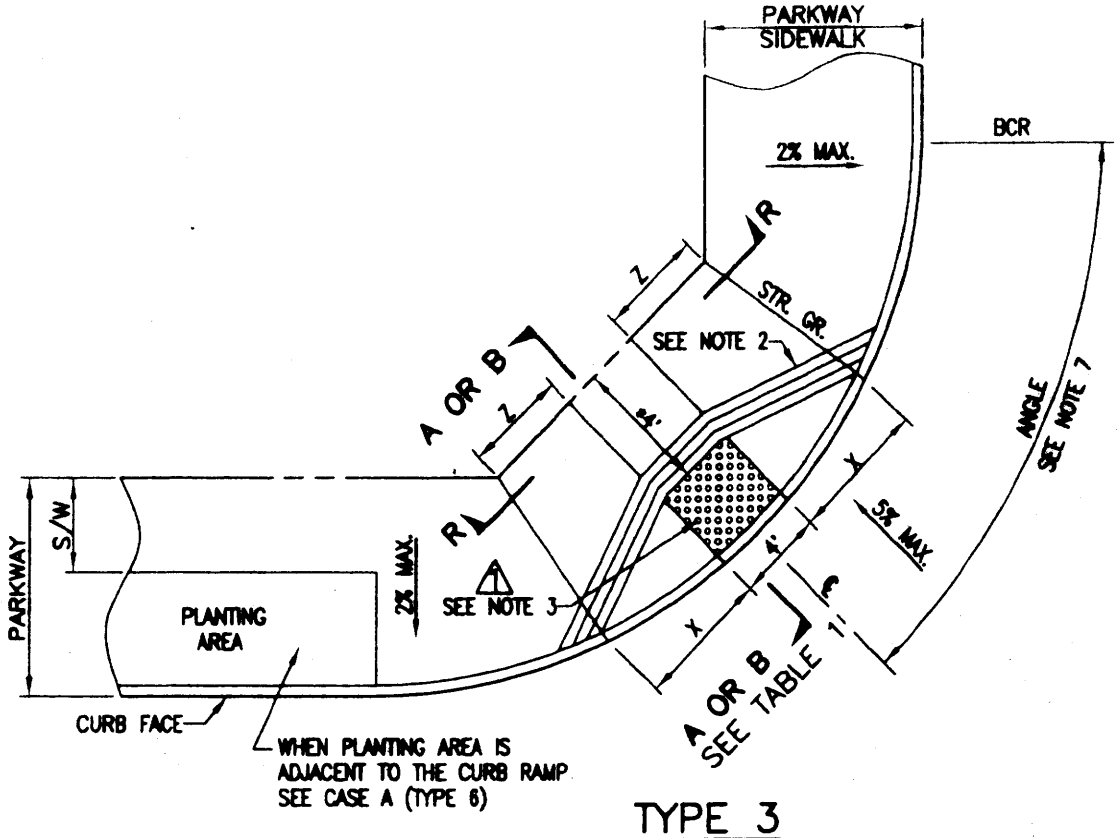
Department of Public Works

APPR. L. Balderrama, PE, City Engineer

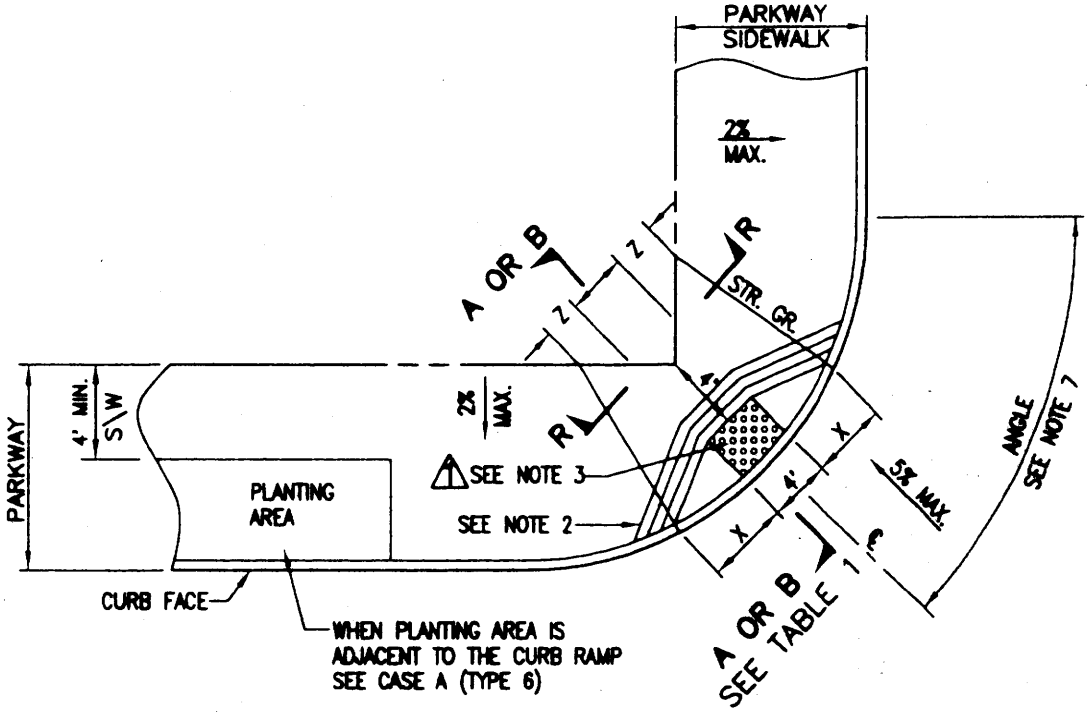
STANDARD PLAN 2002

PLATE 110

SHEET 1 OF 11



TYPE 3



TYPE 4

SEE TABLES 1 AND 2 FOR
X AND Z VALUES (SHT. 9)

* 3' MIN. ALLOWED WHERE EXISTING
RIGHT-OF-WAY CONFLICTS

CASE A

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE
1	L. Balderrama	11-27-07

CURB RAMP

DRAWN: A. ROQUE CKD.:

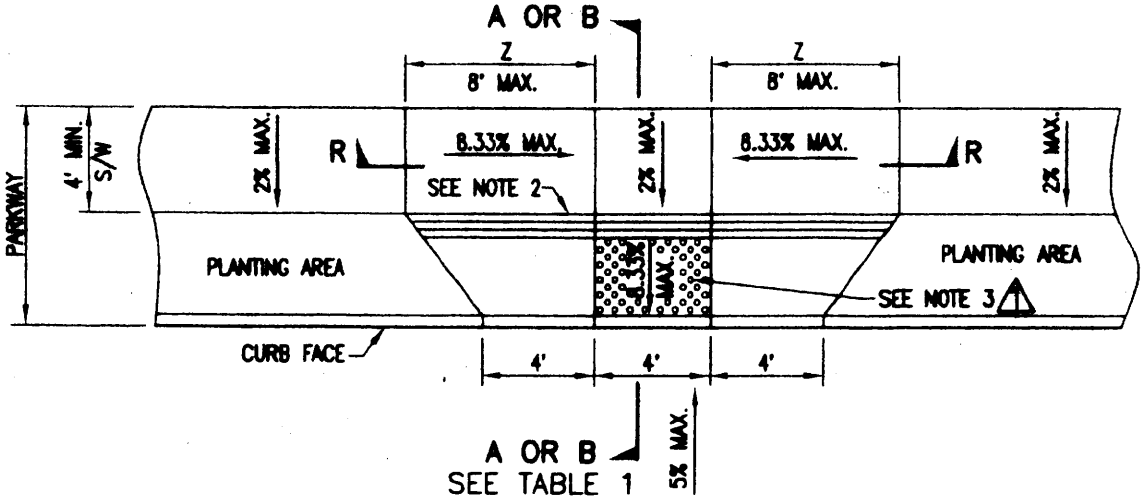
Department of Public Works

APPR: L. Balderrama, PE, City Engineer

STANDARD PLAN 2002

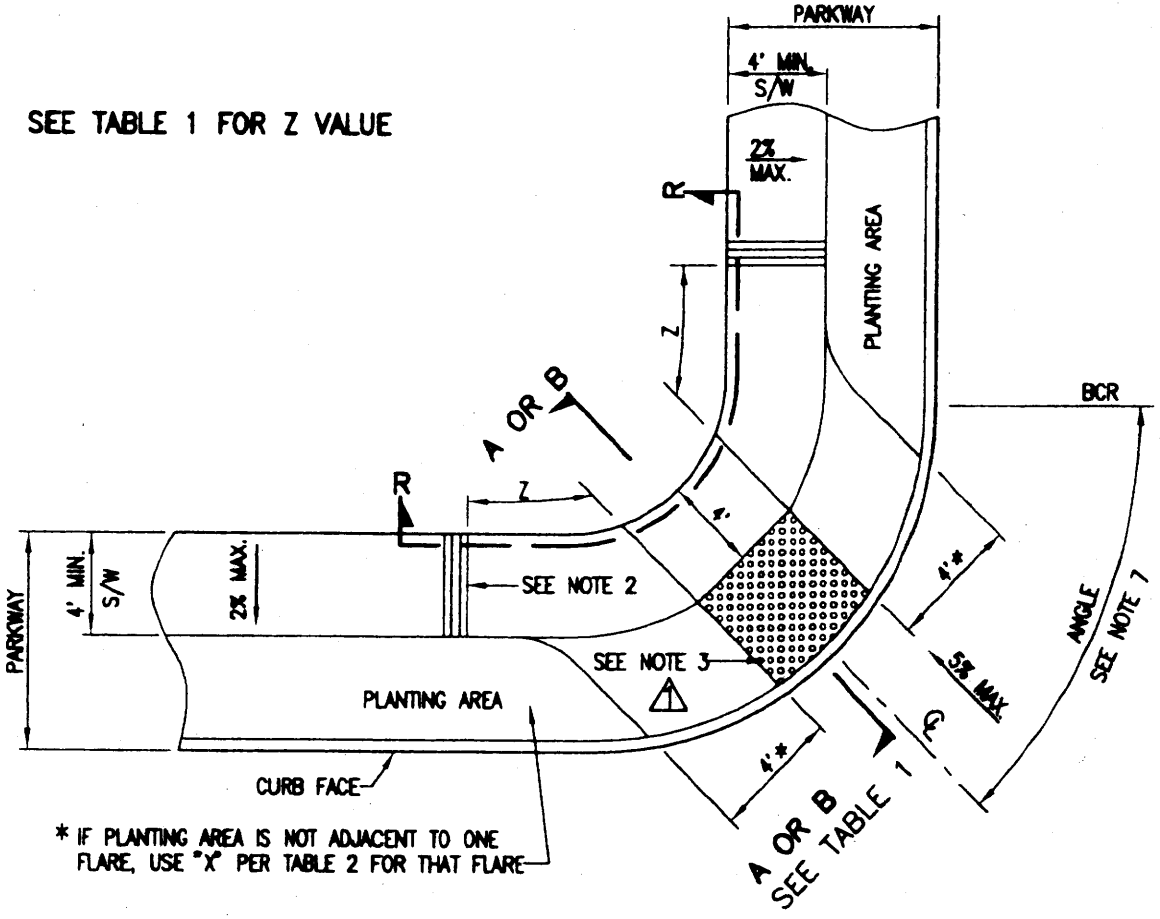
PLATE 110

SHEET 2 OF 11



TYPE 5

SEE TABLE 1 FOR Z VALUE



* IF PLANTING AREA IS NOT ADJACENT TO ONE FLARE, USE "X" PER TABLE 2 FOR THAT FLARE

TYPE 6

CASE A

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE
1 L. Balderrama		11-27-07

CITY OF ANAHEIM CALIFORNIA

Department of Public Works

CURB RAMP

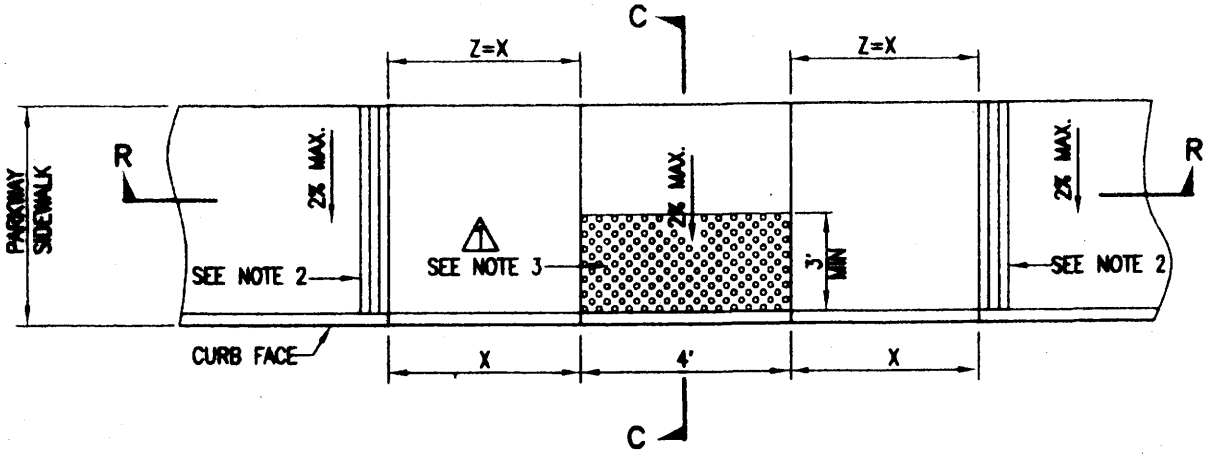
DRAWN: A. ROQUE | CKD.:

APPR. L. Balderrama, PE, City Engineer

STANDARD PLAN 2002

PLATE 110

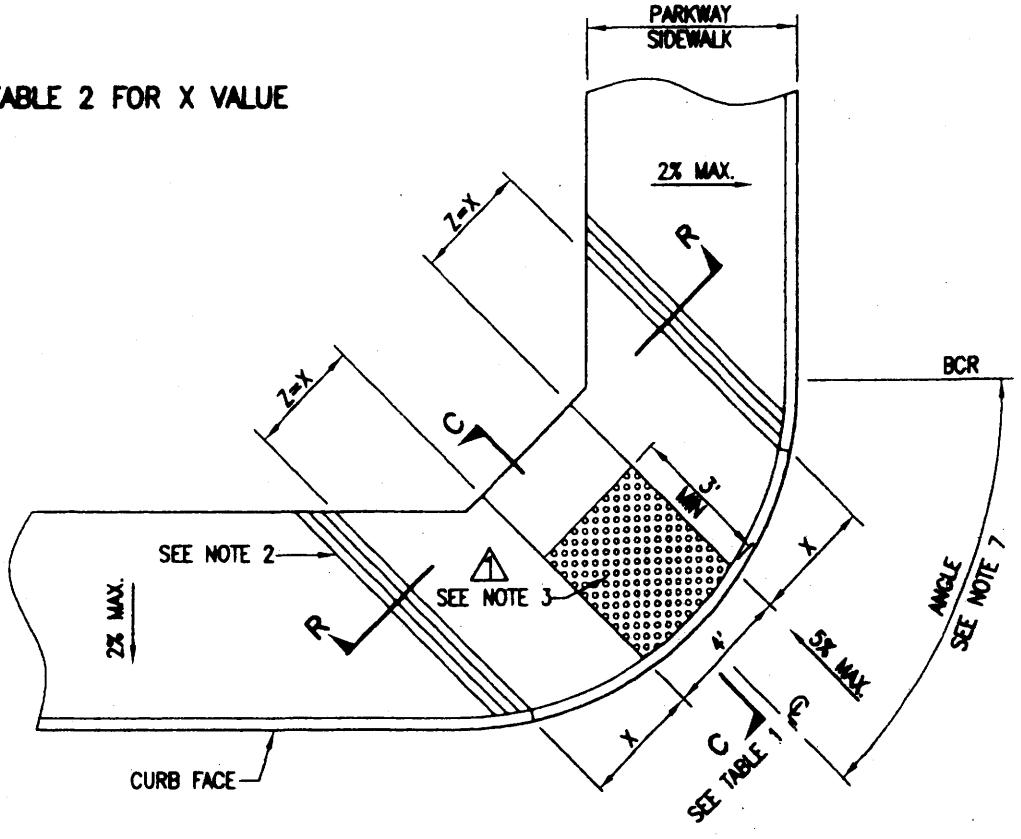
SHEET 3 OF 11



SEE TABLE 1

TYPE 1

SEE TABLE 2 FOR X VALUE



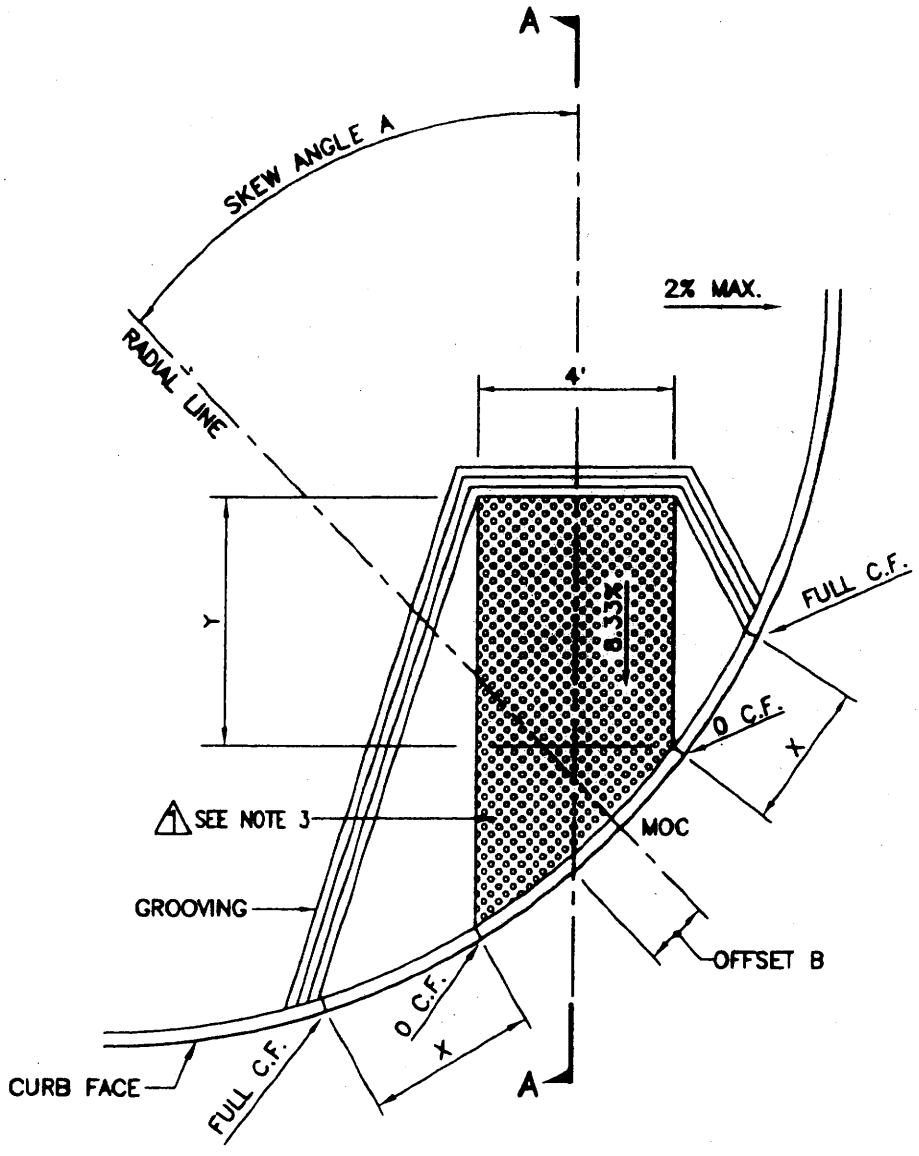
TYPE 2

CASE B

REV. | APPR. BY | DATE

1 L. Balderrama 11-27-07

CURB RAMP		STANDARD PLAN 2002
DRAWN: A. ROQUE	CKD.:	PLATE 110
Department of Public Works	APPR. L. Balderrama, PE, City Engineer	SHEET 4 OF 11



SKEW ANGLE A=45°

OFFSET B=0
UNLESS OTHERWISE NOTED

SEE TABLE 3 FOR Y VALUE

SEE TABLE 2 FOR X VALUE

CASE C

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE
1	L Bolderrama	11-27-07

CITY OF ANAHEIM CALIFORNIA

CURB RAMP

DRAWN: A. ROQUE CKD.:

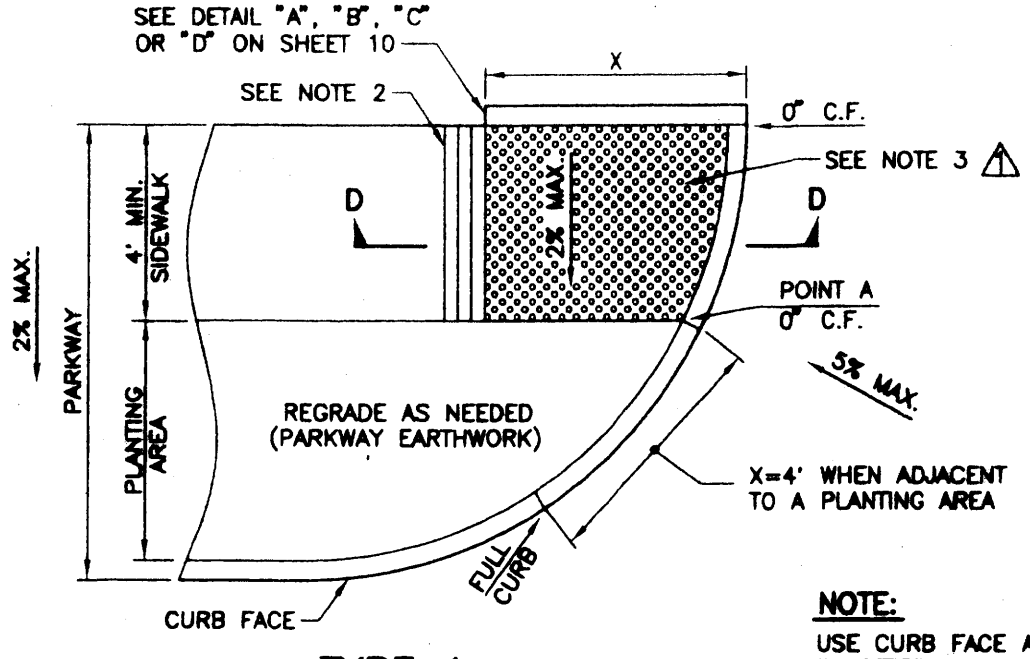
Department of Public Works

APPR. L. Bolderrama, PE, City Engineer

STANDARD PLAN 2002

PLATE 110

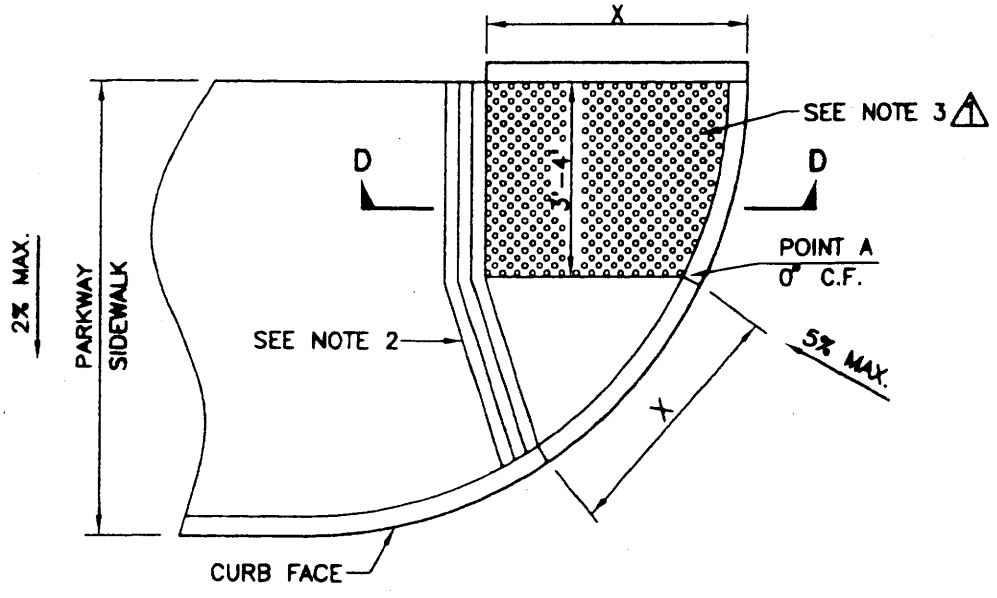
SHEET 5 OF 11



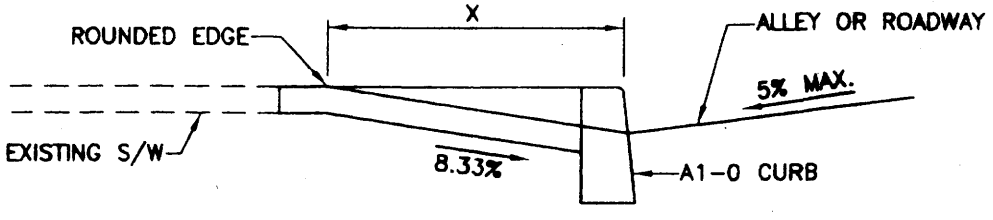
TYPE 1

NOTE:

USE CURB FACE AT POINT A TO DETERMINE X VALUE IN TABLE 2



TYPE 2



SECTION D-D

CASE D

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE
1	L. Balderrama	11-27-07

CITY OF ORANGE CALIFORNIA

CURB RAMP

DRAWN: A. ROQUE | CKD.:

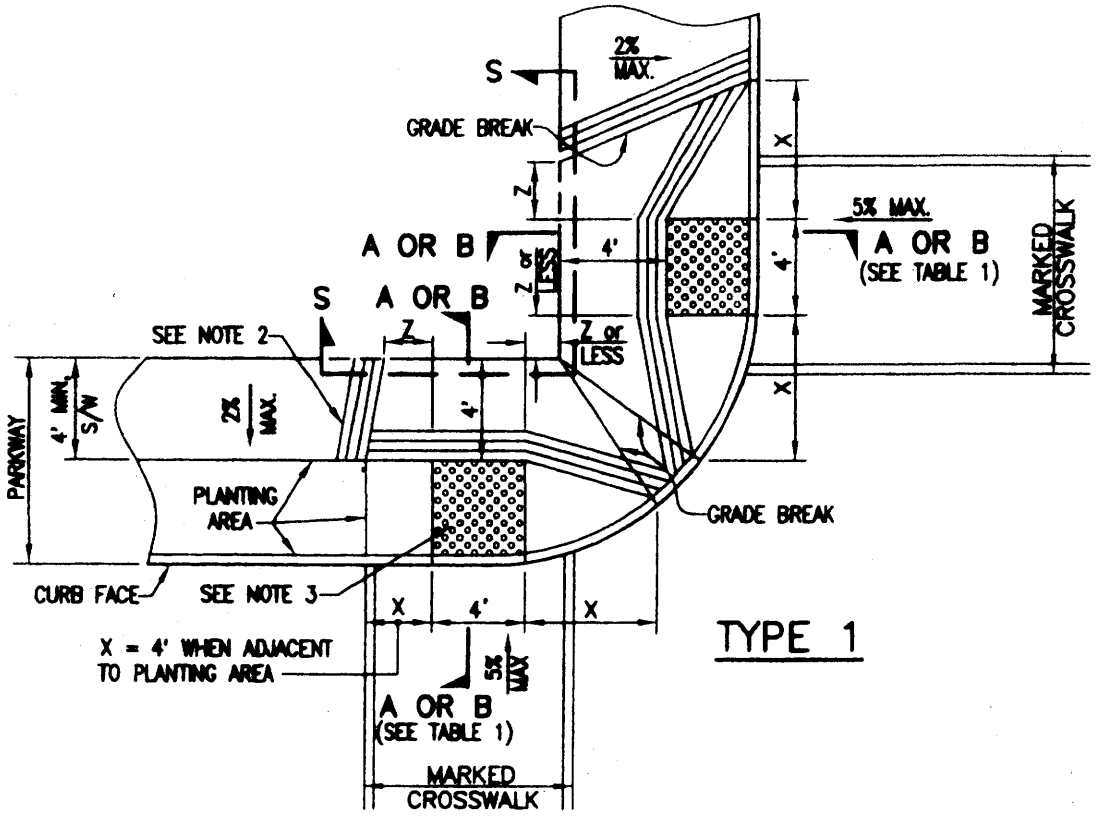
Department of Public Works

APPR. L. Balderrama, PE, City Engineer

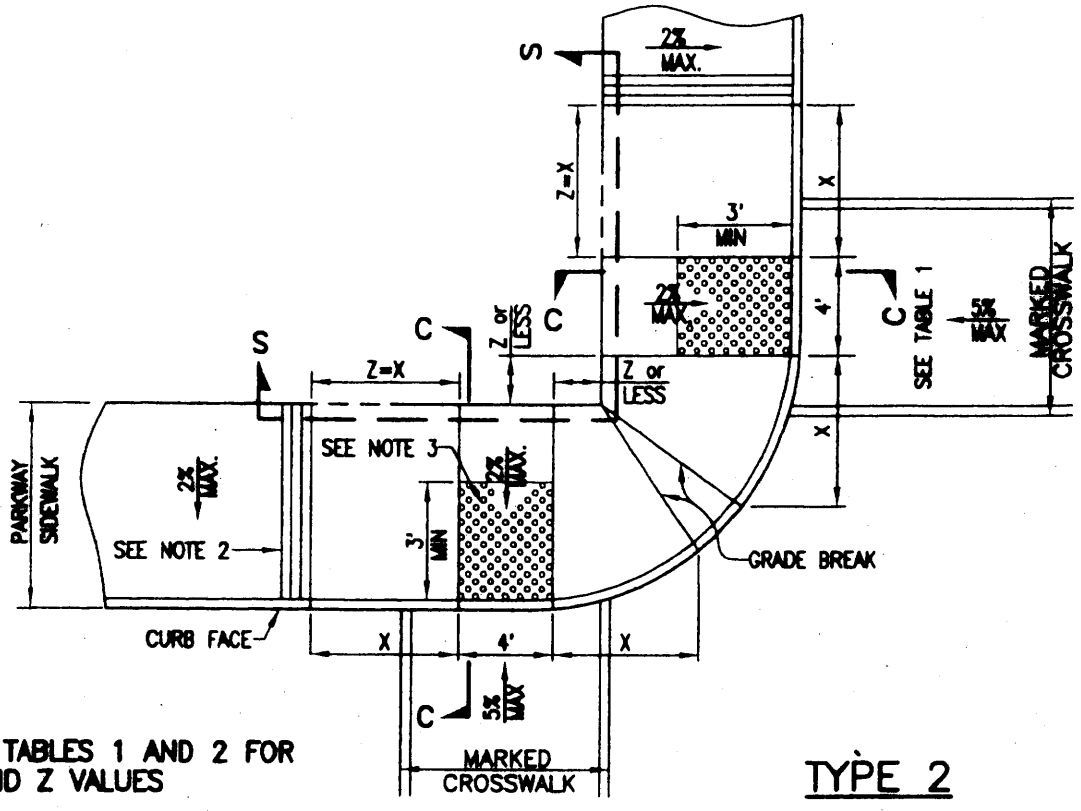
STANDARD PLAN 2002

PLATE 110

SHEET 6 OF 11



TYPE 1



SEE TABLES 1 AND 2 FOR X AND Z VALUES

TYPE 2

CASE E ⚠

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE
⚠	L. Balderrama	11-27-07

CURB RAMP

DRAWN: A. ROQUE | CKD.:

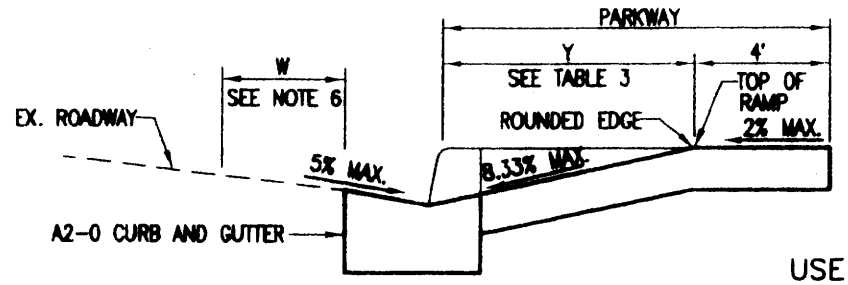
Department of Public Works

APPR. L. Balderrama, PE, City Engineer

STANDARD PLAN 2002

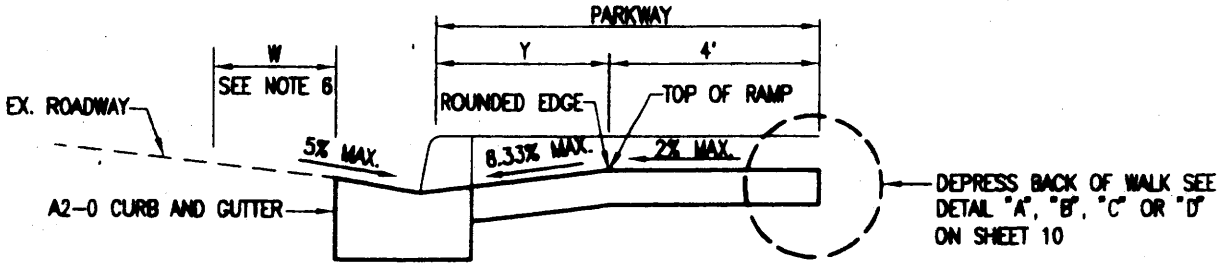
PLATE 110

SHEET 7 OF 11

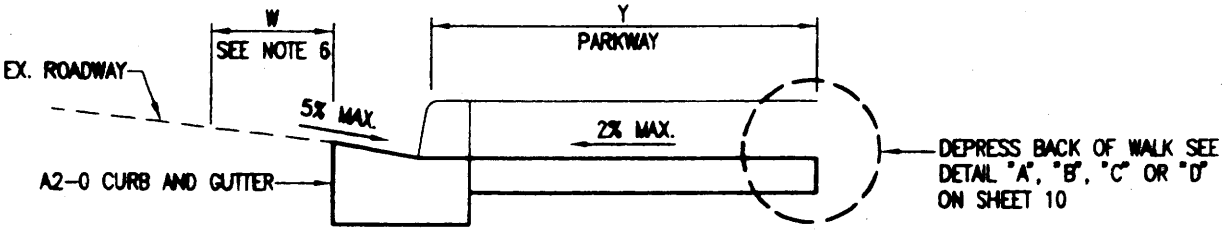


SECTION A-A

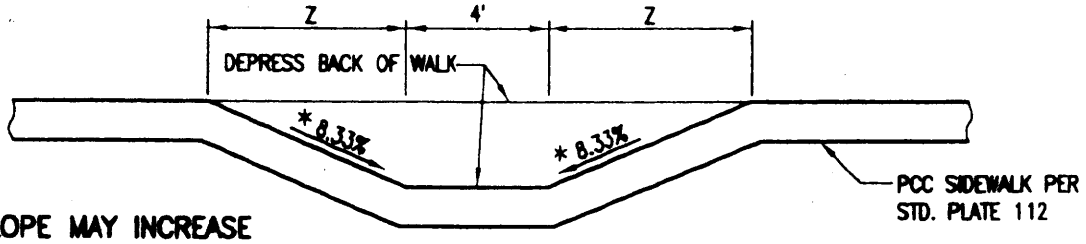
USE TABLE 1 TO DETERMINE WHICH OF SECTIONS A-A, B-B, OR C-C IS APPROPIATE.



SECTION B-B

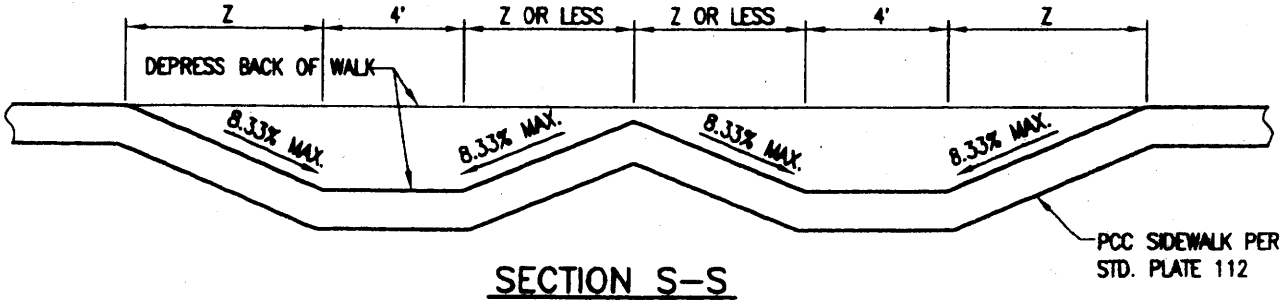


SECTION C-C



* SLOPE MAY INCREASE IF Z EXCEEDS 8'

SECTION R-R



SECTION S-S

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CURB RAMP

DRAWN: A. ROQUE | CKD.:

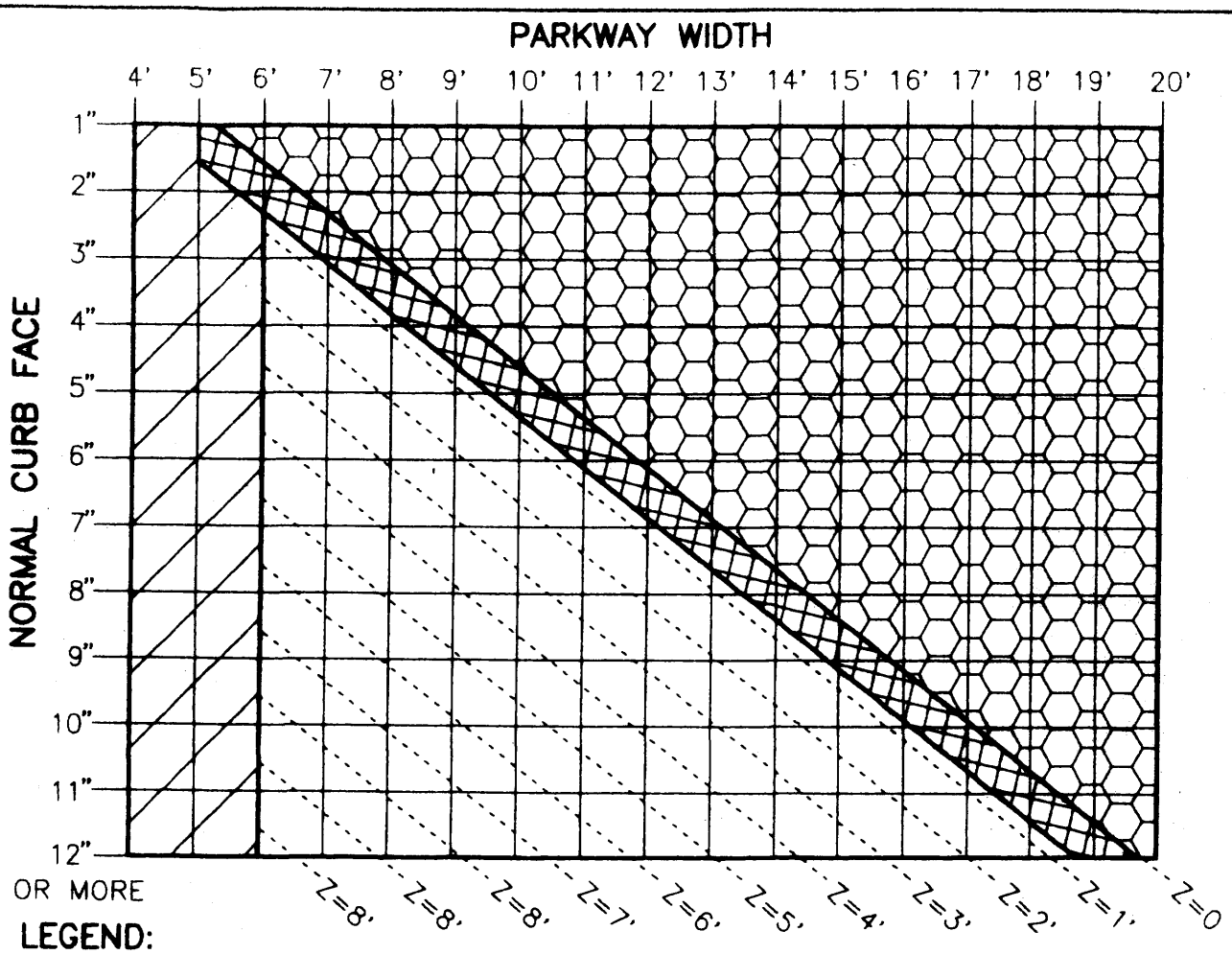
Department of Public Works

APPR. L. Balderrama, PE, City Engineer

STANDARD PLAN 2002

PLATE 110

SHEET 8 OF 11



LEGEND:

SECTION A–A LANDING = 4'

SECTION A–A LANDING = 3'

SECTION B–B

SECTION C–C

TABLE 1 – SECTION USAGE & Z VALUES

NORMAL CURB FACE	X
4" OR LESS	48"
5"	60"
6"	72"
7"	84"
8"	96"
9"	108"
10"	120"
11"	132"
12"	144"

TABLE 2

NORMAL CURB FACE	SECTION A–A Y
2" OR LESS	32"
3"	47"
4"	63"
5"	79"
6"	95"
7"	111"
8"	126"
9"	142"
10"	158"
11"	174"
12" OR MORE	190"

TABLE 3

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE
1	L. Balderrama	11-27-07

CURB RAMP

DRAWN: A. ROQUE CKD.:

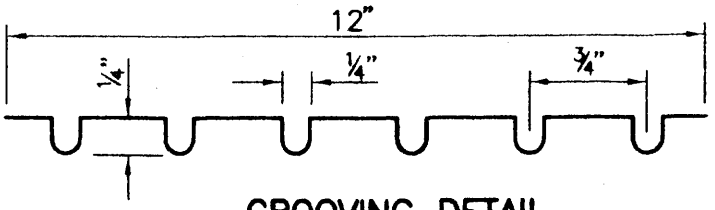
Department of Public Works

APPR. L. Balderrama, PE, City Engineer

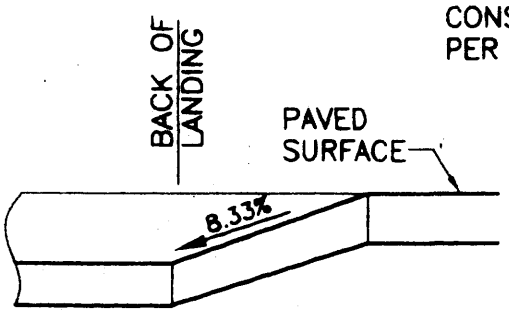
STANDARD PLAN 2002

PLATE 110

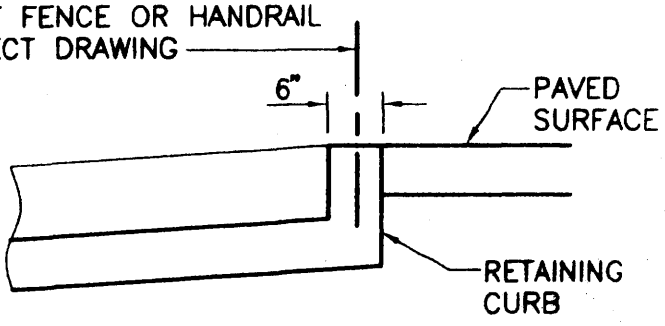
SHEET 9 OF 11



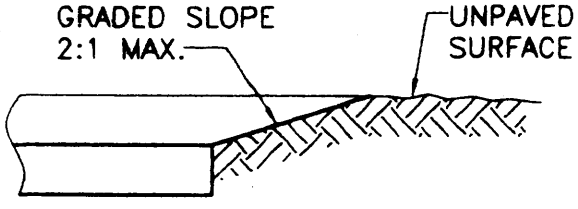
GROOVING DETAIL



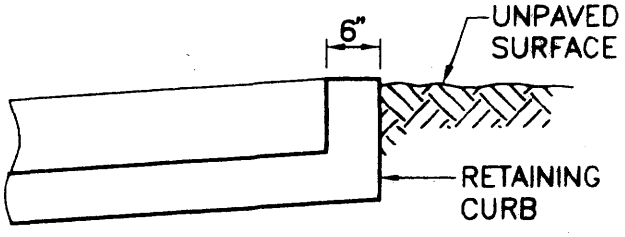
DETAIL "A"



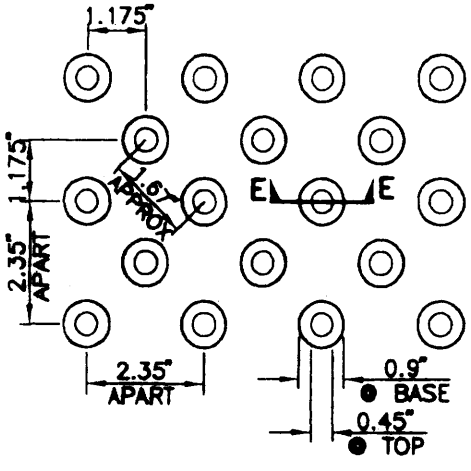
DETAIL "B"

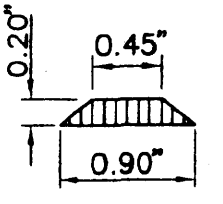


DETAIL "C"



DETAIL "D"





SECTION E-E

TRUNCATED DOMES

⚠ DETECTABLE WARNING SURFACE

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE
⚠	L. Balderrama	11-27-07

CITY OF OAKLAND CALIFORNIA

CURB RAMP

DRAWN: A. ROQUE | CKD.:

Department of Public Works

APPR. L. Balderrama, PE, City Engineer

STANDARD PLAN 2002

PLATE 110

SHEET 10 OF 11

GENERAL NOTES:

1. CONCRETE SHALL BE CLASS 310-C-17 (520-C-2500) AND SHALL BE 4" THICK.
2. THE RAMP SHALL HAVE A 12" WIDE BORDER WITH 1/4" GROOVES APPROXIMATELY 3/4" O.C. SEE GROOVING DETAIL.
3. ⚠ CURB RAMPS SHALL HAVE A DETECTABLE WARNING THAT EXTENDS THE FULL WIDTH AND DEPTH OF THE RAMP, EXCLUDING THE FLARED SIDES, INSIDE THE GROOVED BORDER. DETECTABLE WARNING DEVICE SHALL BE ARMOR-TILE TACTILE SYSTEMS PRODUCT, FEDERAL YELLOW IN COLOR OR APPROVED EQUAL.
4. USE DETAIL "A" OR "B" IF EXISTING SURFACE BEHIND RIGHT OF WAY IS PAVED.
5. USE DETAIL "C" OR "D" IF EXISTING SURFACE BEHIND RIGHT OF WAY IS UNPAVED.
6. W = 3' UNLESS OTHERWISE SHOWN ON PLAN. THIS AREA MAY NOT EXCEED 5% LONGITUDINAL SLOPE.
7. ANGLE = $\Delta/2$ UNLESS OTHERWISE SHOWN ON PLAN.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE
⚠	L. Balderrama	11-27-07

CITY OF ANAHEIM CALIFORNIA

CURB RAMP

DRAWN: A. ROQUE | CKD.:

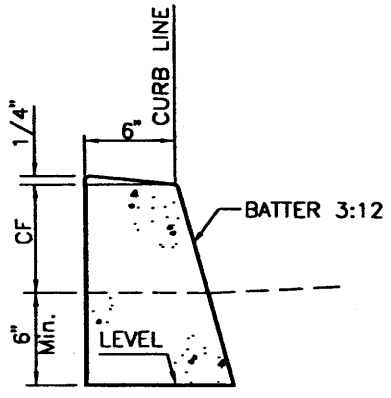
Department of Public Works

APPR. L. Balderrama, PE, City Engineer

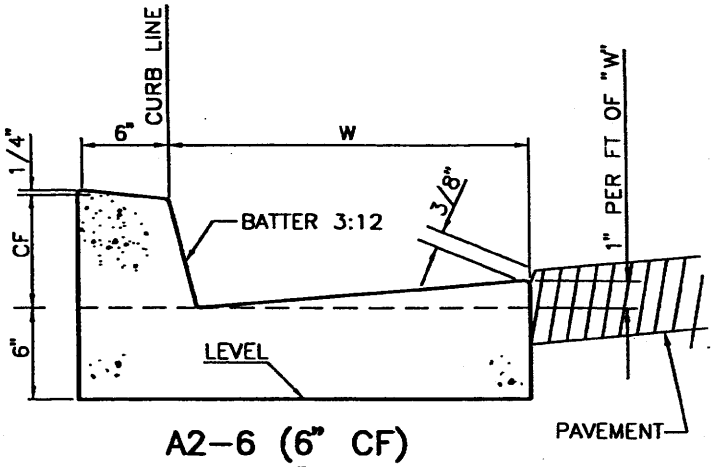
STANDARD PLAN 2002

PLATE 110

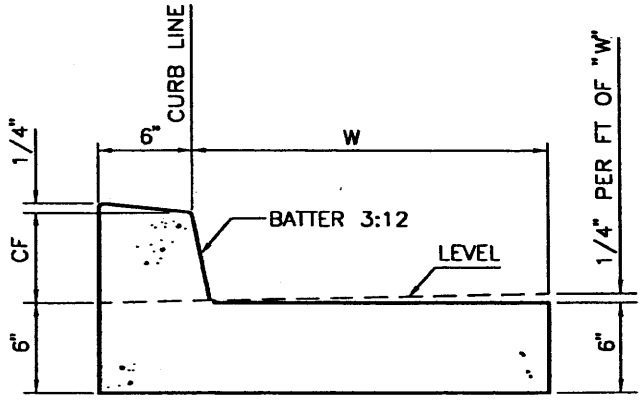
SHEET 11 OF 11



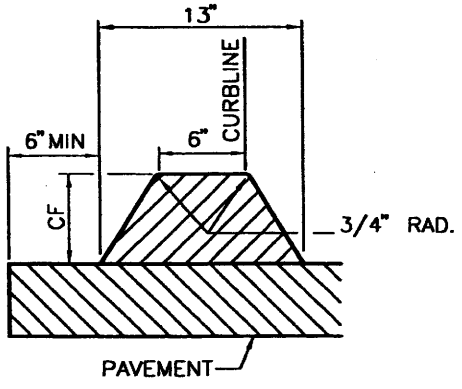
A1-6 (6" CF)
AND
A1-8 (8" CF)



A2-6 (6" CF)
AND
A2-8 (8" CF)



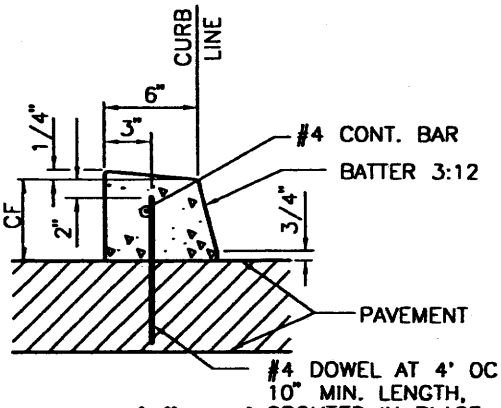
A3-6 (6" CF)
AND
A3-8 (8"CF)



D1-6 (6" CF)
AND
D1-8 (8" CF)

NOTES:

1. ALL DIMENSIONS ARE MEASURED IN INCHES.
2. "CF" IS THE LAST NUMBER IN THE DESIGNATION.
3. W=18" FOR 6" C.F. & 24" FOR 8" C.F.
4. TYPES A1, A2, A3, AND C1 ARE CONSTRUCTED OF PORTLAND CEMENT CONCRETE.
5. TYPE D1 IS CONSTRUCTED OF ASPHALT CONCRETE.
6. TYPE C1 CURB SHALL BE ANCHORED WITH DOWELS AS SHOWN OR WITH AN EPOXY APPROVED BY THE ENGINEER.
7. GRADE SHALL BE MEASURED AT CURB LINE AT TOP OF CURB.
8. ALL EXPOSED CORNERS ON PCC CURBS AND GUTTERS TO BE ROUNDED WITH A 1/2" RADIUS.
9. WHEN SOILS EXPANSION INDEX IS $\geq$ 5%, PLACE 4" THICK SAND OR BASE UNDER CONCRETE CURB AND GUTTER EXTENDING 12" BEHIND CURB.
10. ALL CURBS SHALL HAVE A 1" DEEP WEAKENED PLANE JOINT AT 10' INTERVALS. FULL DEPTH EXPANSION JOINTS SHALL BE INSTALLED AT ALL B.C.'S, E.C.'S, D/W'S RECTANGULAR CORNERS AND AT 60' INTERVAL PER PLATE 112.



C1-6 (6" CF)
AND
C1-8 (8" CF)

REV. APPR. BY DATE

REV. APPR. BY DATE

CITY OF Oxnard
Department of Public Works

CONC. CURB, CURB & GUTTER, A.C. BERM

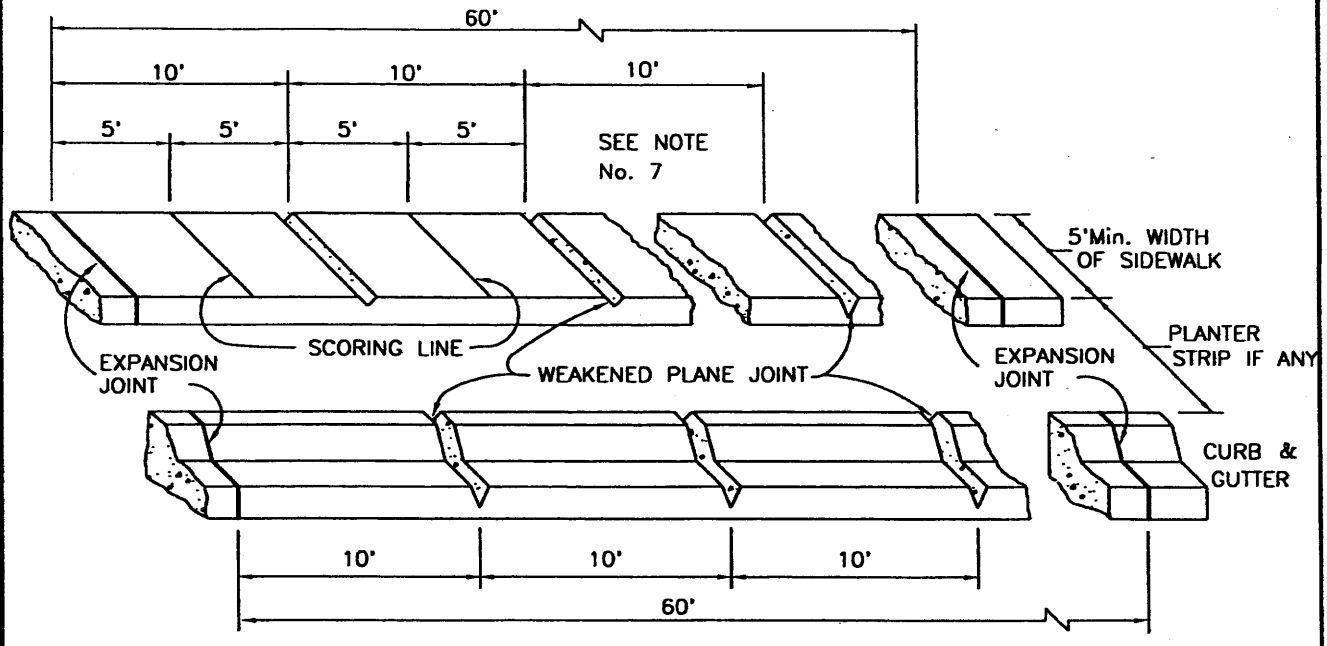
DRAWN: STAFF CKD.: STAFF LB

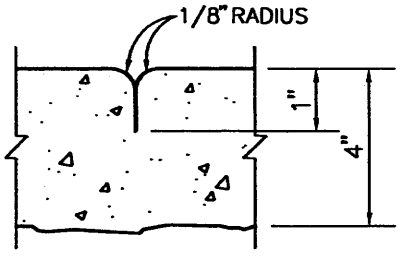
APPR. Granville M. Bowman

STANDARD PLAN 2002

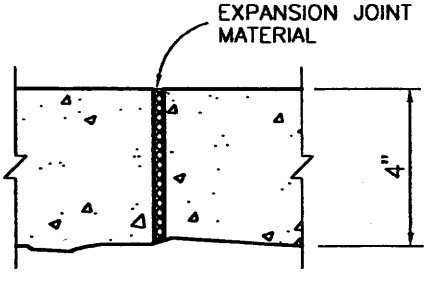
PLATE 111

SHEET 1 OF 1





WEAKENED–PLANE JOINT



EXPANSION JOINT

NOTES:

1. CONCRETE FOR SIDEWALK SHALL BE 520–C–2500 WITH 4" MAX. SLUMP. SELF HAUL NOT PERMITTED.
2. EXPANSION JOINTS SHALL BE MADE AT B.C. AND E.C. OF ALL RETURNS, AT THE OUTER EDGES OF DRIVEWAYS INCLUDING "X" DISTANCES, AND AT UNIFORM INTERVALS AS SHOWN ON PLATE 113 OR AS DIRECTED BY INSPECTOR.
3. WEAKENED PLANE JOINT, ONE INCH DEEP, SHALL BE CONSTRUCTED AT EQUAL SPACING BETWEEN EXPANSION JOINS IN WALKS AND GUTTERS.
4. WEAKENED PLANE JOINTS IN THE CURB AND GUTTER SHALL ALIGN WITH CORRESPONDING JOINTS IN THE WALK.
5. LONGITUDINAL SCORING LINES WILL BE REQUIRED IN WALKS 10 FEET OR WIDER.
6. WEAKENED PLANE JOINTS IN SIDEWALK SHALL BE CONSTRUCTED WITH DEEP GROOVING TOOL. MINIMUM 1" DEEP.
7. WHEN SOILS EXPANSION INDEX IS ≥ 5%, PLACE 4" THICK SAND OR BASE UNDER CONCRETE CURB AND GUTTER EXTENDING 12" BEHIND CURB AND UNDER SIDEWALK.
8. WEED KILLER SHALL BE APPLIED AT ALL COLD JOINTS AND STOP 6' SHORT OF TREE DRIP LINE.

REV. APPR. DATE

REV. APPR. DATE

CITY OF Oxnard
Department of Public Works

EXPANSION JOINTS, WEAKENED PLANE JOINTS AND SCORING LINES–TYPICAL SPACING

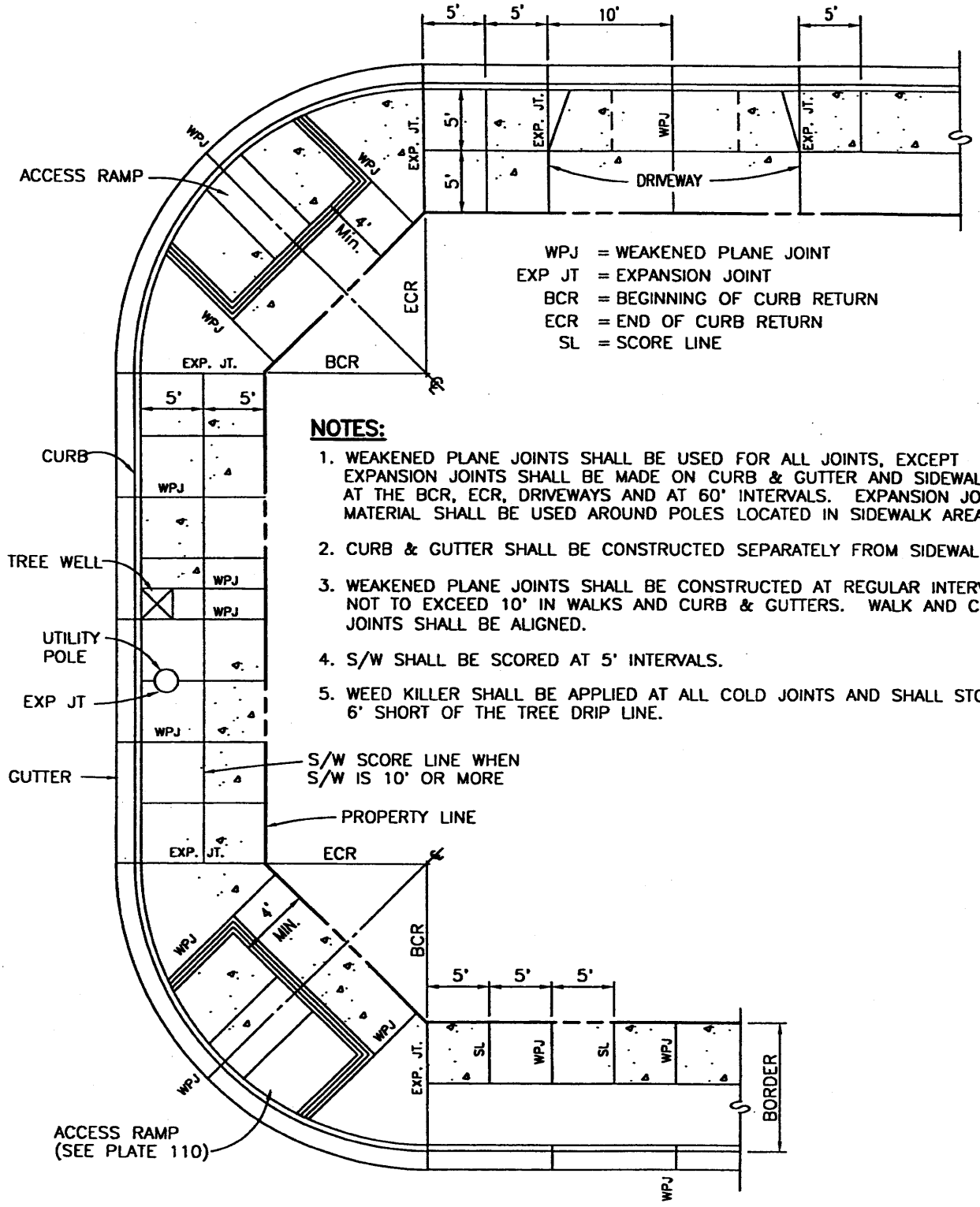
DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 112

SHEET 1 OF 1



NOTES:

1. WEAKENED PLANE JOINTS SHALL BE USED FOR ALL JOINTS, EXCEPT EXPANSION JOINTS SHALL BE MADE ON CURB & GUTTER AND SIDEWALK AT THE BCR, ECR, DRIVEWAYS AND AT 60' INTERVALS. EXPANSION JOINT MATERIAL SHALL BE USED AROUND POLES LOCATED IN SIDEWALK AREAS.
2. CURB & GUTTER SHALL BE CONSTRUCTED SEPARATELY FROM SIDEWALK.
3. WEAKENED PLANE JOINTS SHALL BE CONSTRUCTED AT REGULAR INTERVALS NOT TO EXCEED 10' IN WALKS AND CURB & GUTTERS. WALK AND CURB JOINTS SHALL BE ALIGNED.
4. S/W SHALL BE SCORED AT 5' INTERVALS.
5. WEED KILLER SHALL BE APPLIED AT ALL COLD JOINTS AND SHALL STOP 6' SHORT OF THE TREE DRIP LINE.

SEE PLATE 112 FOR ADDITIONAL INFORMATION ON EJ, WPJ, AND SCORING LINES – TYPICAL SPACING.

REV. APPR. BY DATE

REV. APPR. BY DATE

CITY OF Oxnard

Department of Public Works

CURB AND SIDEWALK JOINTS

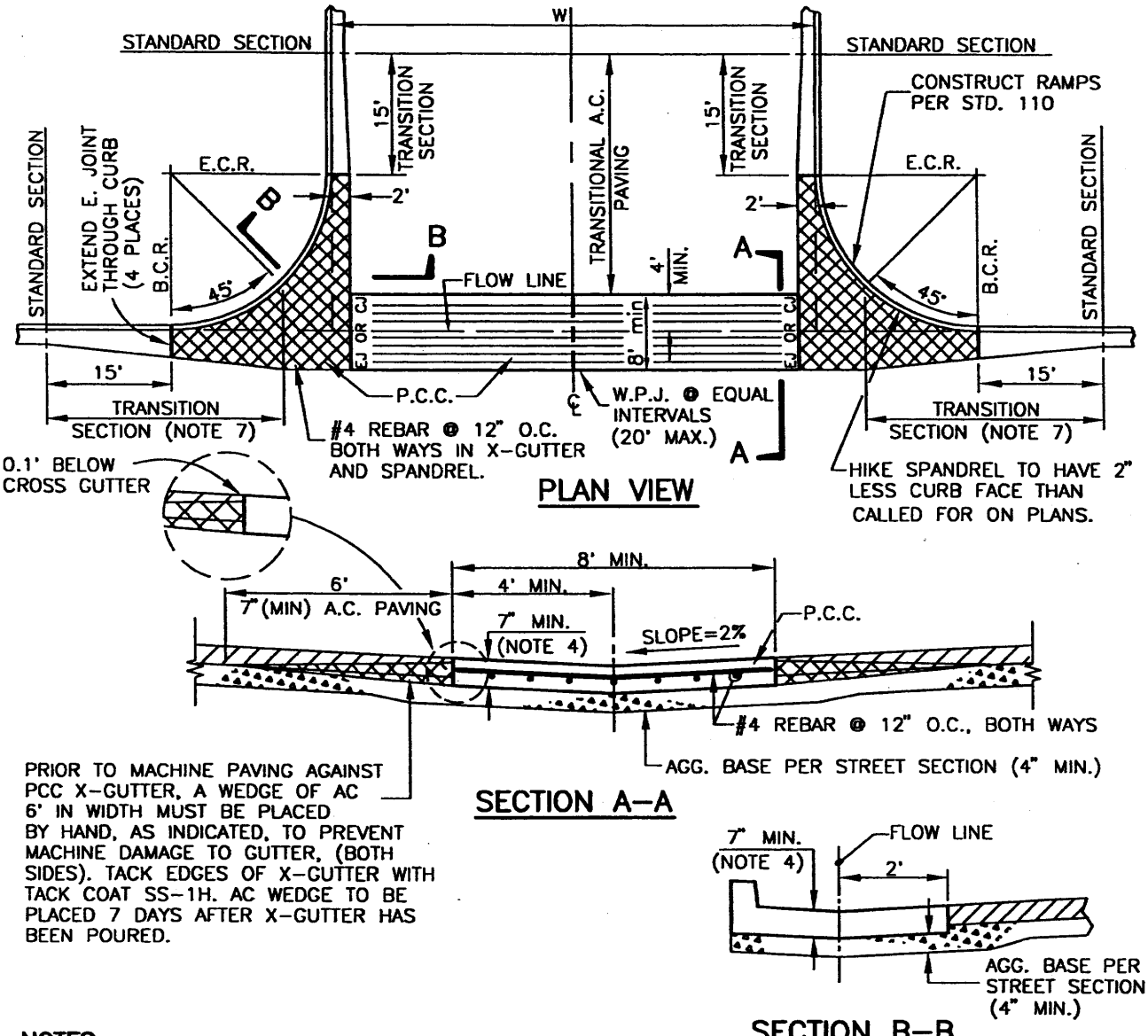
DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 113

SHEET 1 OF 1



PLAN VIEW

PRIOR TO MACHINE PAVING AGAINST PCC X-GUTTER, A WEDGE OF AC 6' IN WIDTH MUST BE PLACED BY HAND, AS INDICATED, TO PREVENT MACHINE DAMAGE TO GUTTER, (BOTH SIDES). TACK EDGES OF X-GUTTER WITH TACK COAT SS-1H. AC WEDGE TO BE PLACED 7 DAYS AFTER X-GUTTER HAS BEEN POURED.

SECTION A–A

SECTION B–B

NOTES:

1. AGGREGATE BASE REQUIRED UNDER CROSS GUTTER BEGINNING AT B.C.R. & E.C.R. & UNDER SPANDREL.
2. ——— INDICATES COLD JOINT (CJ) OR EXPANSION JOINT (EJ).
3. – – – INDICATES WEAKENED PLANE JOINT 2" DEEP TO BE PLACED WHEN W IS GREATER THAN 20'.
4. CROSS GUTTER THICKNESS SHALL BE 8" FOR CROSS GUTTER WIDTH OF 16', 18', AND 20'.
5. STEEL REINFORCING SHALL BE #4 BARS AT 12" O.C. BOTH WAYS IN CROSS GUTTER & SPANDRELS.
6. CROSS SLOPE OF CROSS GUTTER TO FLOW LINE SHALL BE 2%.
7. TRANSITION SECTION SHALL BE INCREASED BY 2' FOR 2' INCREMENTS FOR CROSS GUTTER WIDER THAN 8'.
8. CONSOLIDATE CONCRETE USING A VIBRATOR.

REV. | APPR. BY | DATE

REV. | APPR. BY | DATE

CITY OF Oxnard
Department of Public Works

CROSS GUTTERS

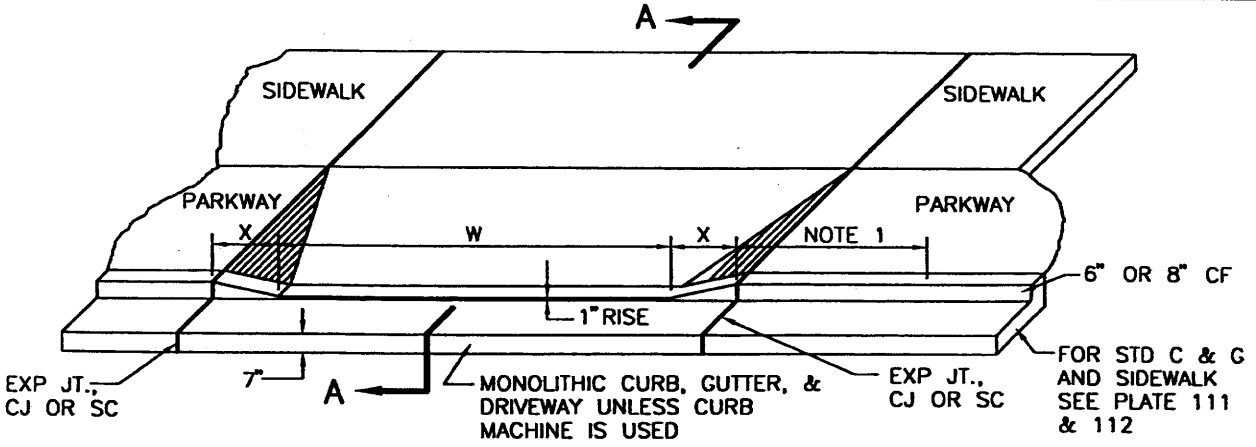
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowmon

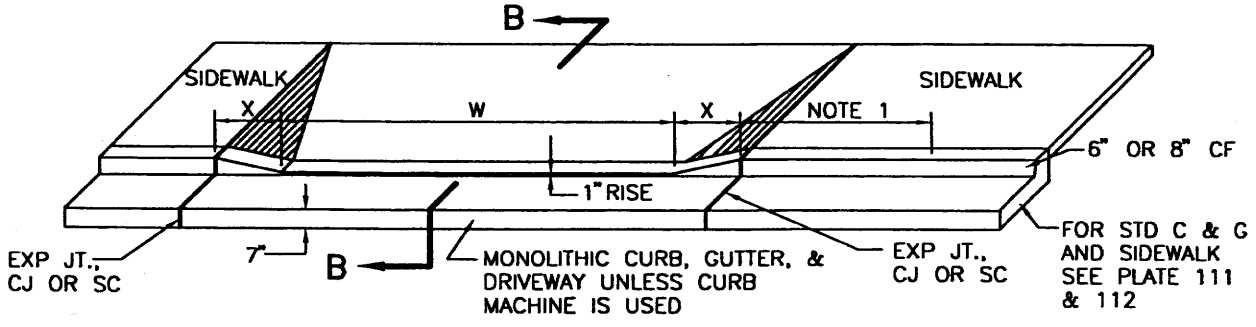
STANDARD PLAN 2002

PLATE 114

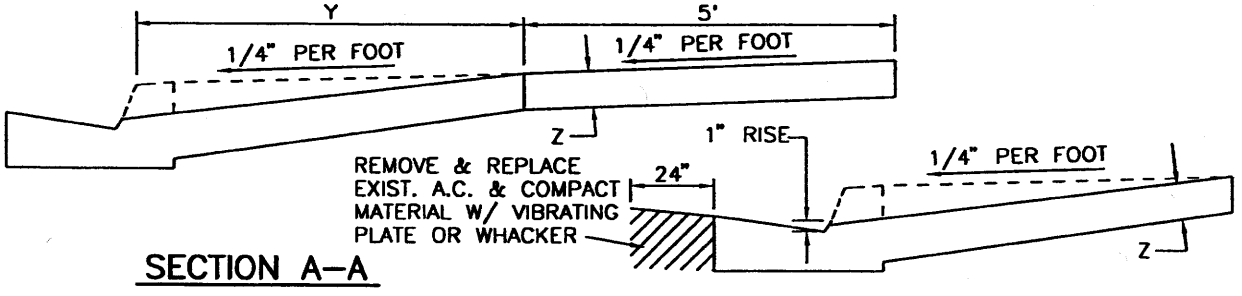
SHEET 1 OF 1



SIDEWALK AND CURB NOT ADJACENT



SIDEWALK AND CURB ADJACENT



SECTION A–A

SECTION B–B

EXP J=EXPANSION JOINT; CJ=COLD JOINT; SC=SAW CUT.

W = SEE PLATE 115 SHEET 2

X = 3' WHEN CURB HEIGHT IS OVER 6" AND 2' WHEN CURB HEIGHT IS 6" OR LESS.

Z = 6" FOR SINGLE FAMILY RESIDENTIAL, 8" FOR MULTI-FAMILY RESIDENTIAL, AND 8" WITH #4 REBAR 12" O.C. BOTH WAYS FOR COMMERCIAL WITH PRIOR APPROVAL ONLY.

Y = 5' MIN. (IF Y<5' USE SECTION B–B)

NOTES:

1. MUST BE A MINIMUM OF 5' FROM STREET LIGHT, FIRE HYDRANT OR BEGINNING OF CURB RETURN MEASURED FROM END OF "X". MUST BE MINIMUM OF 3' FROM PROPERTY LINE. MUST BE A MINIMUM OF 20' OF FULL CURB BETWEEN DRIVEWAYS ON THE SAME LOT.
2. THE CURB AND GUTTER SHALL BE SAWED AT THE NEAREST SCORE MARK.
3. ALL CONCRETE SHALL BE 520-C-2500.
4. ALL DRIVEWAYS SHALL INCLUDE AN A.D.A. COMPLIANT PATHWAY.

REV. | APPR. BY | DATE

REV. | APPR. BY | DATE

CITY OF Oxnard

Department of Public Works

RESIDENTIAL DRIVEWAYS

DRAWN: STAFF | CKD.: STAFF

APPR. Gronville M. Bowman

STANDARD PLAN 2002

PLATE 115

SHEET 1 OF 2

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

WIDTH OF DRIVEWAY

TYPE OF STREET		RESIDENTIAL		COMMERCIAL/ INDUSTRIAL		ARTERIAL	
TYPE OF DEVELOPMENT		MIN	MAX	MIN	MAX	MIN	MAX
RESIDENTIAL		12	25	--	--	--	--
COMMERCIAL	ONE WAY TRAFFIC	--	--	18	25	20	30
	TWO WAY TRAFFIC	--	--	25	36	25	36
INDUSTRIAL PASSENGER CARS	ONE WAY TRAFFIC	--	--	18	25	20	30
	TWO WAY TRAFFIC	--	--	25	36	25	36
INDUSTRIAL TRUCKS		--	--	25	45	25	45

CITY OF Oxnard

Department of Public Works

DRIVEWAYS

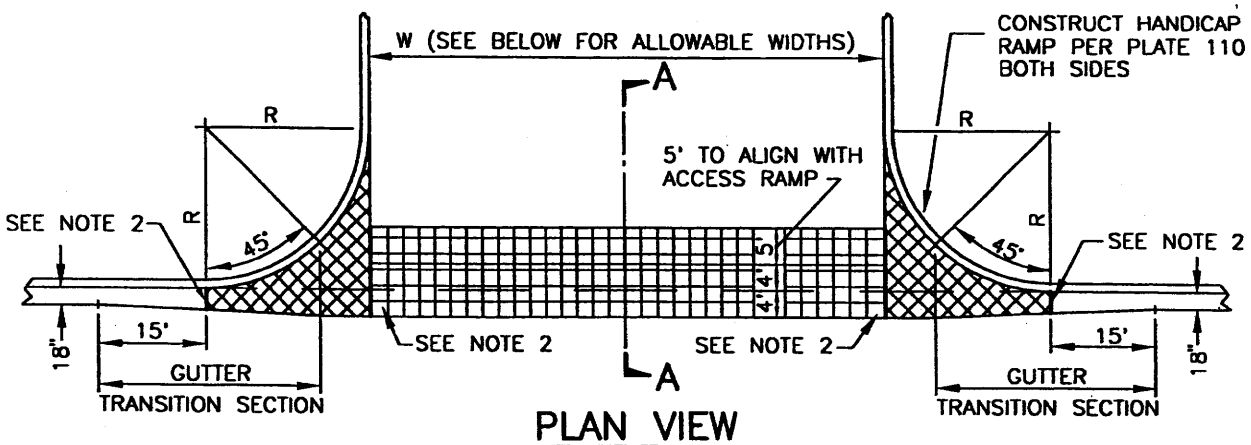
DRAWN: STAFF CKD.: STSAFF

APPR. Granville M. Bowmon

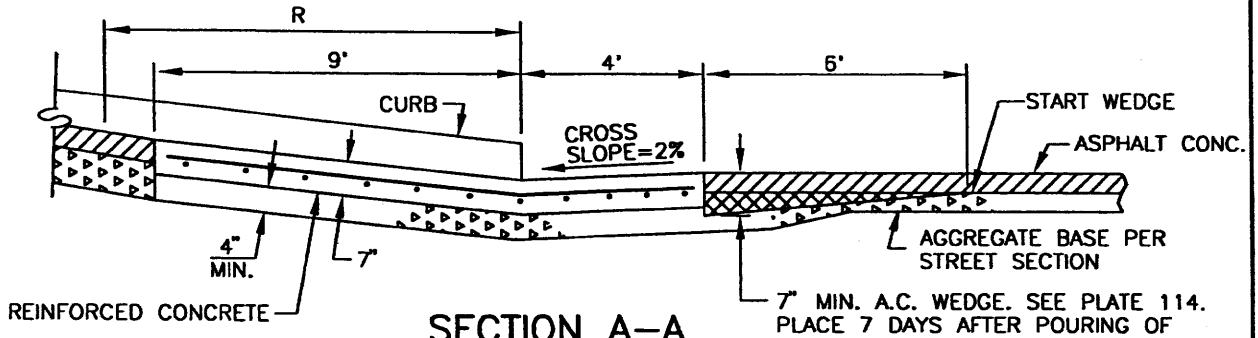
STANDARD PLAN 2002

PLATE 115

SHEET 2 OF 2



PLAN VIEW



SECTION A–A

NOTES:

1. AGGREGATE BASE REQUIRED UNDER CROSS GUTTER BEGINNING AT B.C.R. & E.C.R. & UNDER SPANDREL.
2. ——— INDICATES ½" EXPANSION JOINT OR COLD JOINT.
3. REBAR, #4 SIZE, 12" ON CENTER, BOTHWAYS, GUTTER AND SPANDREL.
4. ALL CONCRETE SHALL BE 520-C-2500.
5. FOR SIDEWALK TREATMENT AROUND THE CURB RETURN, CURB RADIUS, AND RIGHT-OF-WAY REQUIREMENTS, SEE NEXT SHEET.
6. APPLY WEED KILLER AT ALL COLD JOINTS.
7. INSTALL 2" DEEP WEAKENED PLANE JOINTS AT 20' INTERVALS.

WIDTH OF DRIVEWAY

TYPE OF STREET		RESIDENTIAL		COMMERCIAL/ INDUSTRIAL		ARTERIAL	
TYPE OF DEVELOPMENT		MIN	MAX	MIN	MAX	MIN	MAX
RESIDENTIAL		12	25	—	—	—	—
COMMERCIAL	ONE WAY TRAFFIC	—	—	18	25	20	30
	TWO WAY TRAFFIC	—	—	25	36	25	36
INDUSTRIAL PASSENGER CARS	ONE WAY TRAFFIC	—	—	18	25	20	30
	TWO WAY TRAFFIC	—	—	25	36	25	36
INDUSTRIAL TRUCKS		—	—	25	45	25	45

REV. APPR. BY DATE

REV. APPR. BY DATE

CITY OF Oxnard

Department of Public Works

COMMERCIAL & INDUSTRIAL DRIVEWAYS

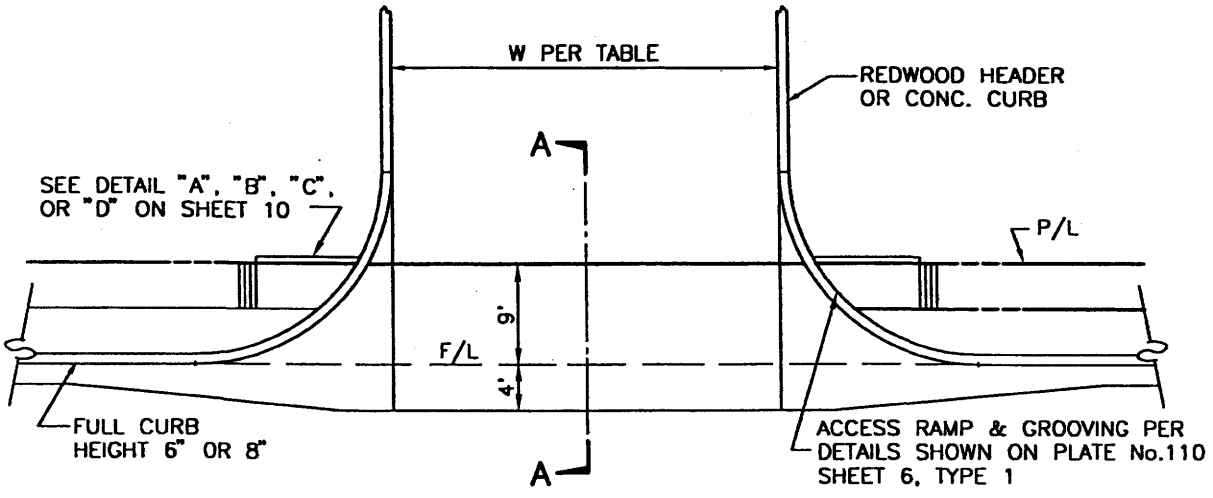
DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

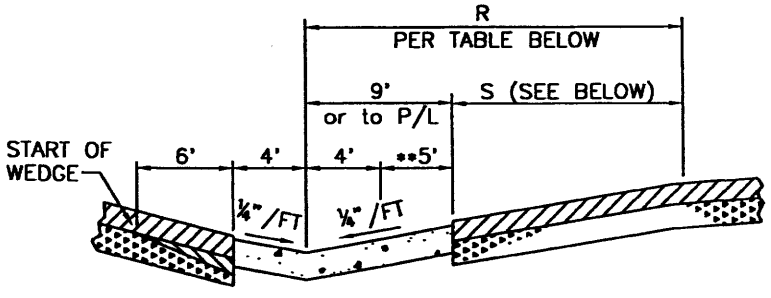
STANDARD PLAN 2002

PLATE 116

SHEET 1 OF 2



PLAN VIEW



SECTION A–A

TYPE OF ROADWAY	R	S	
		6" CF	8" CF
ARTERIAL ROADWAY (PLATE No. 102)	35'	4.0%	4.6%
COMMERCIAL/LOCAL ARTERIAL (PLATE No. 101)	25' *	5.2%	6.2%
IN FILL AREA (SPECIAL CASE) PRIOR APPROVAL BY PWD REQUIRED	20'	6.6%	8.1%

* IF PREDOMINANTLY USED BY TRUCKS, USE R=35'

** FIVE FOOT OF GUTTER WIDTH TO HAVE 2% MAX. CROSSFALL FOR DISABLED ACCESS PATHWAY AND TO ALIGN WITH RAMPS.

REV. APPR. BY DATE

REV. APPR. BY DATE

CITY OF Oxnard

COMMERCIAL & INDUSTRIAL DRIVEWAYS

STANDARD PLAN 2002

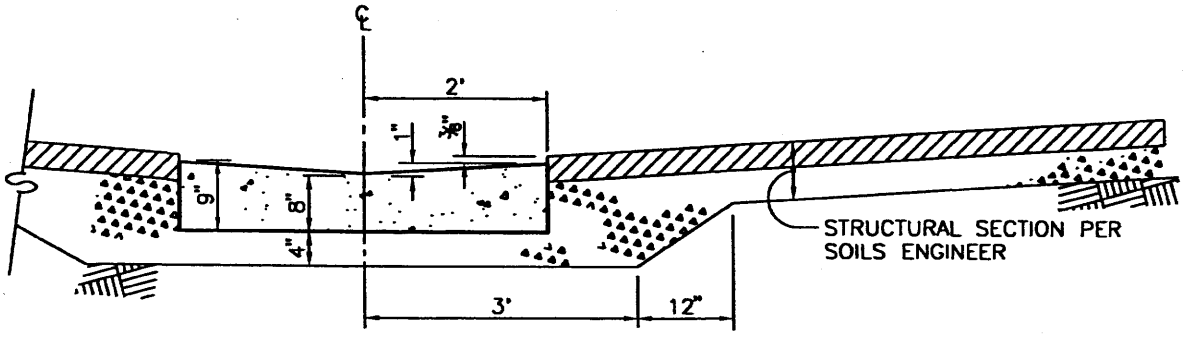
DRAWN: STAFF CKD.: STAFF

Department of Public Works

APPR. Granville M. Bowman

PLATE 116

SHEET 2 OF 2



SECTION

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

NOTES:

1. REINFORCED CONCRETE (8" THICK WITH #4 BARS @ 12" O.C. BOTHWAYS WITHOUT BASE MAY BE SUBSTITUTED).
2. ALL CONCRETE SHALL BE 520-C-2500.

CITY OF Oxnard

Department of Public Works

RIBBON GUTTER

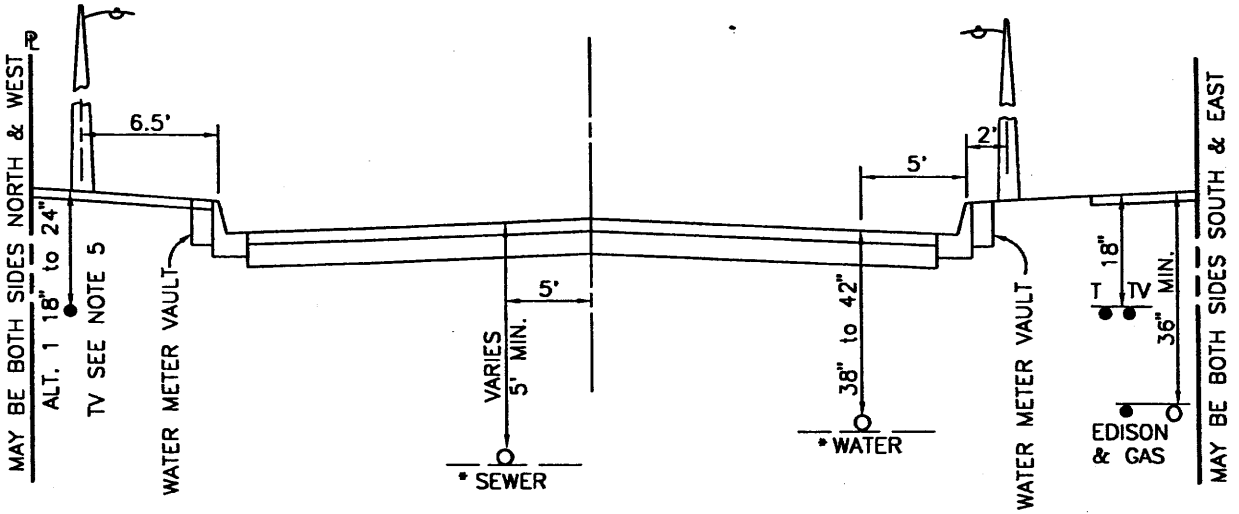
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 117

SHEET 1 OF 1



* MINIMUM SEPARATION REQUIRED WHEN ELECTRICAL CROSSES BENEATH SEWER & WATER

GENERAL NOTES

1. ALL INSTALLATIONS IN PUBLIC- RIGHT- OF WAY SHALL BE APPROVED BY THE CITY FOR LOCATION.
2. TWO COPIES OF PLANS DETAILING THE LOCATION OF ALL UNDERGROUND UTILITIES INSTALLED SHALL BE SUBMITTED BY THE SUBDIVIDER, OR THE PARTY MAKING THE INSTALLATION, TO THE CITY OF OXNARD FOR REVIEW AND APPROVAL.
3. CABLE TV SHALL CROSS STREETS (TRANSVERSE) AT DEPTH OF 36" PER STATE CODE.
4. TRENCH BACKFILL TO BE COMPACTED PER STANDARD SPECIFICATION OF PUBLIC WORKS CONSTRUCTION, SECTION 306-1.3.4 AND PLATE 602.
5. IN AREA PREVIOUSLY IMPROVED, CABLE TV SHALL BE INSTALLED PER ALT. 1.
6. DOES NOT COVER CONVENTIONAL UNDERGROUND ELECTRICAL SUBSTRUCTURES WITHIN RESIDENTIAL SUBDIVISION.
7. "AS-BUILTS" ARE REQUIRED FROM THE ENGINEER.
8. ENGINEERING STAKING MUST BE PROVIDED.
9. PERMIT FROM THE CITY IS REQUIRED FOR EACH TRENCH. DRY UTILITIES MAY SHARE A TRENCH.
10. IF WATER AND SEWER IS LOCATED AT A GREATER DEPTH THAN 6', SCE (750 VOLTS OR GREATER) WILL BE PERMITTED TO CROSS ABOVE SAME, BY USING P.C.C. IN A 4" MINIMUM THICKNESS ENCASEMENT, AS PER P.U.C..
11. ANY UTILITY CUTS ACROSS STREET WILL BE 90° TO STREET ALIGNMENT AND SHALL BE BACKFILLED WITH 2-SACK SLURRY.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard — Department of Public Works

UNDERGROUND UTILITIES LOCATED IN STREET

DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 120

SHEET 1 OF 1

REV.	APPR. BY	DATE	9-21-95

REV.	APPR. BY	DATE	

CITY OF Oxnard
Department of Public Works

DRAWN: STAFF CKD.: STAFF

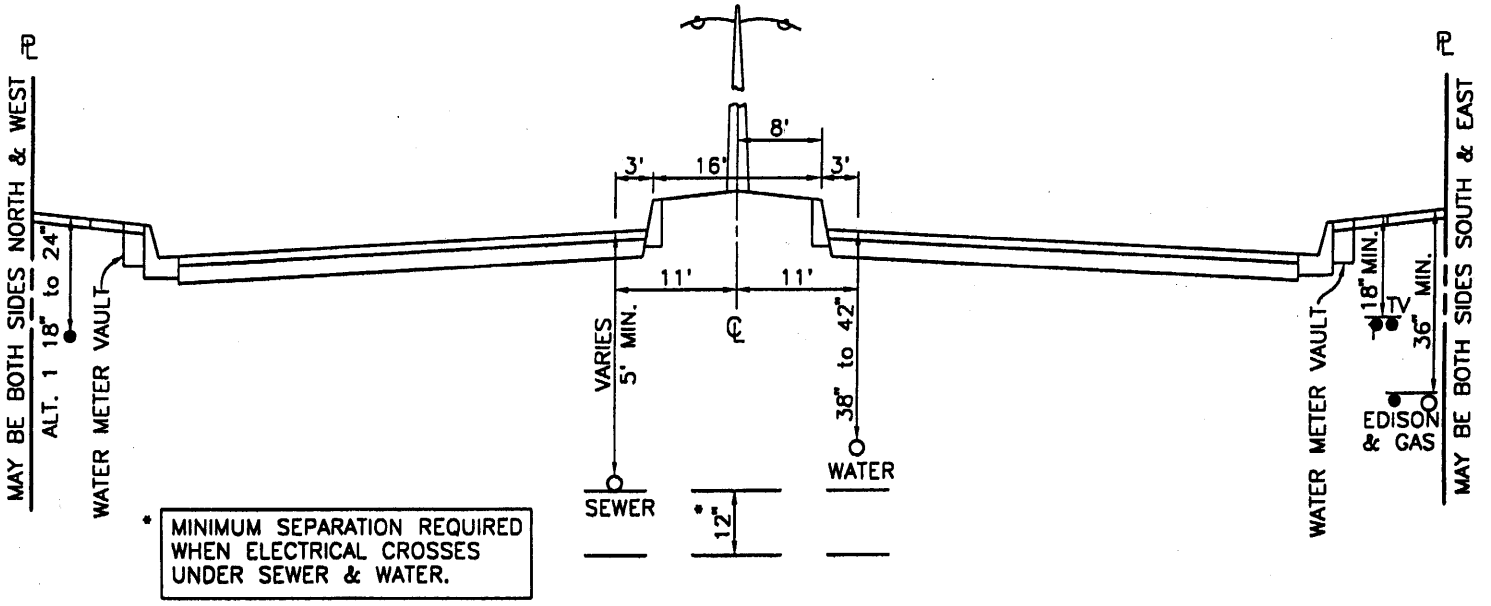
APPR. Granville M. Bowman

UNDERGROUND UTILITIES LOCATED IN ARTERIAL

STANDARD PLAN 2002

PLATE 121

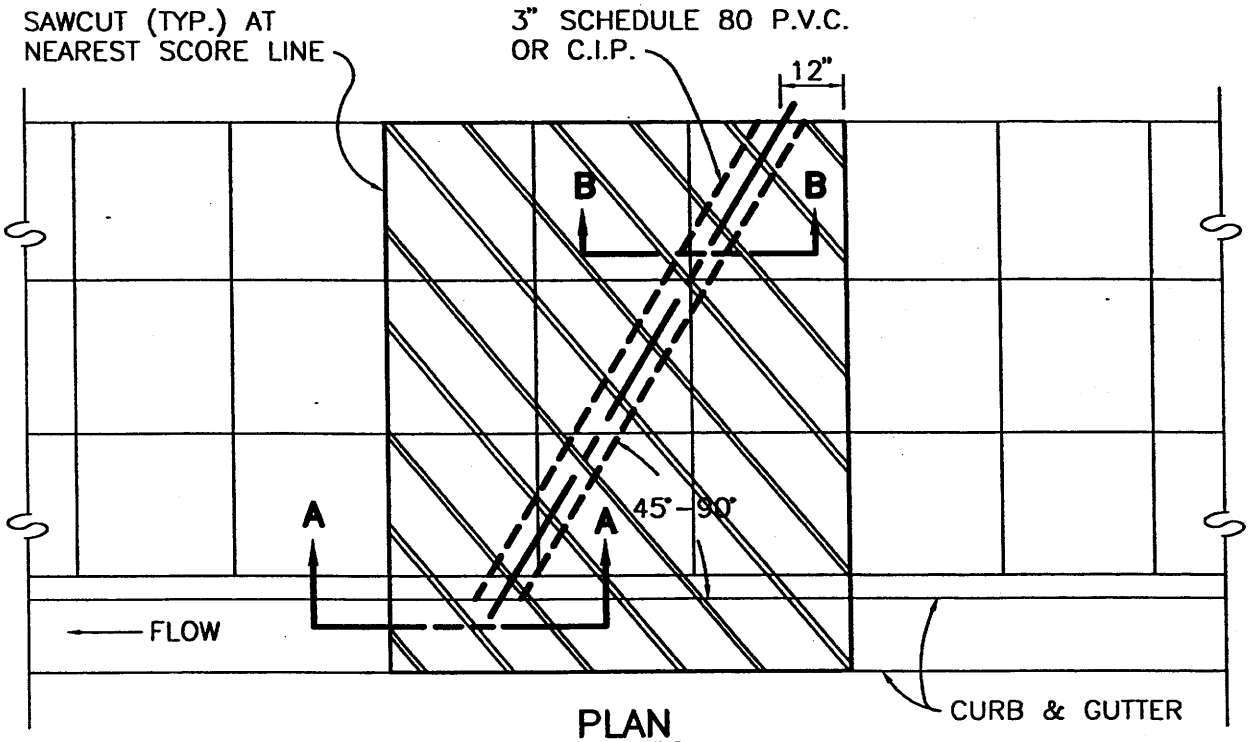
SHEET 1 OF 1



* MINIMUM SEPARATION REQUIRED WHEN ELECTRICAL CROSSES UNDER SEWER & WATER.

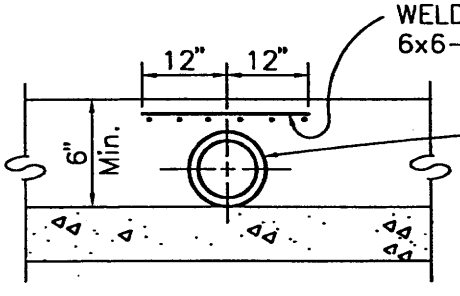
GENERAL NOTES

1. ALL INSTALLATIONS IN PUBLIC RIGHT OF WAY SHALL BE APPROVED BY THE CITY FOR LOCATION.
2. TWO COPIES OF PLANS DETAILING THE LOCATION OF ALL UNDERGROUND UTILITIES INSTALLED SHALL BE SUBMITTED BY THE SUBDIVIDER, OR THE PARTY MAKING THE INSTALLATION, TO THE CITY OF OXNARD FOR REVIEW AND APPROVAL.
3. CABLE TV SHALL CROSS STREETS (TRANSVERSE) AT DEPTH OF 36" PER STATE CODE.
4. ALL TRENCH BACKFILL TO BE COMPACTED PER STANDARD SPECIFICATION FOR PUBLIC WORKS CONSTRUCTION, SECTION 306-1.3.4 AND PLATE 602. TWO SACKS SLURRY BACKFILL ON ALL TRANSVERSE CUTS.
5. IN AREA PREVIOUSLY IMPROVED, CABLE TV SHALL BE INSTALLED PER ALT. 1.
6. DOES NOT COVER CONVENTIONAL UNDERGROUND ELECTRICAL SUBSTRUCTURES WITHIN RESIDENTIAL SUBDIVISION.
7. "AS-BUILTS" ARE REQUIRED FROM THE ENGINEER.
8. ENGINEERING STAKING MUST BE PROVIDED.
9. PERMIT FROM THE CITY IS REQUIRED FOR EACH TRENCH. DRY UTILITIES MAY SHARE A TRENCH.
10. IF WATER AND SEWER IS LOCATED AT A GREATER DEPTH THAN 6', S.C.E. (750 VOLTS OR GREATER) WILL BE PERMITTED TO CROSS ABOVE SAME, BY USING P.C.C. IN A 4" MINIMUM THICKNESS ENCASEMENT, AS PER P.U.C..
11. ANY UTILITIES CUTS ACROSS STREET WILL BE 90° TO STREET ALIGNMENT.



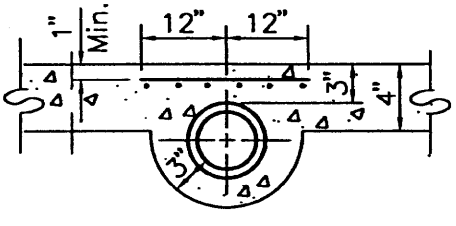
PLAN

REMOVE AND REPLACE EXISTING CONCRETE (4" THICK). PLACE EXPANSION JOINTS BETWEEN EXISTING AND NEW CONCRETE. ANGLE SHALL BE DETERMINED BY THE INSPECTOR.



3" SCHEDULE 80 P.V.C. OR C.I. PIPE SHALL BE CUT FLUSH WITH CURB FACE. MATCH FLOW LINE OF GUTTER. WHERE THERE IS ONLY CURB, RAISE PIPE ½" ABOVE FLOW LINE.

SECTION A-A



SECTION B-B

NOTES:

1. EXISTING P.C.C. CURB MAY BE CORE DRILLED TO ACCEPT PIPE, AS APPROVED BY ENGINEER.
2. NO NEW SIDEWALK DRAINS ALLOWED IN RESIDENTIAL CONSTRUCTION. LIMITED USE ALLOWED IN NON-RESIDENTIAL AREAS WHERE STRUCTURES ABUT PUBLIC SIDEWALKS. PRIOR APPROVAL OF CITY ENGINEER REQUIRED FOR ALL INSTALLATIONS.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard

Department of Public Works

SIDEWALK DRAIN-PIPE

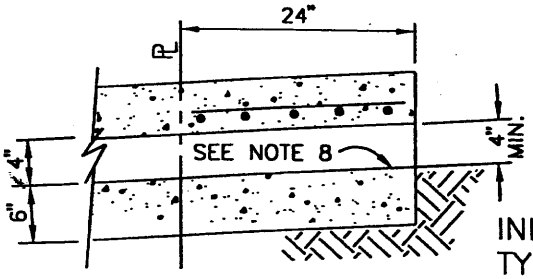
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

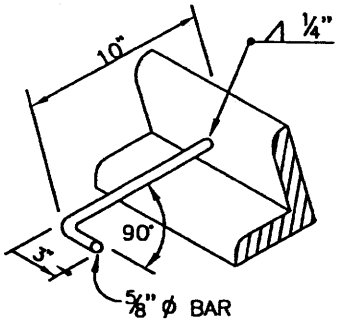
STANDARD PLAN 2002

PLATE 122

SHEET 1 OF 1

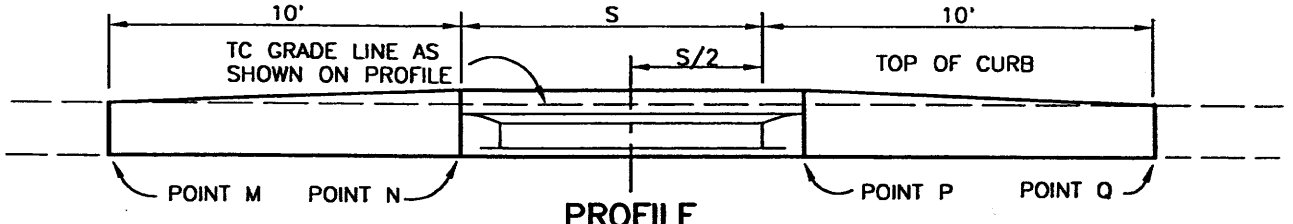


SECTION
INLET TYPE 2



ANCHOR DETAIL

PLAN

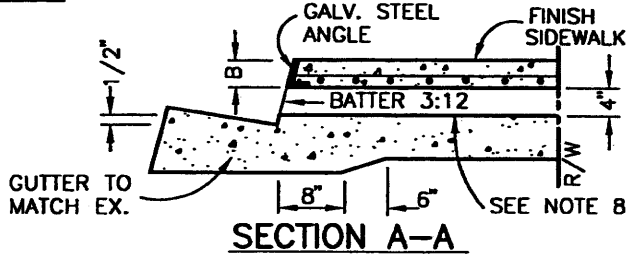


PROFILE

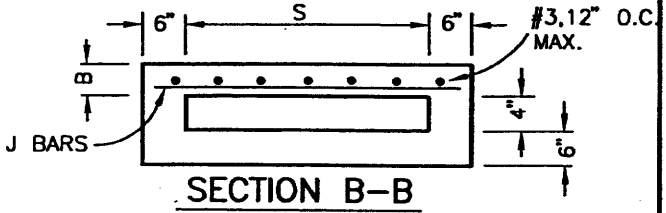
SECTION
INLET TYPE 1

S	J BAR SPACING
12"	7"
18"	7"
24"	7"
30"	7"
36"	7"
42"	6"
48"	5"
54"	6½"
60"	5"
66"	4"
72"	3½"

FOR S=30" AND LESS USE
2 ANCHORS OTHERWISE USE
3 ANCHORS
FOR S=48" AND LESS, B=3"
USE 2-1/2"x2"x3/8"
GALVANIZED STEEL ANGLE.
OTHERWISE B=4". USE
3-1/2"x3"x1/2" GALVANIZED
STEEL ANGLE.
J BARS ARE #3



SECTION A-A



SECTION B-B

CITY OF Oxnard

Department of Public Works

PARKWAY DRAIN

DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 124

SHEET 1 OF 2

REV. | APPR. BY | DATE

NOTES:

1. FLOOR OF BOX SHALL BE TROWLED SMOOTH.
2. IF THE TOE OF SLOPE IS ALLOWED WITHIN THE R/W, INLET TYPE 1 BEGINS AT THE TOE RATHER THAN AT THE R/W LINE.
3. FOR OPEN DITCH (TYPE 2), THE 24" EXTENSION BEYOND THE R/W LINE IS NOT REQUIRED WHEN BACK OF WALK IS 24" OR MORE FROM THE R/W LINE: HOWEVER, THE PIPE SHALL EXTEND TO THE R/W LINE IN ANY EVENT.
4. TOP OF INLET STRUCTURE (TYPE 1 & 2) SHALL BE FLUSH WITH ADJACENT SURFACE WHERE PRACTICAL.
5. A HEADED STEEL STUD WITH A $\frac{5}{8}$"x 6–$\frac{3}{8}$, 1" HEAD ATTACHED BY A FULL PENETRATION BUTT WELD MAY BE USED AS AN ALTERNATE ANCHOR.
6. NORMAL CURB FACE AT POINT M AND Q. CURB FACE IS B + 5" AT POINT N AND P.
7. THE 3" LEG OF THE $\frac{5}{8}$" DIA. ANCHORS SHALL BE PARALLEL TO THE TOP OF SIDEWALK.
8. SLOPE = 2.0%

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard

Department of Public Works

PARKWAY DRAIN

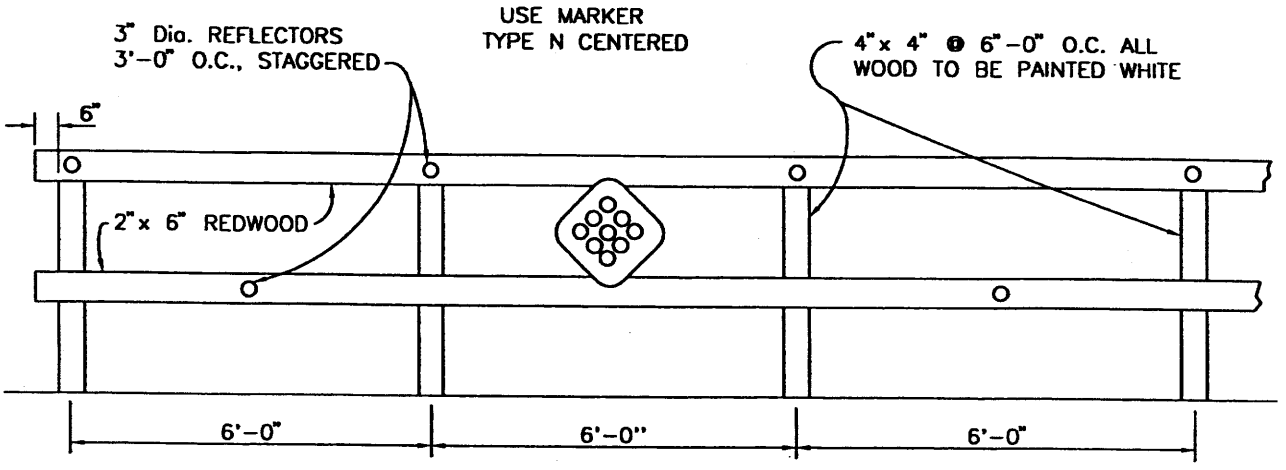
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

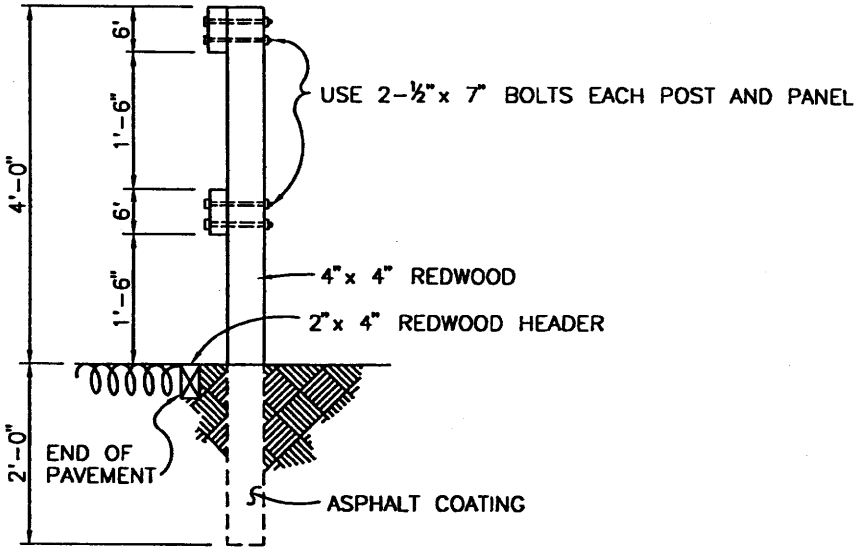
STANDARD PLAN 2002

PLATE 124

SHEET 2 OF 2



ELEVATION VIEW



CROSS SECTION

REV. APPR. BY DATE

REV. APPR. BY DATE

NOTES:

1. BARRICADE MUST EXTEND FROM PROPERTY LINE TO PROPERTY LINE.

CITY OF Oxnard

Department of Public Works

BARRICADE

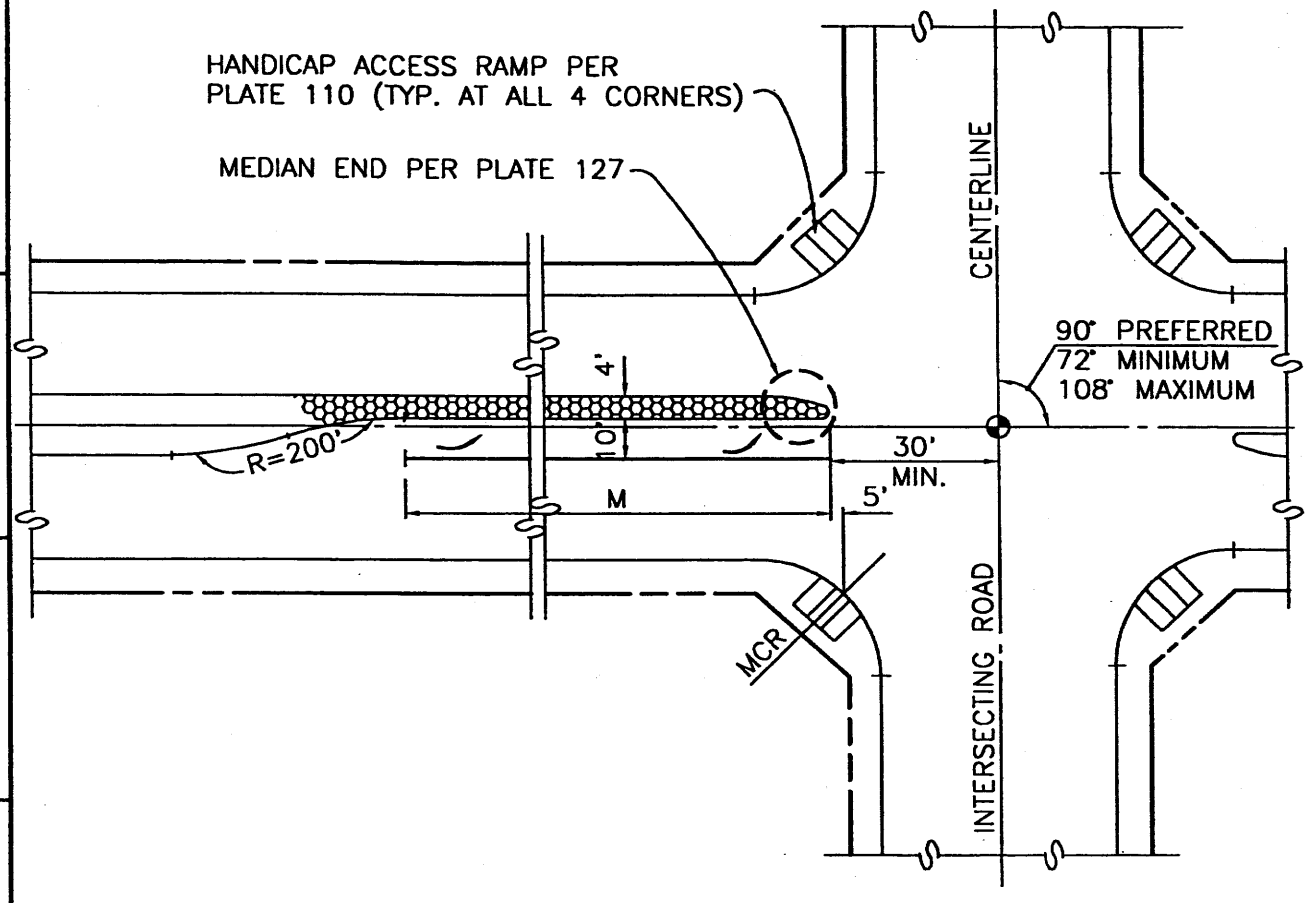
DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 125

SHEET 1 OF 1



M=200' MINIMUM AT ARTERIAL INTERSECTING ROAD ACTUAL LENGTH TO BE DETERMINED BY THE CITY TRAFFIC ENGINEER.

NOTES:

1. MEDIAN CURB HEIGHT SHALL BE 8" UNLESS OTHERWISE APPROVED BY CITY ENGINEER.
2. COLORED STAMPED CONCRETE MEDIAN PAVING SHALL CONFORM TO THE REQUIREMENTS AND APPROVAL OF PARKS.
3. DECORATIVE SCORED CONCRETE IN TRAVEL WAYS AND INTERSECTIONS SHALL BE DESIGNED TO WITHSTAND PROPER TRAFFIC INDEX AS OUTLINED IN SECTION 14, PLATE 8.
4. MINIMUM SPACING FOR FULL ACCESS MEDIAN BREAKS SHALL BE 1320' ON ARTERIALS UNLESS OTHERWISE APPROVED BY THE CITY TRAFFIC ENGINEER.

REV. APPR. BY DATE

REV. APPR. BY DATE

CITY OF Oxnard
Department of Public Works

INTERSECTION AND LEFT TURN POCKET

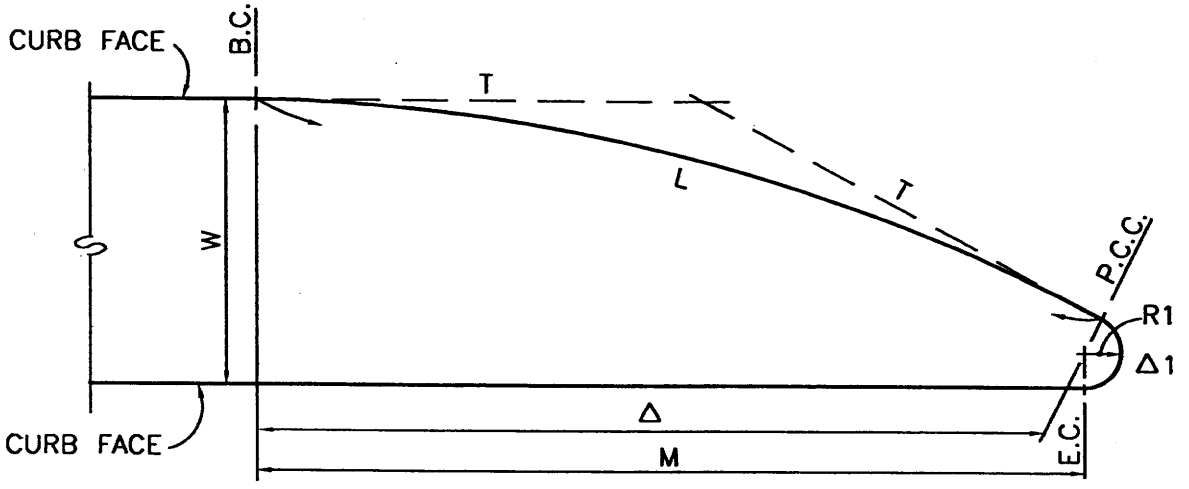
DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

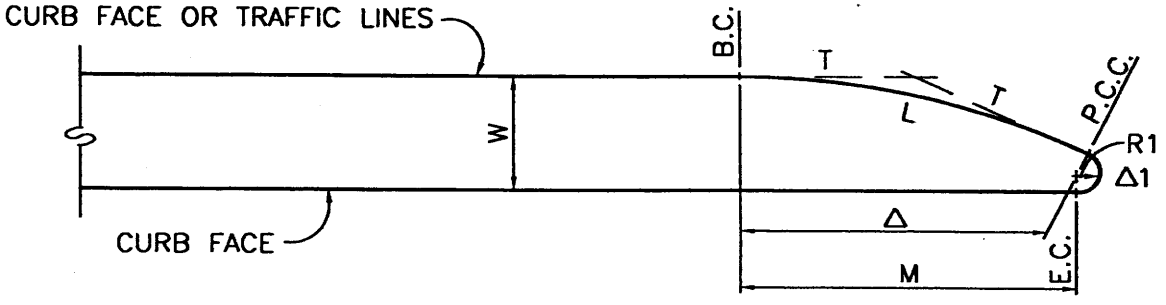
STANDARD PLAN 2002

PLATE 126

SHEET 1 OF 1



MEDIAN END



LEFT TURN POCKET FINGER

W	M	R	Δ	T	L	R1	Δ1	L1	T1
14'	43.13'	100'	26° 06' 32"	23.19'	45.57'	2'	153° 53' 28"	5.37'	8.63'
4'	13.86'	50'	16° 25' 35"	7.22'	14.33'	1'	163° 34' 25"	2.85'	6.93'
16'	46.99'	100'	28° 39' 06"	25.54'	50.01'	2'	151° 20' 54"	5.28'	7.83'
6'	19.39'	50'	23° 18' 41"	10.31'	20.34'	1'	156° 41' 19"	2.73'	4.85'

NOTE:

ALL NECESSARY SIGNING AND STRIPING SHALL BE IN ACCORDANCE WITH THE CURRENT STATE STANDARDS AND/OR AS DIRECTED BY THE CITY ENGINEER.

REV. | APPR. BY | DATE

REV. | APPR. BY | DATE

CITY OF Oxnard

Department of Public Works

MEDIAN ENDS DETAIL

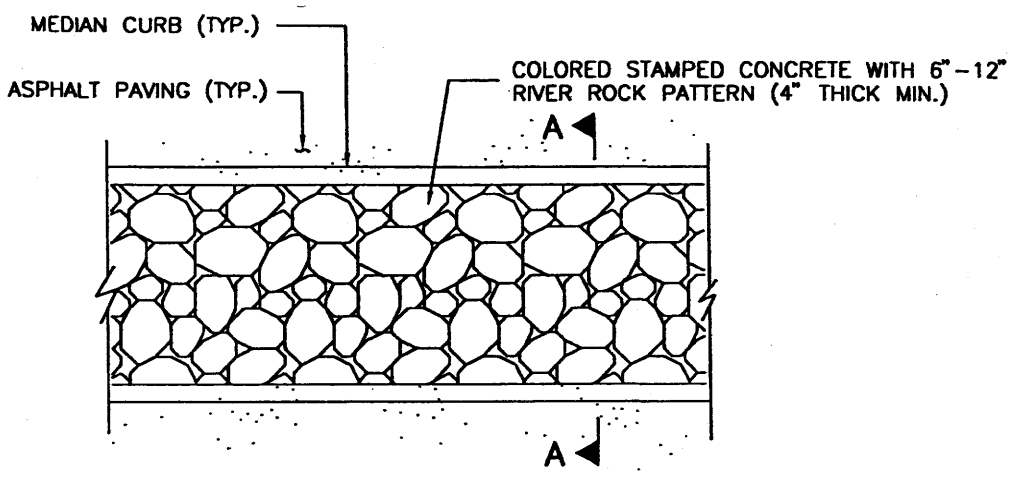
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

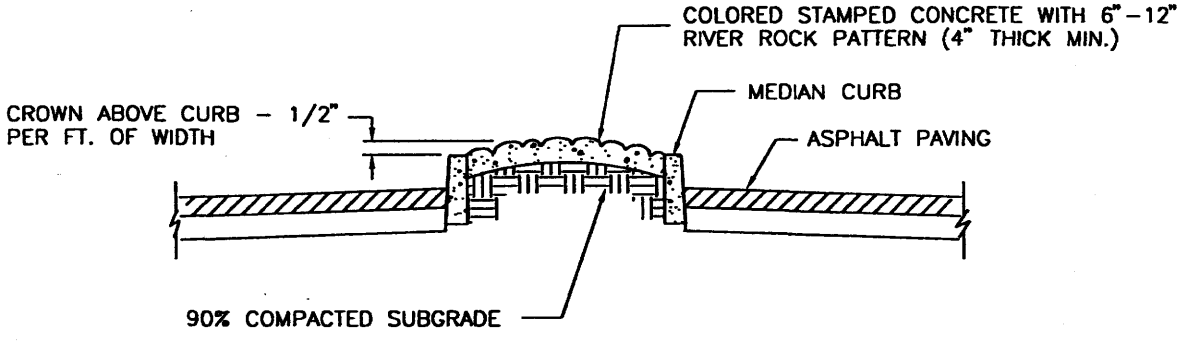
STANDARD PLAN 2002

PLATE 127

SHEET 1 OF 1



PLAN VIEW



SECTION A–A

NOTES:

1. STAMPED CONCRETE SHALL BE 6'-12" RIVER ROCK PATTERN. COLOR SHALL BE PECAN TAN # A55P. STAMPED PATTERN SHALL BE FROM BOMANITE & COLORS SHALL BE FROM L. M. SCOFIELD CO. OR APPROVED EQUAL.
2. THE PATTERN IMPRINT SHALL BE 1" MIN. DEPTH.
3. THE PATTERN JOINT WIDTH (BETWEEN SIMULATED ROCKS) SHALL BE 1/4" MIN. - 1 1/4" MAX.
4. ALL JOINTS SHALL BE UNGROUTED.
5. ORIENT WEAKEN PLANE LINES ACROSS THE SHORT DIMENSION ON THE PATTERN AND AT INTERVALS NOT TO EXCEED 15'.
6. PLASTIC SHEETING SHALL BE LAID OVER CONCRETE PRIOR TO STAMPING PATTERN TO PRODUCE "LOAFED" SURFACES.
7. APPLY COLORWAX TO ALL SURFACES.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

STAMPED CONCRETE MEDIAN DETAIL

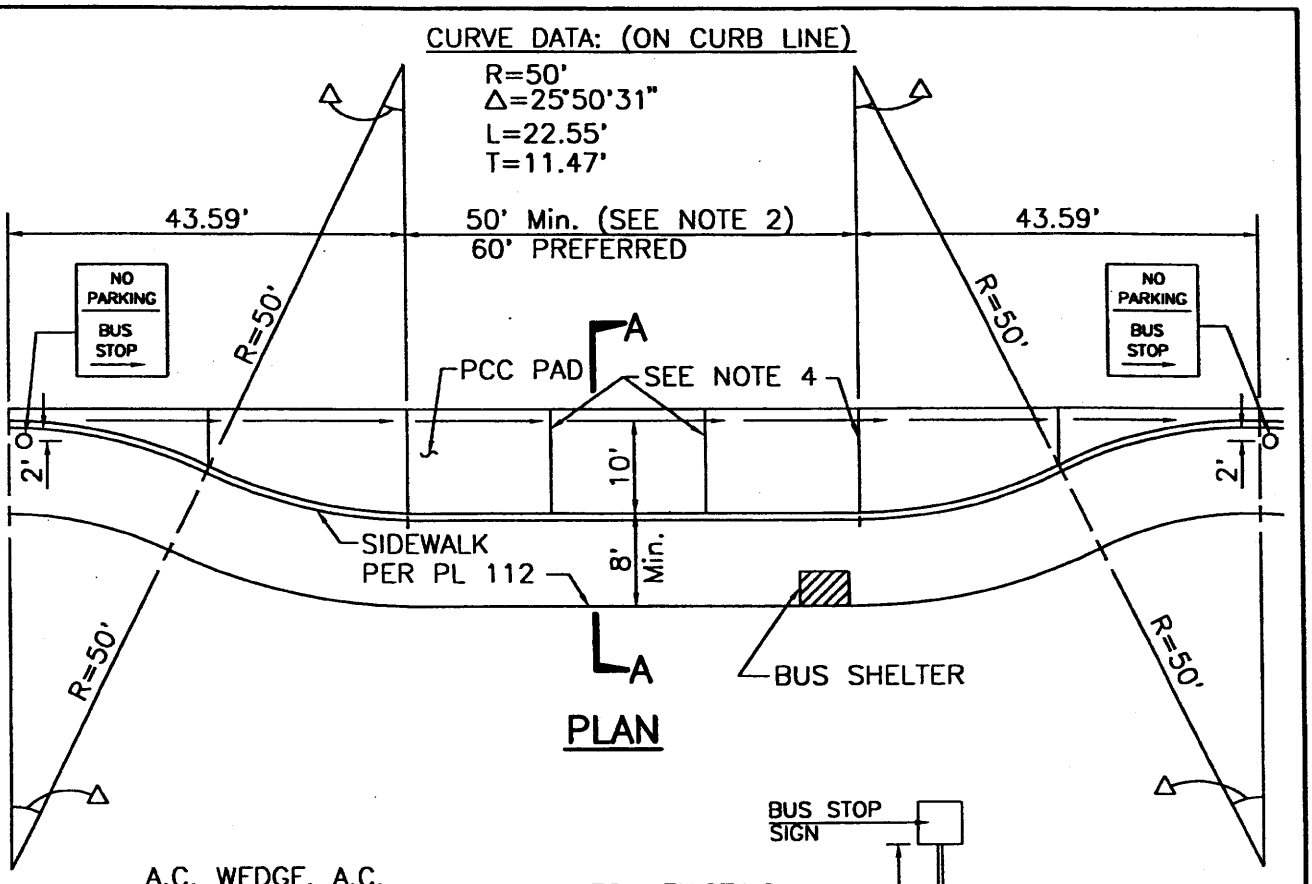
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

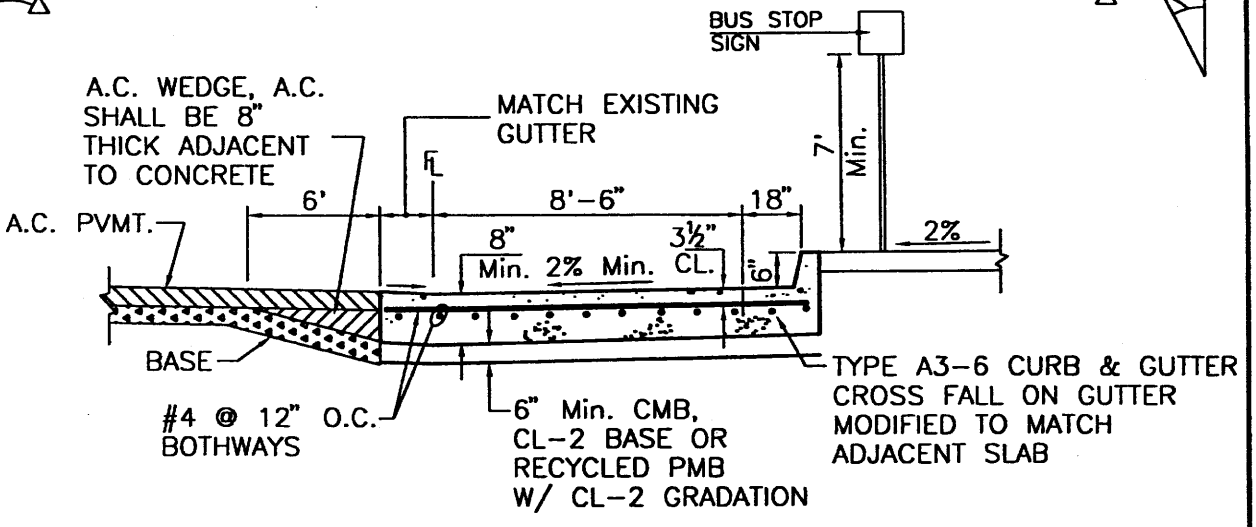
STANDARD PLAN 2002

PLATE 128

SHEET 1 OF 1



PLAN



SECTION A–A

NOTES:

1. CONCRETE SHALL BE 560-C-3250 STEEL SHALL BE GRADE 40.
2. FOR EACH ADDITIONAL PASS THROUGH BUS BERTH ADD 50' AND FOR EACH ADDITIONAL LAYOVER BUS BERTH ADD 80'.
3. APPLY WEED KILLER AT ALL JOINTS.
4. TURNOUT TO MATCH EXPANSION OR WEAKENED PLANED JOINTS IN CURB.

REV. APPR. BY DATE

REV. APPR. BY DATE

CITY OF Oxnard

Department of Public Works

BUS TURNOUT– FOR STREET WITHOUT PARKING LANE

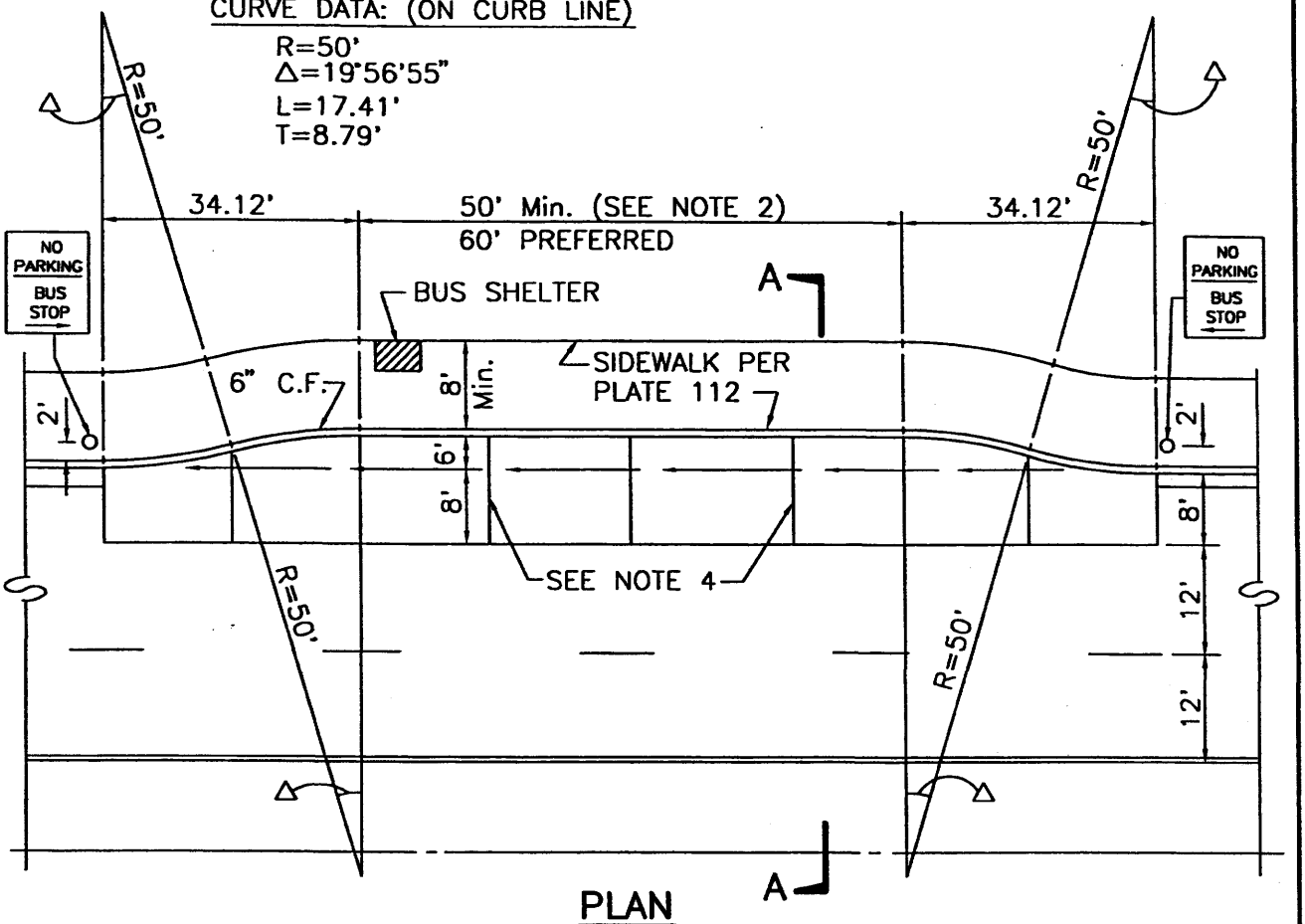
DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowmon

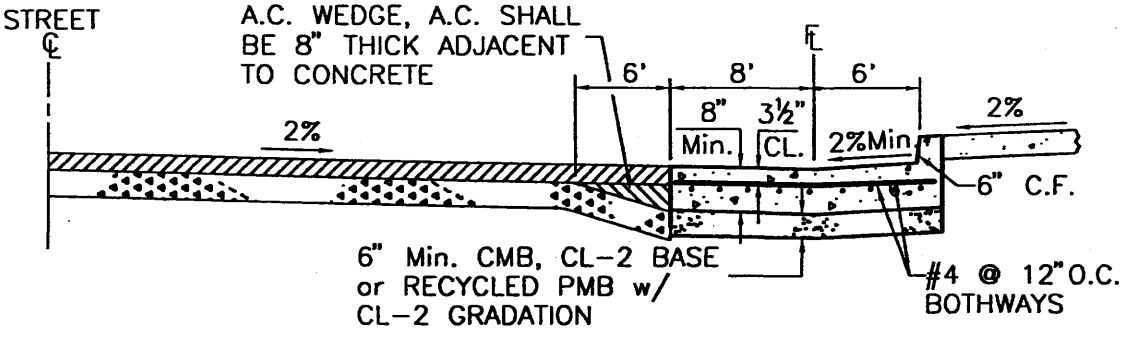
STANDARD PLAN 2002

PLATE 200

SHEET 1 OF 1



PLAN



SECTION A-A

NOTES:

1. CONCRETE SHALL BE 560-C-3250, STEEL SHALL BE GRADE 40.
2. FOR EACH ADDITIONAL PASS THROUGH BUS BERTH ADD 50' AND FOR EACH ADDITIONAL LAYOVER BUS BERTH ADD 80'.
3. APPLY WEED KILLER AT ALL COLD JOINTS.
4. TURNOUT TO MATCH EXPANSION OR WEAKENED PLANED JOINTS IN CURB.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard

BUS TURNOUT— FOR STREET WITH PARKING LANE

STANDARD PLAN 2002

PLATE 201

DRAWN: STAFF | CKD.: STAFF

Department of Public Works

APPR. Granville M. Bowman

SHEET 1 OF 1

TYPICAL HYDRANT MARKER LOCATION

-FIRE HYDRANT

• -BLUE PAVEMENT MARKER

FIGURE 1
TWO LANE STREET

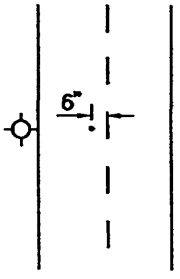


FIGURE 2
MULTI-LANE STREET

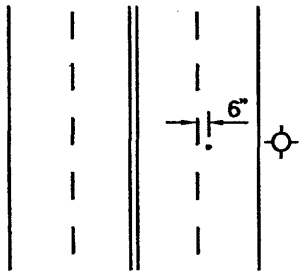


FIGURE 3
AN INTERSECTION

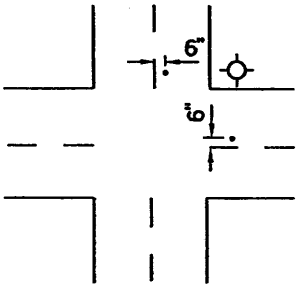


FIGURE 4
FOUR LANE STREET WITH TURN LANE AT INTERSECTION

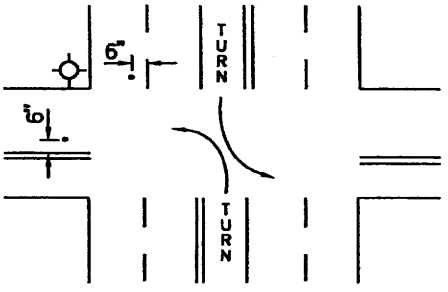


FIGURE 5
MULTI-LANE STREET WITH TURN LANE

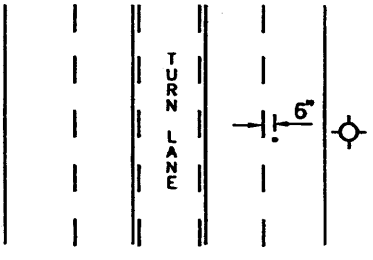
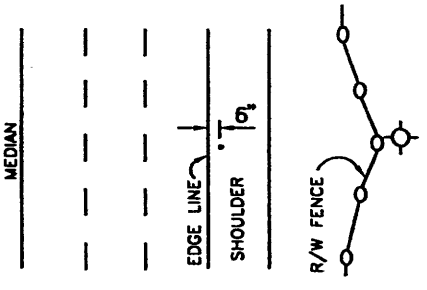


FIGURE 6
FREEWAYS AND EXPRESSWAYS



NOTES:

1. INSTALL TWO-WAY BLUE REFLECTIVE MARKERS. MARKERS SHALL BE AS SPECIFIED IN CALTRANS STANDARD SPECIFICATIONS AND APPROVED BY FIRE CHIEF.
2. INSTALL MARKERS WITH EPOXY APPROVED BY THE CITY TRAFFIC ENGINEER.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

BLUE REFLECTIVE PAVEMENT MARKERS

DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 202

SHEET 1 OF 1

CODE	DESCRIPTION	SIZE	REFLECT MATERIAL
R1	Stop	24x24	S
R1	Stop	30x30	S
R1-2	Yield	30x30	S
R1-4	All Way Plate	18x6	S
R2	Speed Limit	18x24	S
R2	Speed Limit	24x30	S
R2	Speed Limit	30x36	S
R2-4	Speed Zone Ahd	24x30	S
R2-5	Reducd Spd Limit	24x30	S
R3	End Spd Limit	24x30	S
R7	Symbolic Keep Rt	24x30	S
R7	Symbolic Keep Rt	18x24	S
R10	One Way	36x12	S
R10A	One Way	18x24	S
R11	Do Not Enter	24x24	H
R11A	Wrong Way	36x21	H
R13A	No Turn Red	18x30	S
R13A	No Turn Red	24x36	S
R15	No Turns	24x24	S
R16	Symbolic No Rt	24x24	S
R17	Symbolic No Lt	24x24	S
R18-1	Rt Lane Must	20x32	S
R18-2	Rt Lane Must	30x30	S
R20 B	No Truck Symb	24x30	E
R20 D	Over 5 Tons	24x6	E
R24	Park Parallel	12x18	E
R26 D	No Pkg Symbol	12x12	E
R26 D	Symbol w/arrow	12x18	E
R26 F	No Stopg Fire	12x18	E
R26 S	No Stop Anytime	12x18	E
R28 B	No Pkg over 6 ft	12x18	E
R30 A	No Pkg w/hours	12x18	E
R31	Combo Pkg	14x20	E
R32	Time Limt Pkg	12x18	E
R34	Symbolic No U	24x24	S
R34-2	Symb No Left/U	24x24	S
R35	Truck Route	24x24	E
R41	Right Turn Only	24x30	S
R42	Left Turn Only	24x30	S
R49	No Ped Xing	24x12	E
R49	No Ped Xing	36x18	E
R59	Symbolic Rt Only	30x36	S
R63	Do Not Pass	24x30	S
R72	When Children	24x12	E
R73	Lane Use	24x24	S
R73-7	Left Yield On Gr.	24x30	S
R81	Bike Lane	24x18	E
R96	Symbolic No Ped	18x18	E
R99	Disabled Pkg	12x18	E
Type K	Marker		S
Type L	Marker		S
Type N1	Yellow	18x18	S
Type N2	Red	18x18	S
Type N4	Yellow Reflectors	18x18	S
Type N5	Red Reflectors	18x18	S
Type P		12x36	H
Type R		24x30	H
W1	Curve	30x30	H
W2	Curve	30x30	H
W3	Curve	30x30	H
W5	Curve	30x30	H
W6	Advisory Speed	24x24	H
W7	Tee Intersection	30x30	S
W7A	Side Street	30x30	S

CODE	DESCRIPTION	SIZE	REFLECT MATERIAL
W9	Cross Road	30x30	S
W11	Lane Ends	30x30	S
W15	Road Narrows	30x30	S
W17	Stop Ahead	30x30	S
W23	Narrow Bridge	30x30	S
W25	Divided Rd ends	30x30	S
W26	Divided Rd begin	30x30	S
W28	Yield Ahead	30x30	S
W31	End	24x24	H
W31	End	30x30	H
W31 A	Road Ends-Feet	30x30	H
W32	Dip	30x30	H
W41	Signal Ahead	30x30	S
W47	Railroad	30x30	S
W48	2 Tracks	30x24	S
W53	Not Thru St	24x24	S
W53	Not Thru St	30x30	S
W53 A	No Outlet	24x24	S
W53 A	No Outlet	30x30	S
W54	Ped Xing	30x30	S
W54 A	Advance Ped	30x30	S
W55	Flooded	30x30	S
W56	Double Arrow	36x18	H
W57	Arrow	36x18	H
W57	Arrow	48x24	H
W58	Down Arrows	24x24	H
W62	Farm Equip	30x30	E
W63	School Zone	30x30	E
W65	"School"	30x10	E
W66	School Xing	30x30	E
W66 A	"School Xing"	24x18	E
W74	Thru Traff Merge	36x36	S
W75	Lane Ends	24x24	S
W79	Bicycles	30x30	S
W80	"Xing"	24x8	E
W81	Chevron	18x24	H
SW1	Cross traffic does not stop	30x12	S
SW21 B	Fire Station	30x30	S
SW24	School	30x40	E
SW25	School Xing	30x40	E
SW44	45 deg arrow	30x30	H
SR4	School/25mph	24x48	E

E=Engineering grade with F-CAL Film (Nippon Carbide)
S=Super engineering grade with F-CAL Film
H=High Intensity with F-CAL Film

1. Sign layout and colors shall conform to Caltrans Sign Specifications Sheets. Reflective material shall be as shown on this plate. Sign blanks shall be .080 inch anodized aluminum.

2. Posts shall be 2 inch I.D. sch 40 galv. pipe set 18 inches into a concrete anchor with dimensions of 6"x6"x21".

3. Maintain 7 foot clearance from bottom of sign to ground.

4. Mounting hardware-a)For 2" poles use clamp-on U-brackets, electroplated steel U-bolt with ¼"-20 threads and square steel nuts ¼"-20. Heavy zinc plated 11 gage steel U-bracket saddle with hex head steel washer face cap screw-5/16"-18x½" with rubber washer attached. b)On electroliers or signal poles use zinc coated 12 gauge steel strap-on bracket with 5/16"-18 threaded hole and hex head cap screw with rubber washer and band with heavy duty ⅝"x.032 inch stainless steel strap.

4. Refer to Plate 205 for Street Signs Detail.

REV. APPR. BY DATE

REV. APPR. BY DATE

CITY OF Oxnard

Department of Public Works

TRAFFIC CONTROL SIGNS

DRAWN: STAFF CKD.: STAFF

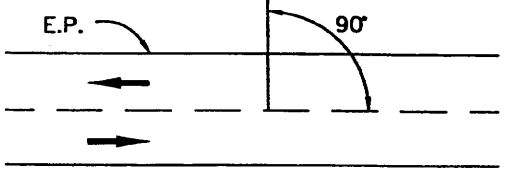
APPR. Granville M. Bowman

STANDARD PLAN 2002

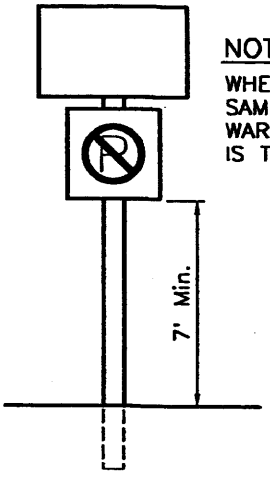
PLATE 203

SHEET 1 OF 1

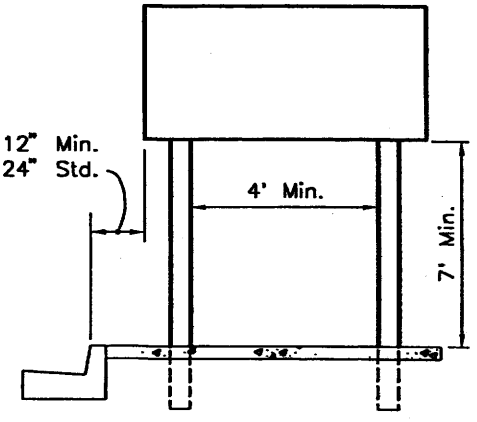
NOTE:
SIGNS MUST FACE APPROXIMATELY 90° FROM DIRECTION OF TRAFFIC. FOR PARKING SIGNS WITH ARROWS, SET ANGLE BETWEEN 30–45° TO THE DIRECTION OF TRAVEL.



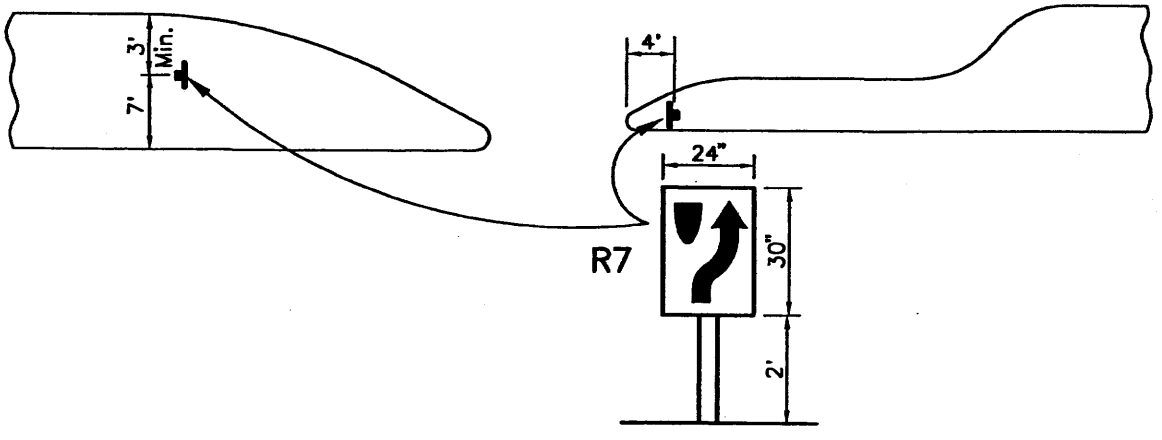
PLAN VIEW



NOTE:
WHEN A PARKING SIGN IS ON THE SAME POLE AS A REGULATORY OR WARNING SIGN, THE PARKING SIGN IS TO BE BELOW.



SIDEWALK



MAY BE POSTED ON STREET LIGHT WITHIN 25 FEET OF END OF ISLAND

REV. APPR. BY DATE

REV. APPR. BY DATE

CITY OF Oxnard
Department of Public Works

POSITION OF SIGNS

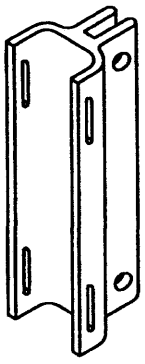
DRAWN: STAFF CKD.: STAFF

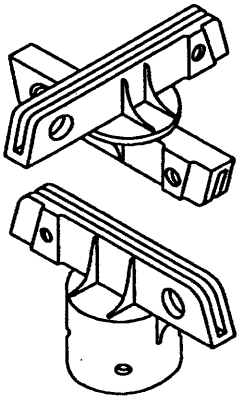
APPR. Granville M. Bowman

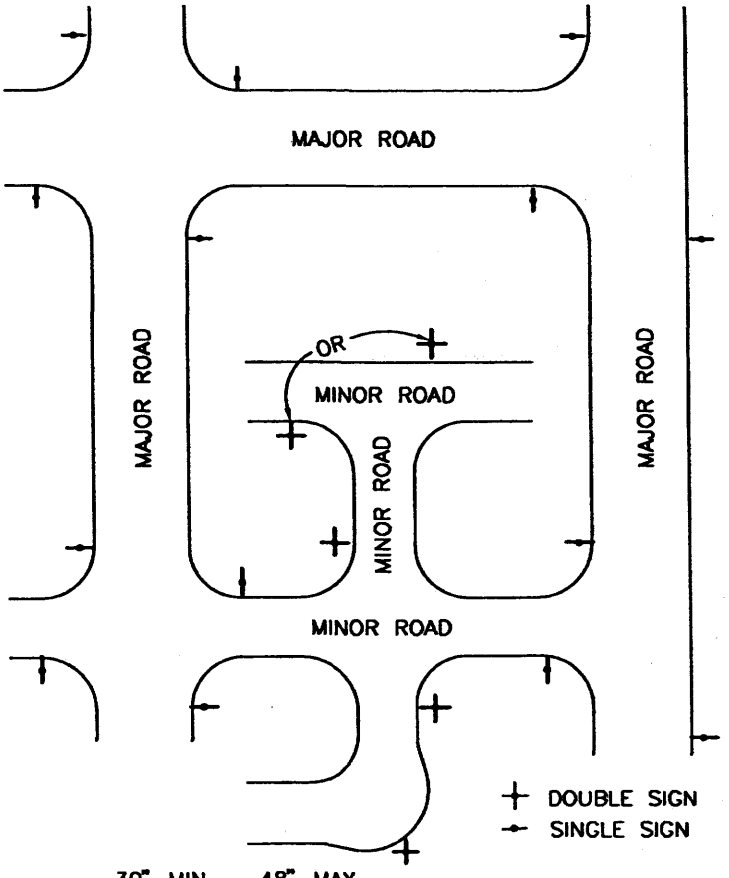
STANDARD PLAN 2002

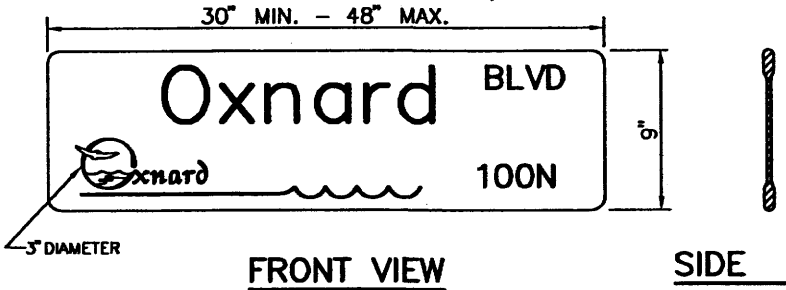
PLATE 204

SHEET 1 OF 1









FRONT VIEW

SIDE VIEW

NOTES:

1. BOTTOM OF STREET NAME SIGNS SHALL BE A MINIMUM OF 9(NINE) FEET ABOVE GROUND.
2. INSTALL STREET NAME SIGNS ABOVE ANY STOP SIGNS.
3. POLES SHALL BE 2 INCH SCH. 40 GALVANIZED PIPE SET 18 INCHES INTO A CONCRETE ANCHOR WITH DIMENSION OF 6"x 6"x 21". MOUNT ON ELECTROLIERS OR SIGNAL POLES WHEN PRACTICAL.
4. SIGN PANEL IS "I" SHAPED EXTRUDED ALUMINUM 9 INCHES WIDE, MINIMUM LENGTH 30 INCHES MAXIMUM 48 INCHES.
5. STREET NAME LETTERING IS 4½" UPPER CASE, 3½" LOWER CASE. SUFFIX AND BLOCK NUMBER ARE 2" CAPS. ALL LETTERING IS WHITE, BACKGROUND IS BROWN AND LOGO CONTAINS ORANGE.
6. ENTIRE SIGN FACE IS HIGH–INTENSITY MATERIAL WITH F–CAL FILM.
7. FOR POLE MOUNT, USE ALUMINUM POST CAP BRACKETS WITH 5 INCH LONG SLOTS. SLOT WIDTH: .280" WITH STANDARD STAINLESS STEEL SET SCREWS.
8. WHEN ATTACHED TO ELECTROLIER USE STRAP–ON ALUMINUM SIDE BRACKET 9 INCHES LONG. BAND WITH HEAVY DUTY 5/8"x .32" STAINLESS STEEL STRAP.
9. REFER TO PLATE 203 FOR ADDITIONAL SIGN INFORMATION.
10. WHERE SIDEWALK IS LESS THAN 5 FEET AND ADJACENT TO CURB, LOCATE POST BEHIND SIDEWALK. NO PORTION OF SIGN SHALL EXTEND PAST CURB.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard

Department of Public Works

STREET NAME SIGN–SPECIFICATION & LOCATION

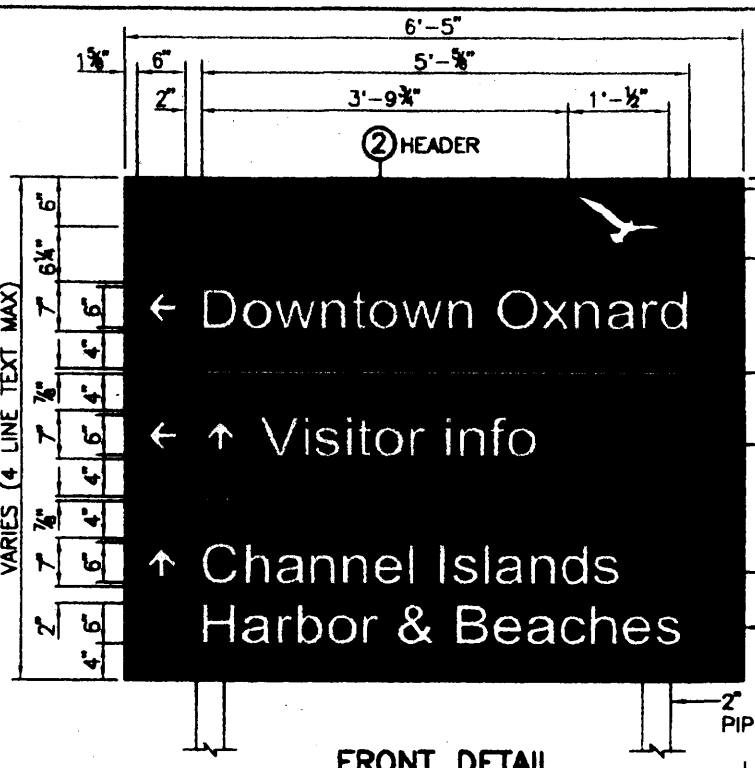
DRAWN: STAFF | CKD.: STAFF

APPR: Granville M. Bowman

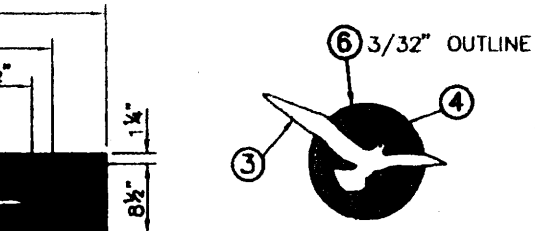
STANDARD PLAN 2002

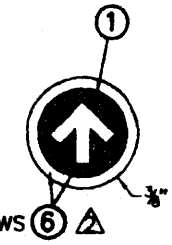
PLATE 205

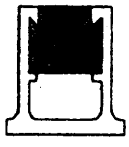
SHEET 1 OF 1



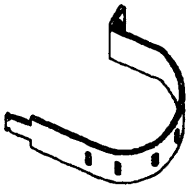
FRONT DETAIL



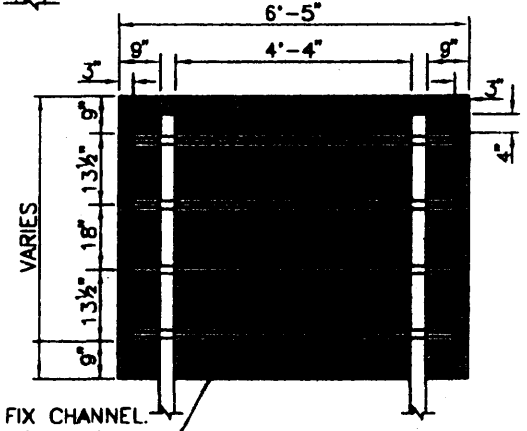




MEDIUM EXTRUSION



ANTI-ROTATIONAL TWIST-IN CLAMP



BACK DETAIL

COLOR SCHEDULE

NO.	COLOR NO.	COLOR NAME	FINISH
①	PMS 653c	BLUE	3M TRANSPARENT INK
②	PMS 248c	VIOLET	3M TRANSPARENT INK
③	PMS 128c	YELLOW	3M TRANSPARENT INK
⚠ ④	PMS 284c	LT. BLUE	3M TRANSPARENT INK
⑤	FRAZEE PAINT 7536N	DEEP SPACE (BLUE)	SEMI GLOSS
⑥	3M DIAMOND GRADE CUBE REFLECTIVE 4090 WHITE SHEETING		

⑤ PAINTED BACK, BACK SUPPORTS & EDGES

- SURFACE SHALL BE COVERED WITH 3M DIAMOND GRADE CUBE REFLECTIVE 4090 SHEETING WITH COLORS SCREENED PRINTED AND APPLY 1160A PROTECTIVE OVERLAY FILM FOR A MATCHED COMPONENT SYSTEM WARRANTY.
- TEXT SHALL BE FHWA SERIES C FRUTIGER WITH 6" UPPERCASE AND 4½" LOWERCASE LETTERING.
- LAST LINE OF TEXT SHALL BE 4" FROM BOTTOM OF SIGN. MAX HEIGHT OF SIGN SHALL BE 5'-3".
- THREE LINES OF TEXT MAXIMUM EXCEPT AS SHOWN.
- ALL SIGNS SHALL BE ORDERED FROM THE CITY OF OXNARD. FINAL TEXT LAYOUT SHALL BE APPROVED BY THE CITY TRAFFIC ENGINEER PRIOR TO THE CONSTRUCTION OF SIGN.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE
⚠	Lou B.	4/19/06
⚠	Lou B.	10/19/06

WAYFINDING SIGN

DRAWN: A. Rogue | CKD.: E. Hipolito

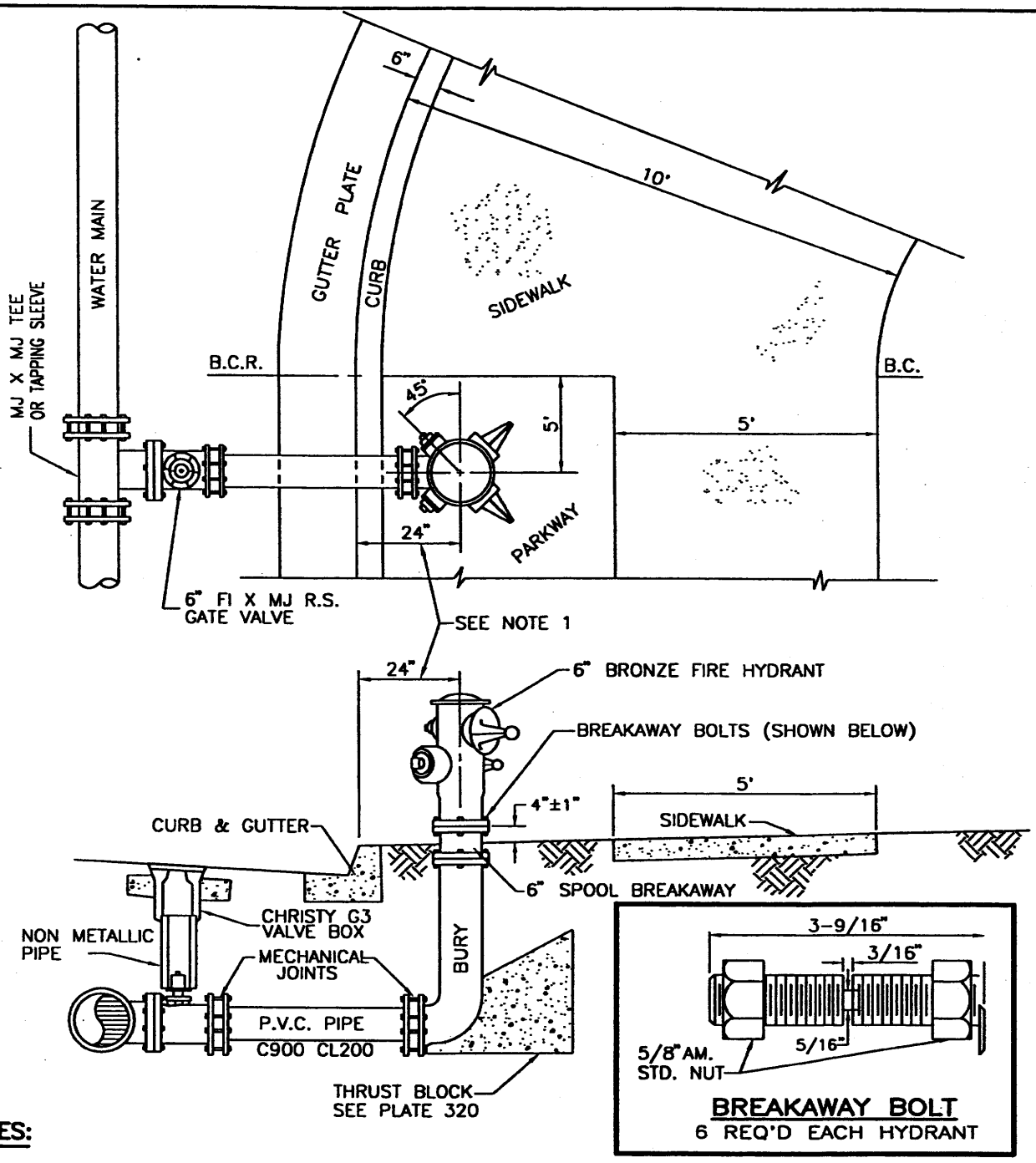
Department of Public Works

APPR. L. Balderrama, City Engineer

STANDARD PLAN 2002

PLATE 207

SHEET 1 OF 1



REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

NOTES:

1. IF SIDEWALK IS ADJACENT TO CURB AND 5' OR LESS IN WIDTH, THEN F.H. SHALL BE PLACED 18" FROM FACE OF CURB.
2. ALL BREAKAWAY BOLTS SHALL BE CADMIUM PLATED. ALL BELOW GRADE BOLTS TO BE STAINLESS STEEL.
3. REFER TO GENERAL REQUIREMENT SECTION FOR PAINT REQUIREMENTS.
4. ALTERNATE FIRE HYDRANT LOCATIONS MAY BE APPROVED BY CITY ENGINEER.
5. COPPER LOCATION WIRE REQUIRED.
6. BLUE REFLECTIVE PAVEMENT MARKERS REQUIRED PER PLATE 202.
7. RESTRAINED JOINTS MAY BE SUBSTITUTED IN LIEU OF THRUST BLOCKS. RESTRAINED JOINTS SHALL BE MANUFACTURED BY ROMAC INDUSTRIES OR APPROVED EQUAL.

CITY OF Oxnard
Department of Public Works

DETAILS FOR FIRE HYDRANT INSTALLATION

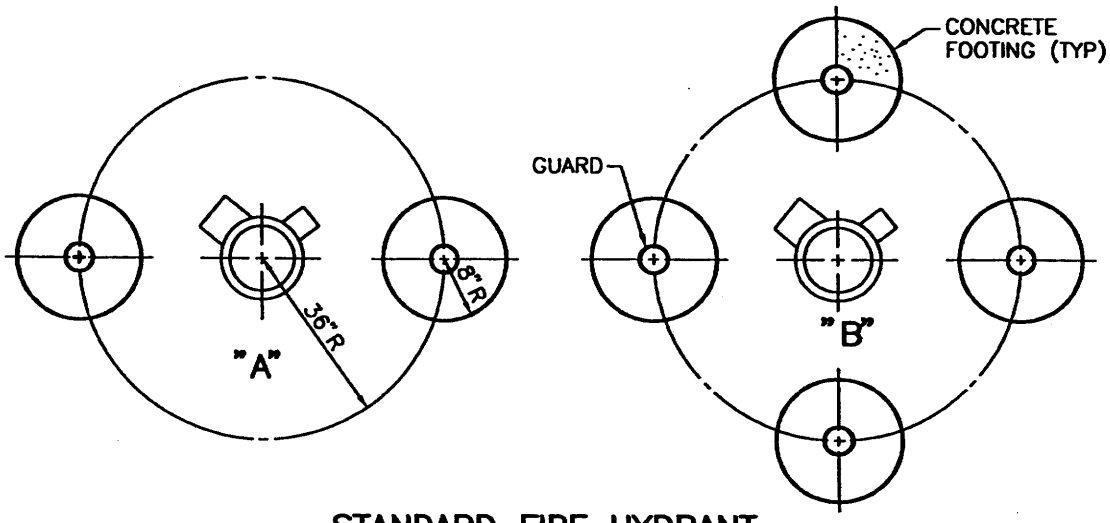
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

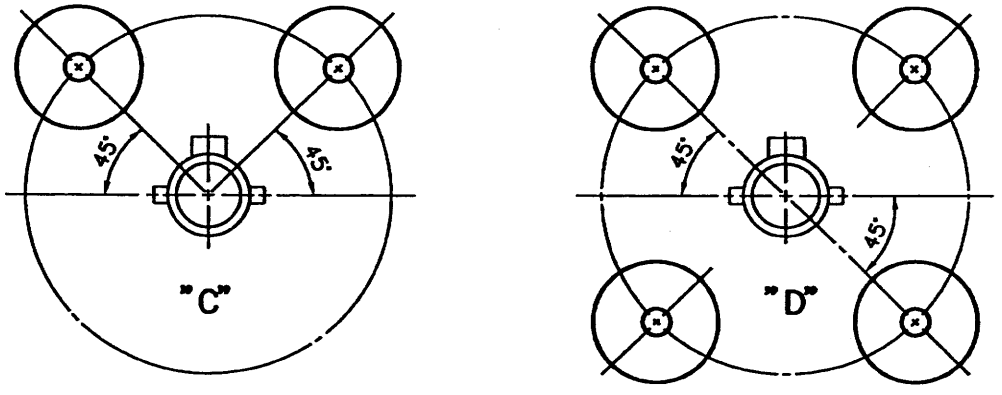
STANDARD PLAN 2002

PLATE 300

SHEET 1 OF 1



STANDARD FIRE HYDRANT



THREE–OUTLET FIRE HYDRANT

NOTES:

1. CONCRETE FOOTING SHALL EXTEND 3' BELOW SURFACE.
2. GUARD SHALL BE 5'–6" IN LENGTH EXTENDING 2'–6" ABOVE THE SURFACE AND SHALL BE 3" STEEL PIPE FILLED WITH CONCRETE.
3. VARIATIONS OF THE ABOVE ARRANGEMENTS MAY BE REQUIRED UNDER UNUSUAL CIRCUMSTANCES.
4. GUARD TO BE PAINTED THE SAME AS FIRE HYDRANT.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard

Department of Public Works

TYPICAL BARRICADES FOR FIRE HYDRANT

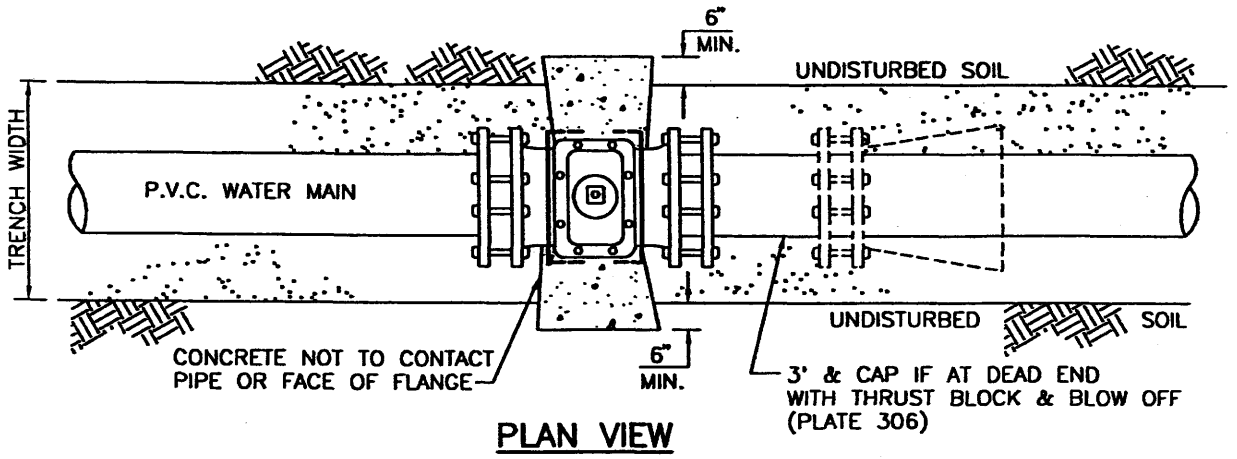
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

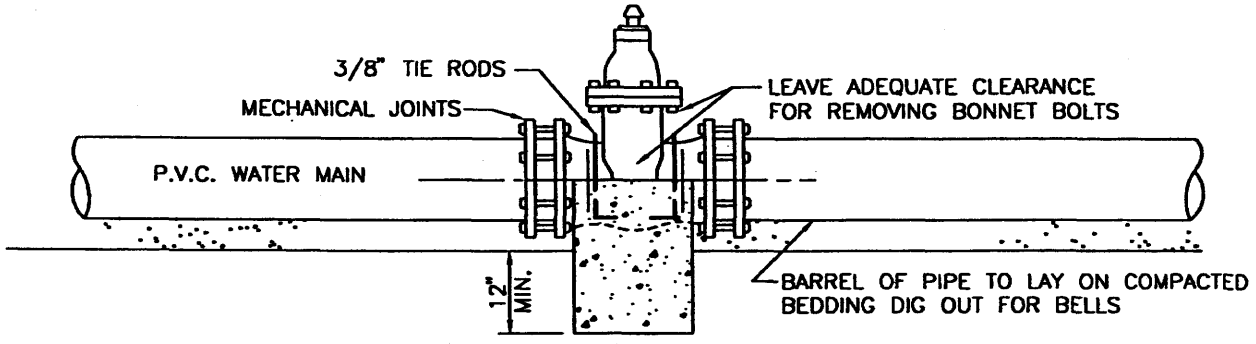
STANDARD PLAN 2002

PLATE 301

SHEET 1 OF 1

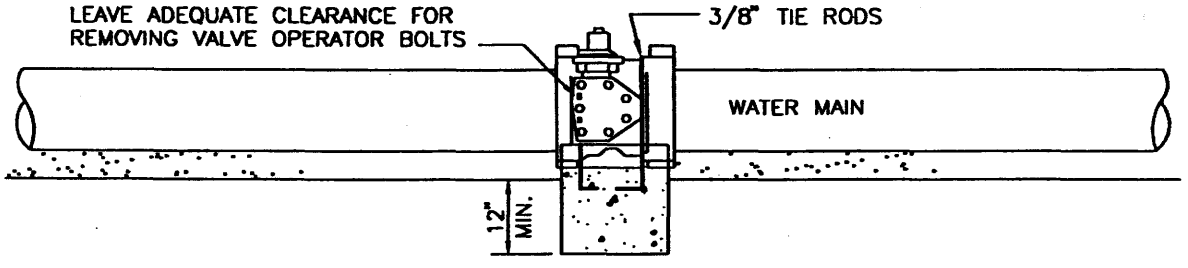


PLAN VIEW



LONGITUDINAL SECTION

GATE VALVES



LONGITUDINAL SECTION

BUTTERFLY VALVES

NOTES:

1. INSTALL INSULATED COPPER LOCATION WIRE, 12 GAUGE, ON ALL P.V.C. PIPE PER GENERAL REQUIRMENT SECTION.
2. VALVE THRUST BLOCKS ARE SIZED FOR DIFFERENTIAL PRESSURE OF 200 PSI. GREATER DIFFERENTIAL PRESSURES REQUIRE SPECIFIC DESIGN BY ENGINEER.
3. VALVES ON TEMPORARY DEAD ENDS SHALL BE CAPPED AND CLOSED.
4. THE RODS AND BOLTS SHALL BE COATED WITH NO OX-ID MATERIAL OR EQUAL AND P.E. WRAPPED.
5. REFER TO PLATE 602 FOR BEDDING REQUIREMENTS.

REV. APPR. BY DATE

REV. APPR. BY DATE

CITY OF Oxnard

Department of Public Works

VALVE ANCHOR

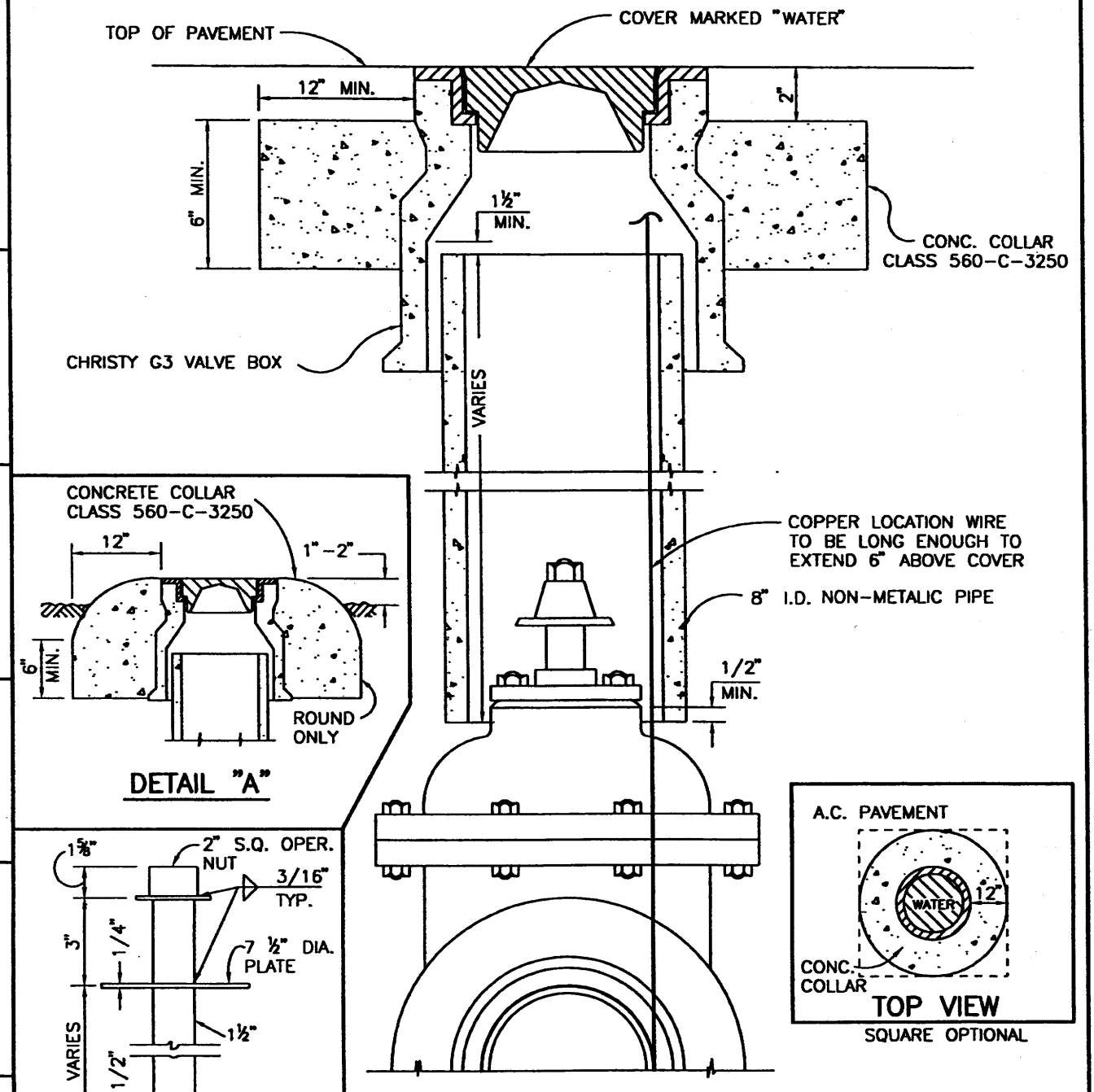
DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 302

SHEET 1 OF 1



1. VALVE BOXES SET IN ROAD SHOULDERS, FIELDS, ETC. SHALL BE AS SHOWN ON DETAIL "A". (ROUND ONLY)
2. CONTRACTOR SHALL PROVIDE A VALVE STEM EXTENSION FOR EACH VALVE HAVING ITS OPERATOR NUT MORE THAN 40" BELOW FINISHED GRADE. TOP OF EXTENSION SHALL BE BETWEEN 18" AND 24" BELOW FINISHED GRADE. (SEE DETAIL "B")
3. FOR ANCHORAGE OF GATE VALVES REFER TO PLATE 302.

REV. APPR. BY DATE

REV. APPR. BY DATE

CITY OF Oxnard

Department of Public Works

VALVE BOX INSTALLATION

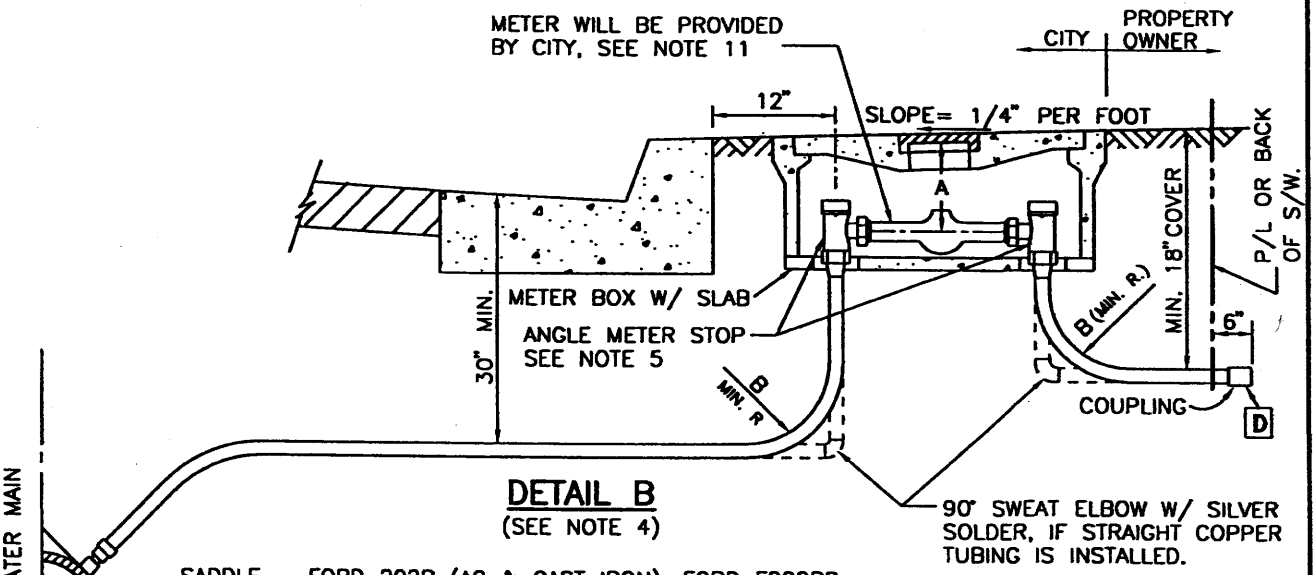
DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 303

SHEET 1 OF 1



DETAIL B
(SEE NOTE 4)

SADDLE – FORD 202B (AC & CAST IRON), FORD F202BS (PVC C900) & CORPORATION STOP FB 1000 OR FB 600 OR EQUAL. LEAVE KEY TO SIDE & OPEN

1 1/2" & 2" ANGLE MAY BE 0° to 15°

METER BOX

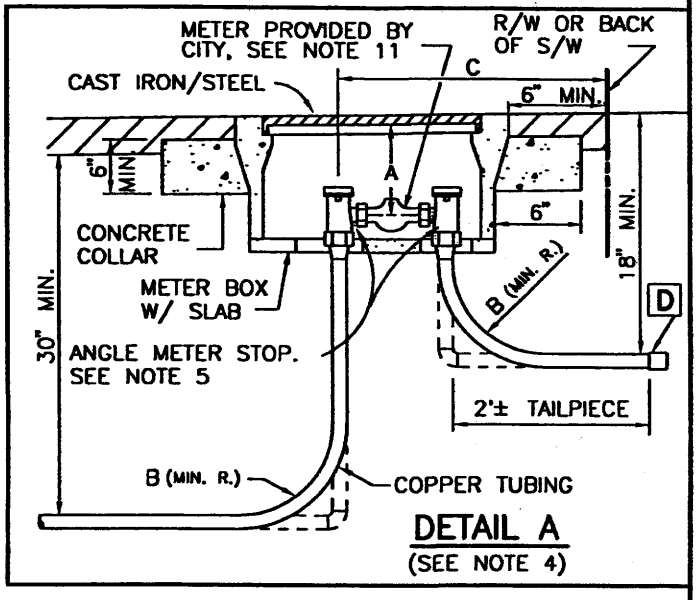
1 1/2" BROOKS 65S OR EQUAL
2" BROOKS 66s OR EQUAL

DIMENSIONS

SERVICE SIZE	A	B	C
1 1/2"	9"	13"	26"
2"	10"	18"	33"

1/2"± TOLERANCE ALLOWED ON ALL SIZES

D TAKE CONSTRUCTION WATER FROM THIS POINT ONLY.



DETAIL A
(SEE NOTE 4)

NOTES:

1. CONTRACTOR SHALL PROVIDE 48 HOURS NOTICE PRIOR TO REQUESTING METER INSTALLATION.
2. SEE STANDARD DRAWING NO. 305 FOR P.E. SERVICES.
3. SERVICES SHALL NOT BE INSTALLED ON PRIVATE PROPERTY WITHOUT PUBLIC UTILITIES EASEMENT.
4. METER BOXES INSTALLED IN DRIVEWAY, ALLEY OR TRAFFIC LOCATIONS REFER TO DETAIL "A". FOR PARKWAYS, SHOULDERS, ETC. SEE DETAIL "B".
5. 1 1/2" & 2" SERVICES SHALL HAVE FLANGED ANGLE METER STOPS, FORD FV-23 (FLARE), FORD FV-43 (PACK JOINT), JONES J-4205 (COMPRESION) OR EQUAL.
6. CLOSE KEYWAYS IN METER BOX WITH PLASTIC SHINGLE OR MORTAR.
7. ALL SERVICES SHALL BE PERPENDICULAR TO THE MAIN.
8. INSTALL METER BOX 6" TO 18" FROM SIDE PROPERTY LINE AND GROUPED FOR EASE OF READING, SEE PLATE 306.
9. CONTRACTOR SHALL PROTECT ENTIRE METER ASSEMBLY FROM DAMAGE DURING CONSTRUCTIOON ACTIVITIES.
10. METER BOX SHALL BE SET AND ADJUSTED PRIOR TO INSTALLATION OF METER.
11. METER SHALL BE INSTALLED BY CITY. CONTRACTOR SHALL MAKE NECESSARY ARRANGEMENTS WITH WATER SERVICES PROGRAM TO COORDINATE INSTALLATION.

REV. APPR. BY DATE

REV. APPR. BY DATE

CITY OF Oxnard
Department of Public Works

STANDARD 1½"–2" COPPER SERVICE INSTALLATION

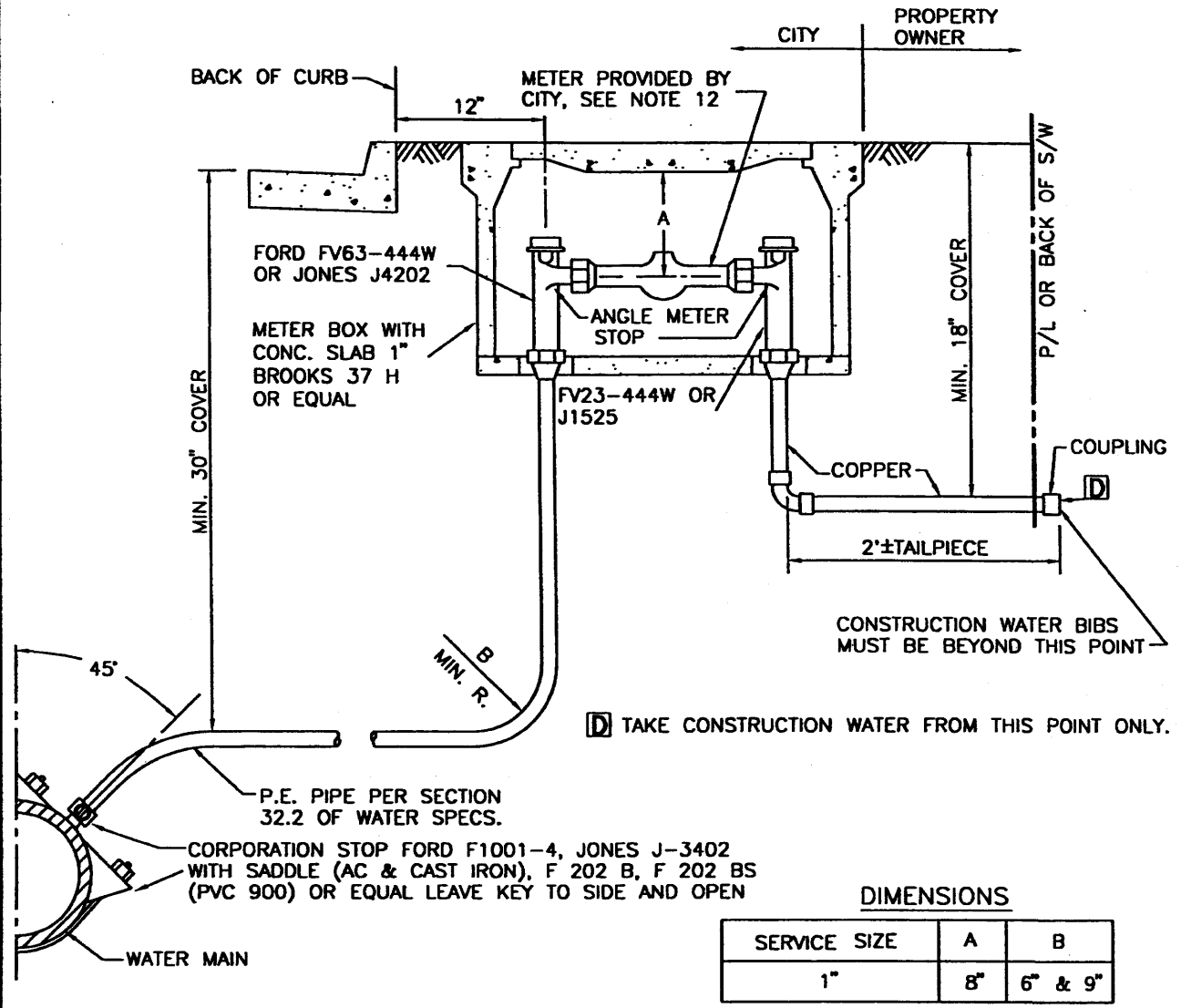
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 304

SHEET 1 OF 1



DIMENSIONS

SERVICE SIZE	A	B
1"	8"	6" & 9"

1/2"± TOLERANCE ALLOWED ON ALL SIZES

NOTES:

1. ALL SERVICES SHALL BE PERPENDICULAR TO THE MAIN, WITH 12 GAUGE LOCATING WIRE INSTALLED.
2. SEE STANDARD DRAWING 304 FOR COPPER SERVICES.
3. METER BOXES SUBJECT TO TRAFFIC SHALL HAVE CAST IRON OR STEEL LIDS.
4. CLOSE KEYWAYS IN METER BOX WITH PLASTIC SHINGLE OR MORTAR.
5. SEE 304 (DETAIL A) FOR INSTALLATION OF SERVICES IN ALLEY.
6. CONTRACTOR SHALL PROVIDE 48 HOURS NOTICE PRIOR TO REQUESTING METER INSTALLATION.
7. STAINLESS STEEL INSERTS MUST BE USED WITH P.E. SERVICES. INSERT TO BE SOLID FLARED.
8. 3/4" METER MAY BE INSTALLED ON A 1" SERVICE.
9. CONTRACTOR SHALL PROTECT ENTIRE METER ASSEMBLY FROM DAMAGE DURING CONSTRUCTION ACTIVITIES.
10. METER SHALL BE SET AND ADUJUSTED PRIOR TO INSTALLATION OF METER.
11. METER SHALL BE INSTALLED BY CITY, CONTRACTOR SHALL MAKE NECESSARY ARRANGEMENTS WITH WATER SERVICES PROGRAM TO COORDINATE INSTALLATION.
12. INSTALL METER BOX 6" TO 8" FROM SIDE PROPERTY LINE AND GROUPED FOR EASE OF READING, SEE PLATE 306.

REV. APPR. BY DATE

REV. APPR. BY DATE

CITY OF Oxnard
Department of Public Works

STANDARD 1" POLYETHYLENE (P.E.) SERVICE INSTALLATION

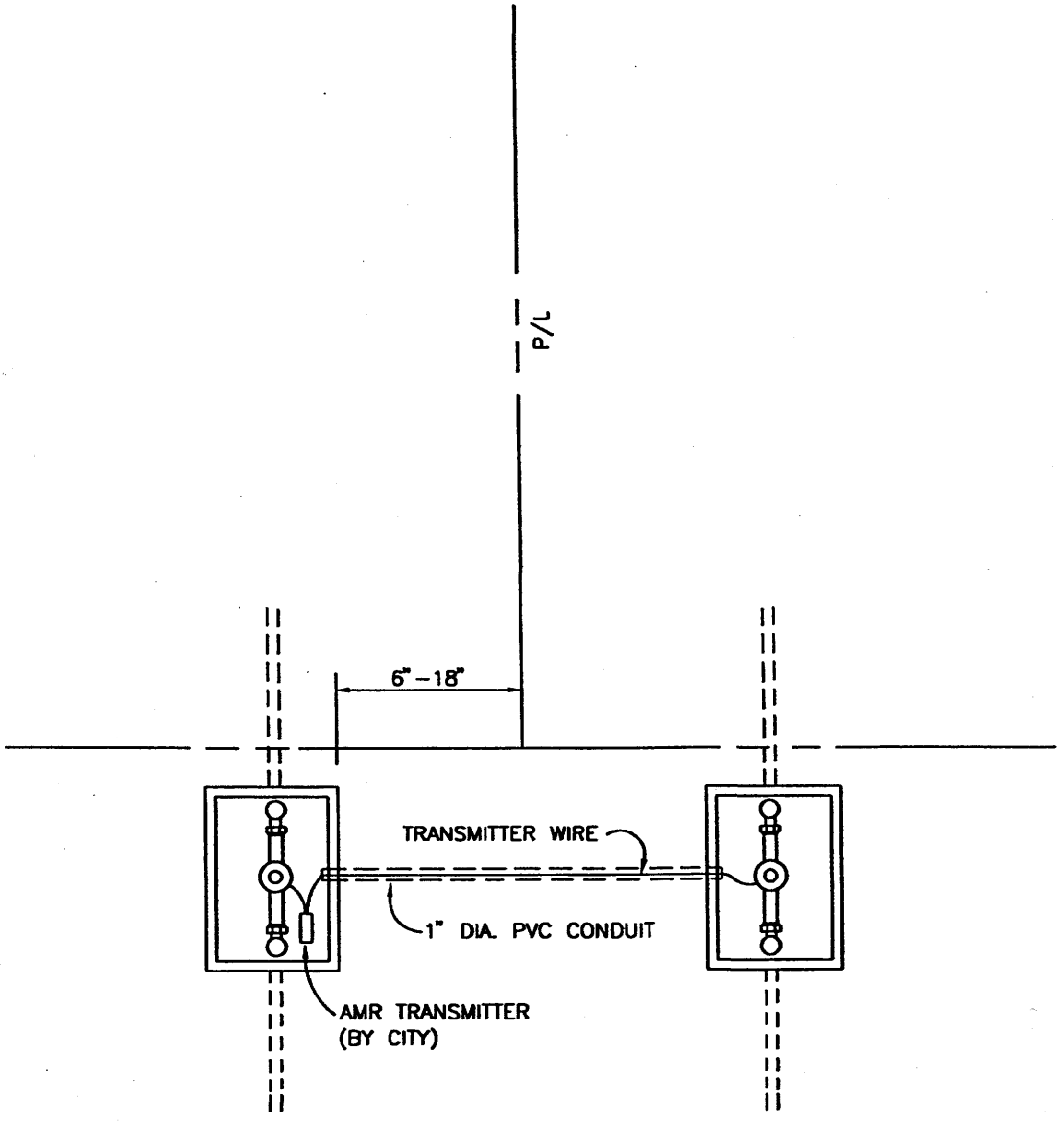
DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 305

SHEET 1 OF 1



REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

NOTES:

1. ADJACENT METER BOXES SHALL INCLUDE A 1 INCH DIA. PVC CONDUIT WHICH CONNECTS THE BOXES.

CITY OF Oxnard
Department of Public Works

GROUPED METER BOXES

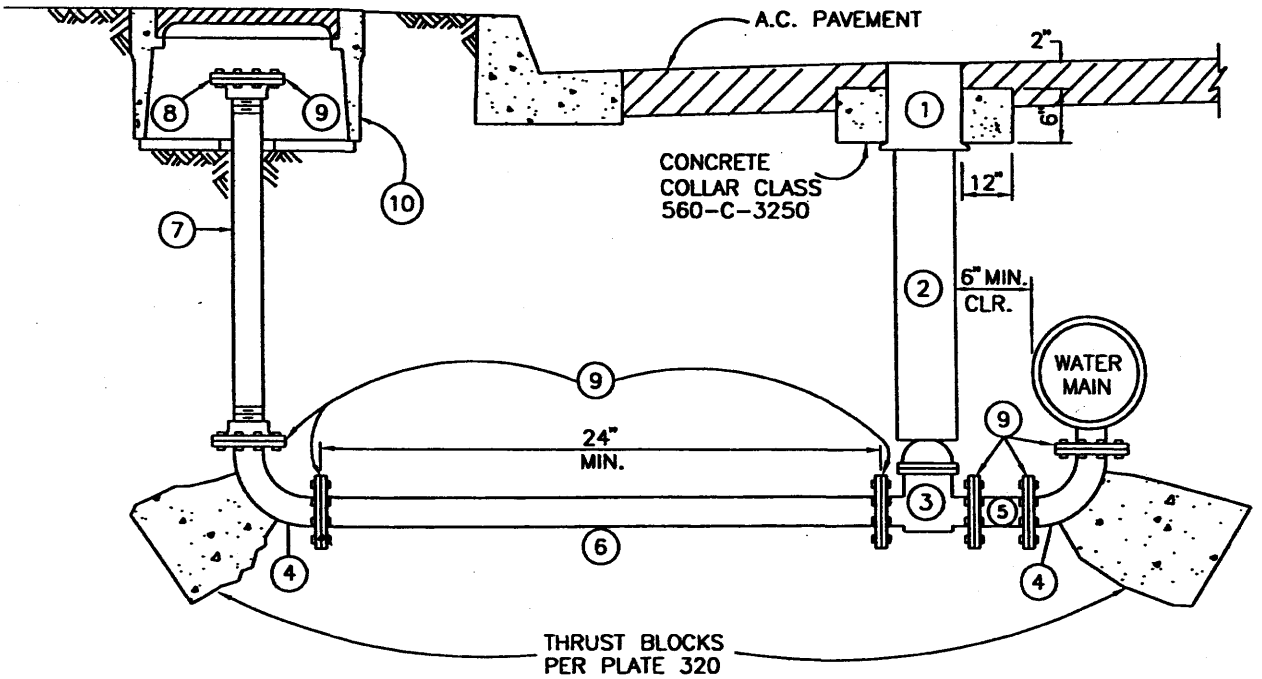
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 306

SHEET 1 OF 1



KEY	QUANTITY	DESCRIPTION
(1)	1	CHRISTY G3 VALVE BOX
(2)	1	8" I.D. NON METALIC PIPE
(3)	1	GATE VALVE (RESILIENT SEAT) FLANGED BOTH ENDS
(4)	2	90° ELBOW–FLANGED BOTH ENDS
(5)	1	FLANGED SPOOL–LENGTH VARIES (DUCTILE IRON)
(6)	1	D.I.P. OR C900 PVC CLASS 200
(7)	1	THREADED SPOOL, FLANGED BOTH ENDS (DUCTILE IRON)
(8)	1	FLANGE COVER WITH STAINLESS STEEL BOLTS AND NUTS
(9)	7	1/8" THICK FULL FACE CLOTH RUBBER GASKET BETWEEN ALL FLANGES
(10)	1	2" METER BOX–BROOKS 66 S (SEE NOTE 1) TRAFFIC LIDS

REV. APPR. BY DATE

REV. APPR. BY DATE

NOTES:

1. IRON OR STEEL LIDS REQUIRED FOR ALL INSTALLATIONS SUBJECT TO TRAFFIC LOADS.
2. INSTALL GATE VALVE, ASSEMBLY PER STANDARD PLATE 303.
3. ALL FLANGE BOLTS & NUTS TO BE STAINLESS STEEL.
4. BLOW–OFF SIZE: 6" THRU 12" MAIN–4" BLOW–OFF. MAINS OVER 12" TO BE DETERMINED BY WATER DIVISION.
5. REFER TO PROTECTIVE COATING OF GENERAL REQUIREMENT SECTION FOR INTERNAL AND EXTERNAL COATINGS.
6. P.E. ENCASE ALL DUCTILE IRON PIPE AND CAST IRON FITTINGS.
7. RESTRAINED JOINTS MAY BE SUBSTITUTED IN LIEU OF THRUST BLOCKS. RESTRAINED JOINTS SHALL BE MANUFACTURED BY ROMAC INDUSTRIES, OR APPROVED EQUAL.
8. ALL FITTINGS SHALL BE DUCTILE IRON.
9. PVC INSTALLATIONS SHALL INCLUDE A 12 GAUGE LOCATING WIRE.

CITY OF Oxnard
Department of Public Works

BLOWOFF INSTALLATION

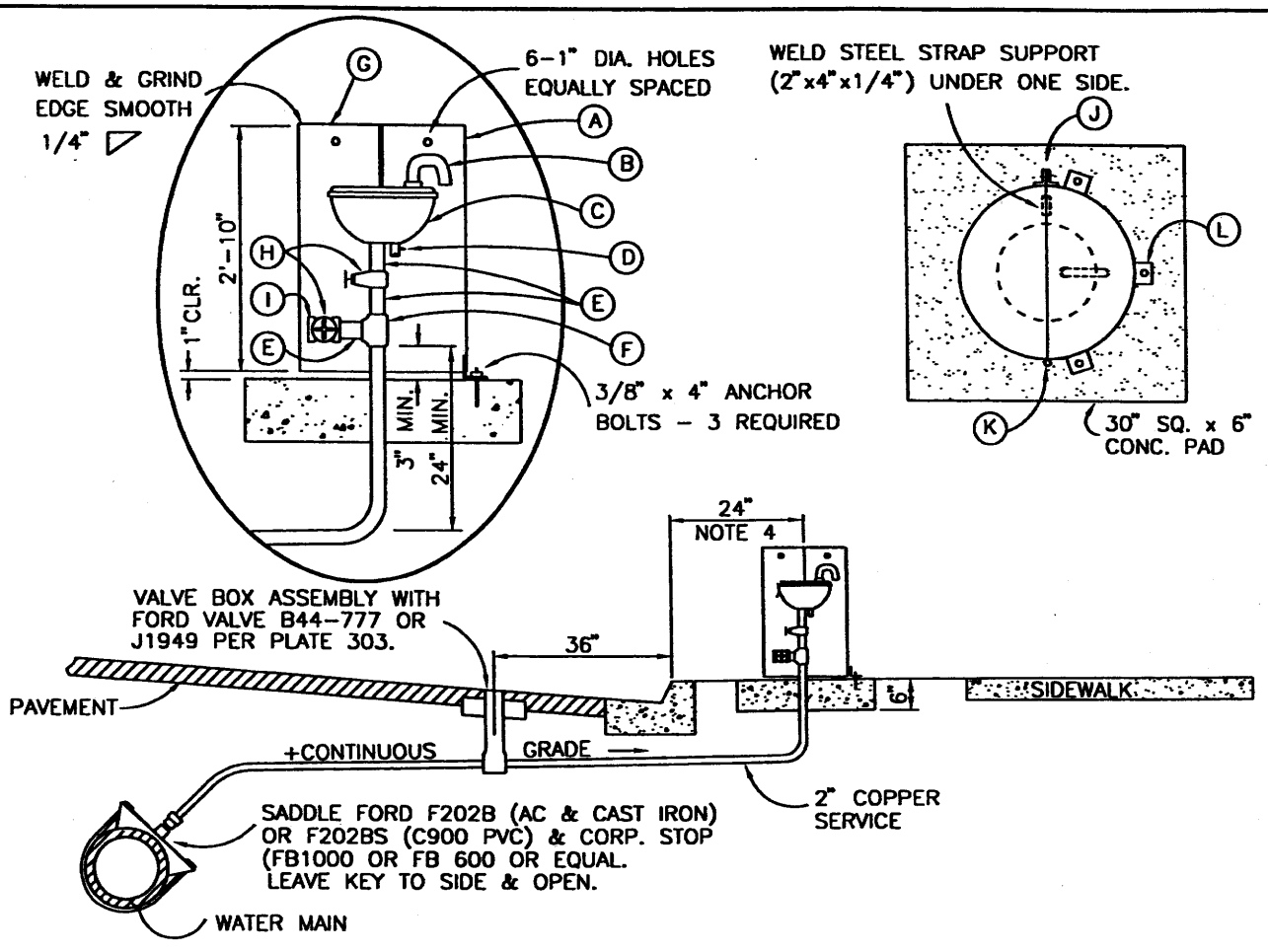
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 307

SHEET 1 OF 1



MATERIALS LIST

- (A) 20" DIA. STA. STEEL PIPE UNLESS OTHERWISE INDICATED
- (B) 2 - 90° STREET ELBOWS
- (C) COMB. AIR RELEASE & AIR VAC. VALVE, APCO HEAVY DUTY MODEL 145C
- (D) TEST DRAIN VALVE - 1/2" I.P.T. x 3/4" H.T.
- (E) 2" BRASS NIPPLE (3" LONG)
- (F) 2" x 2" BRASS TEE
- (G) 1/4" STEEL PLATE
- (H) 2" BRASS BALL VALVE
- (I) 2" x 2 ½" INCREASER & 2 ½" I.P.T. x 2 ½" FIRE HOSE THREAD ADAPTER
- (J) WELD 2-1 ½" x 1 ½" x ½" ANGLES (2" LONG) WITH ⅜" DIA. HOLE FOR PADLOCK
- (K) 2-3" x 3" HEAVY DUTY HINGES. WELD TO STL. PIPE (NON-REMOVABLE PINS)
- (L) 3-3" x 3" x ¼" GALV. ANGLES (2" WIDE) WITH ½" DIA. HOLE. WELD TO PIPE ON RIGID SIDE

NOTES:

1. PROTECTIVE COATING PER GENERAL REQUIREMENT SECTION.
2. BARRIERS SHALL BE PROVIDED FOR ALL INSTALLATIONS IN UNIMPROVED AREAS. (REFER TO PLATE 301)
3. AIR VACUUM RELEASE VALVES SHALL BE INSTALLED AT HIGH POINT OF MAIN WHEN THE ELEVATION OF THE PIPE IS CHANGED BY 1/2 DIAMETER OR MORE FROM BOTH DIRECTIONS CAUSING AIR TO BE TRAPPED.
4. IF SIDEWALK IS ADJACENT TO CURB AND 5' OR LESS IN WIDTH, THEN A AIR-VAC. VALVE ASSEMBLY SHALL BE PLACED 18" FROM FACE OF CURB.
5. ALL STEEL ENCLOSURE PARTS SHALL BE GALVANIZED AFTER FABRICATION.

REV. | APPR. BY | DATE

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CITY OF Oxnard
Department of Public Works

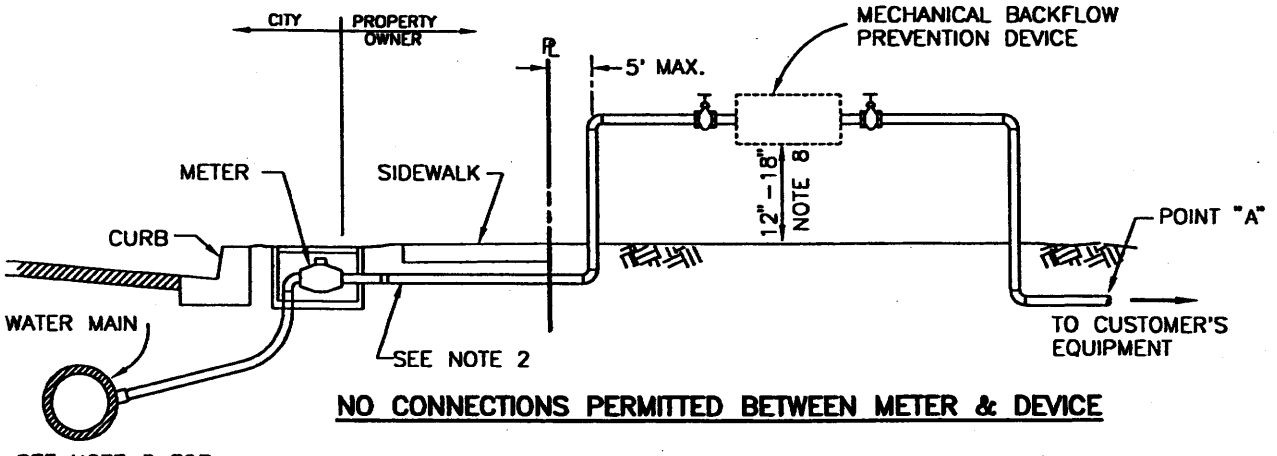
COMBINATION AIR-VACUUM VALVE INSTALLATION

DRAWN: STAFF | CKD.: STAFF | APPR. Granville M. Bowman

STANDARD PLAN 2002

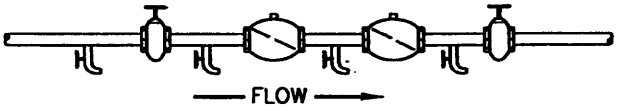
PLATE 308

SHEET 1 OF 1



NO CONNECTIONS PERMITTED BETWEEN METER & DEVICE

NOTE: BALL VALVES AND TEST COCKS ARE REQUIRED.



MECHANICAL BACKFLOW PREVENTER

NOTES:

1. MECHANICAL BACKFLOW PREVENTION DEVICE SHALL BE A REDUCED PRESSURE PRINCIPLE DEVICE APPROVED BY CITY CROSS CONNECTION CONTROL INSPECTOR.
2. PIPE FROM METER TO BACKFLOW PREVENTION DEVICE AND POINT "A" SHALL BE TYPE "K" RIGID OR BRONZED COPPER PIPE. EXPOSED COPPER SHALL BE PAINTED THE SAME COLOR AS BACKFLOW DEVICE. SEE GENERAL REQUIREMENT SECTION.
3. SERVICES FROM 1"- 2" SHALL BE INSTALLED IN ACCORDANCE WITH PLATE 304 OR 305. LARGER SERVICES SHALL BE INSTALLED AS SPECIFIED BY PLATE 310.
4. ALL COPPER JOINTS SHALL BE SILVER SOLDERED WITH 85-15.
5. ALL IRRIGATION SERVICES ARE REQUIRED TO HAVE A REDUCED PRESSURE PRINCIPLE ASSEMBLY.
6. BACKFLOW PREVENTERS SHALL BE TESTED BY A CERTIFIED TESTER IMMEDIATELY AFTER THEY ARE INSTALLED.
7. INSTALLATION SHALL BE INSPECTED AND APPROVED BY CROSS-CONNECTION CONTROL PRIOR TO ACTIVATING (PHONE 805/385-8155)
8. CLEARANCES SHALL BE MEASURED TO THE LOWEST PART OF THE DEVICE INCLUDING ANY RELIEF VALVES.
9. INSTALLATION AND FITTINGS SHALL HAVE A MINIMUM OF 12" SIDE CLEARANCE.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

TYPICAL BACKFLOW PREVENTION DEVICE INSTALLATION (FOR 2" AND SMALLER WATER SERVICES)

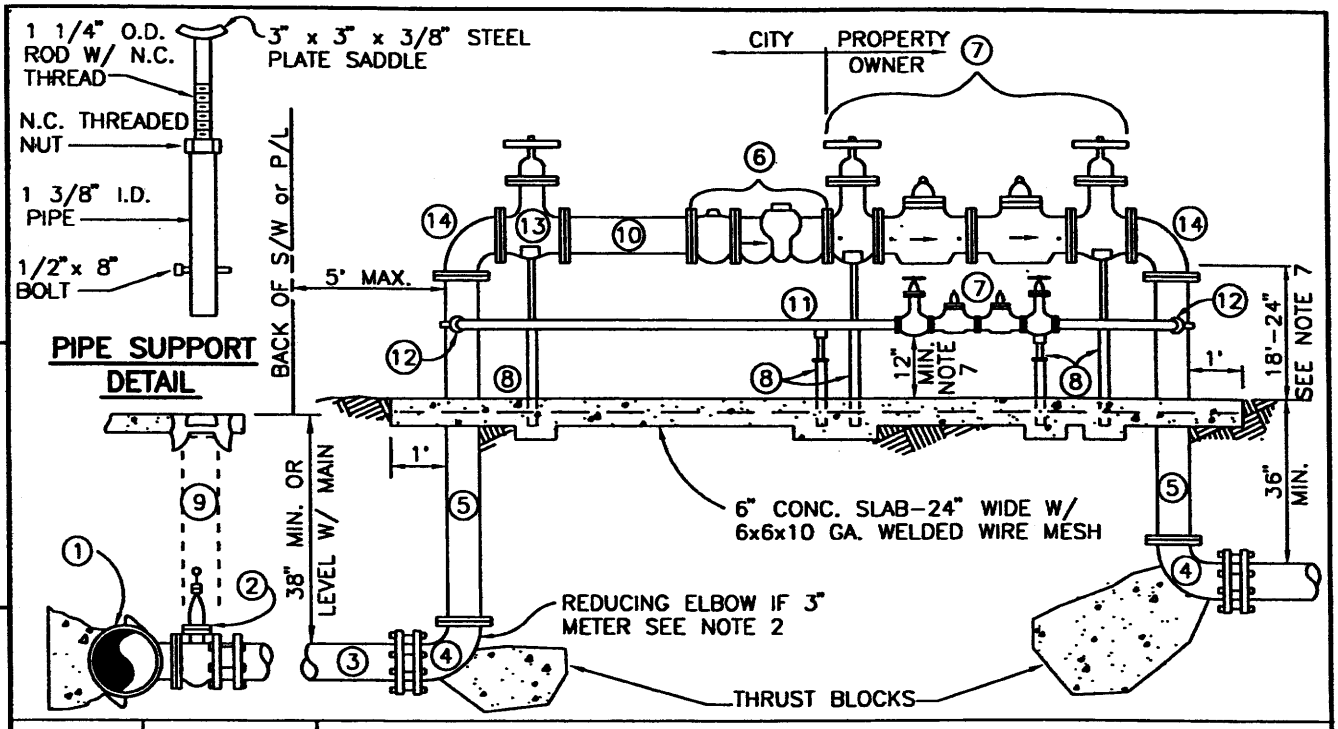
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 309

SHEET 1 OF 1



KEY	QUANTITY	DESCRIPTION
①	1	ROMAC STAINLESS STEEL TAPPING SLEEVE OR EQUAL
②	1	TAPPING VALVE (RESILIENT SEAT) WITH FLANGE & MECHANICAL JOINT
③	1	C 900 P.V.C. PIPE CLASS 200 OR DUCTILE IRON (4" MIN.)
④	2	90° ELBOW-FLANGED BY MECHANICAL JOINT
⑤	2	THREADED FLANGED SPOOL (DUCTILE IRON)
⑥	1	METER WITH STRAINER (Meter Type to be Approved by Water Division)
⑦	2	REDUCED PRESSURE BACKFLOW PREVENTER WITH GATE VALVES (U.S.C. APPROVED)
⑧	5	PIPE SUPPORT (SEE DETAIL)
⑨	1	CHRISTY G3 VALVE BOX
⑩	1	THREADED FLANGED SPOOL-5 DIAMETERS LONG (DUCTILE IRON)
⑪	1	1½" BRONZE PIPE-FOR 3"-6" METER, 2" PIPE FOR 8" & LARGER METER
⑫	1	BY PASS SADDLE & CURB STOPS WITH LOCKS
⑬	1	GATE VALVE
⑭	2	90° ELBOW-FLANGED BY FLANGED

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NOTES:

1. INSTALLATION AND FITTINGS SHALL HAVE A MIN. OF 12" SIDE CLEARANCE.
2. A 3" METER MUST BE INSTALLED WITH A 4" SERVICE & A REDUCING ELBOW, INSTALLED AS SHOWN.
3. ALL FITTINGS SHALL BE THERMO EPOXY OR MORTAR LINED. BURIED FITTINGS TO BE NO-OX-ID COATED AND P.E. WRAPPED.
4. THE COMPLETE ASSEMBLY ABOVE GROUND SHALL BE PAINTED BY CONTRACTOR (SEE GENERAL REQUIRMENTS SECTION).
5. INSTALLATION SHALL BE INSPECTED AND APPROVED BY CROSS-CONNECTION CONTROL REPRESENTATIVE PRIOR TO ACTIVATING. (PHONE 805/385-8155).
6. BACKFLOW PREVENTERS SHALL BE TESTED BY A CERTIFIED TESTER IMMEDIATELY AFTER THEY ARE INSTALLED.
7. CLEARANCES SHALL BE MEASURED TO THE LOWEST PART OF THE DEVICE INCLUDING ANY RELIEF VALVES.
8. RESTRAINED JOINTS MAY BE SUBSTITUTED IN LIEU OF THRUST BLOCKS. RESTRAINED JOINTS SHALL BE MANUFACTURED BY ROMAC INDUSTRIES, OR APPROVED EQUAL.
9. PVC INSTALLATIONS SHALL INCLUDE A 12 GAUGE LOCATING WIRE.

CITY OF Oxnard
Department of Public Works

3" & LARGER WATER SERVICE AND METER INSTALLATION

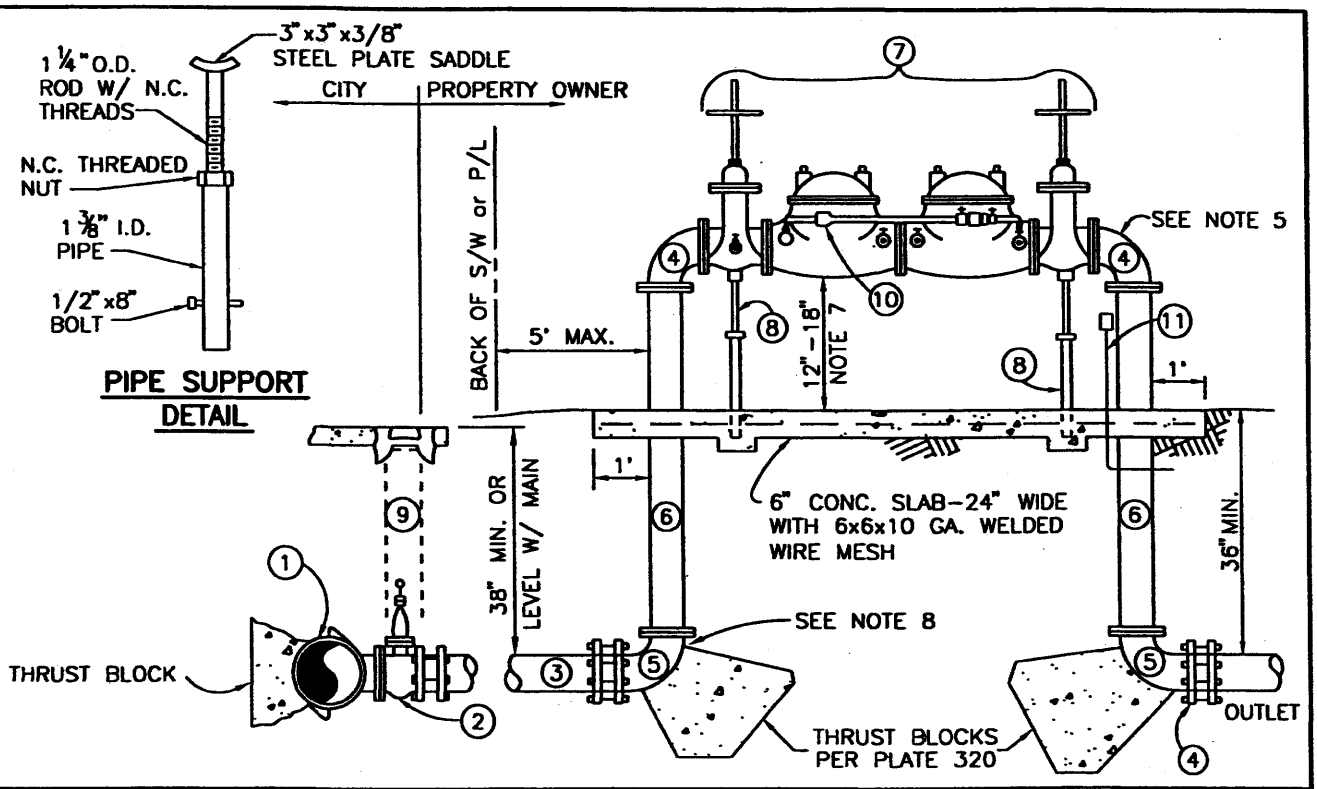
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 310

SHEET 1 OF 1



KEY	QUANTITY	DESCRIPTION
①	1	ROMAC STAINLESS STEEL TAPPING SLEEVE OR EQUAL (4" MIN.)
②	1	TAPPING VALVE (RESILIENT SEAT) WITH FLANGE & MECHANICAL JOINT
③		C 900 P.V.C. PIPE CLASS 200 OR DUCTILE IRON (4" MIN.)
④	2	90° ELBOW-FLANGED BY FLANGED
⑤	2	90° ELBOW-FLANGED BY MECHANICAL JOINT
⑥	2	THREADED FLANGED SPOOL (DUCTILE IRON)
⑦	1	DOUBLE DETECTOR CHECK ASSEMBLY WITH O.S. & Y. VALVES (U.S.C. APPROVED)
⑧	2	PIPE SUPPORT (SEE DETAIL)
⑨	1	CHRISTY G3 VALVE BOX
⑩	1	3/4" BYBASS METER-SENSUS SR II
⑪	1	CONDUIT AND BOX FOR FUTURE ALARM SYSTEM

NOTES:

1. INSTALLATION AND FITTINGS SHALL HAVE A MIN. OF 12" SIDE CLEARANCE.
2. ALL FITTINGS SHALL BE THERMO EPOXY OR MORTAR LINED, NO-OX-ID COATED AND P.E. WRAPPED.
3. THE COMPLETE ASSEMBLY ABOVE GROUND SHALL BE PAINTED BY CONTRACTOR (SEE GENERAL REQUIRMENTS SECTION).
4. INSTALLATION WILL BE INSPECTED AND APPROVED BY CROSS-CONNECTION CONTROL PRIOR TO ACTIVATING. (PHONE 805/385-8155)
5. CONTACT FIRE DEPARTMENT (PHONE 805/385-7722) FOR ADDITIONAL CONNECTIONS AND ALARM SYSTEM REQUIREMENTS.
6. BACKFLOW PREVENTER SHALL BE TESTED BY A CERTIFIED TESTER IMMEDIATELY AFTER THEY ARE INSTALLED.
7. CLEARANCES SHALL BE MEASURED TO THE LOWEST PART OF THE DEVICE INCLUDING RELIEF VALVES.
8. A 2½" OR 3" BACKFLOW DEVICE MUST BE INSTALLED WITH A 4" SERVICE & REDUCING ELBOW AS SHOWN.
9. RESTRAINED JOINTS MAY BE SUBSTITUTED IN LIEU OF THRUST BLOCKS. RESTRAINED JOINTS SHALL BE MANUFACTURED BY ROMAC INDUSTRIES, OR APPROVED EQUAL.
10. PVC INSTALLATIONS SHALL INCLUED A 12 GAUGE LOCATING WIRE.

REV. APPR. BY DATE

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CITY OF Oxnard
Department of Public Works

2½" & LARGER FIRE LINE INSTALLATION

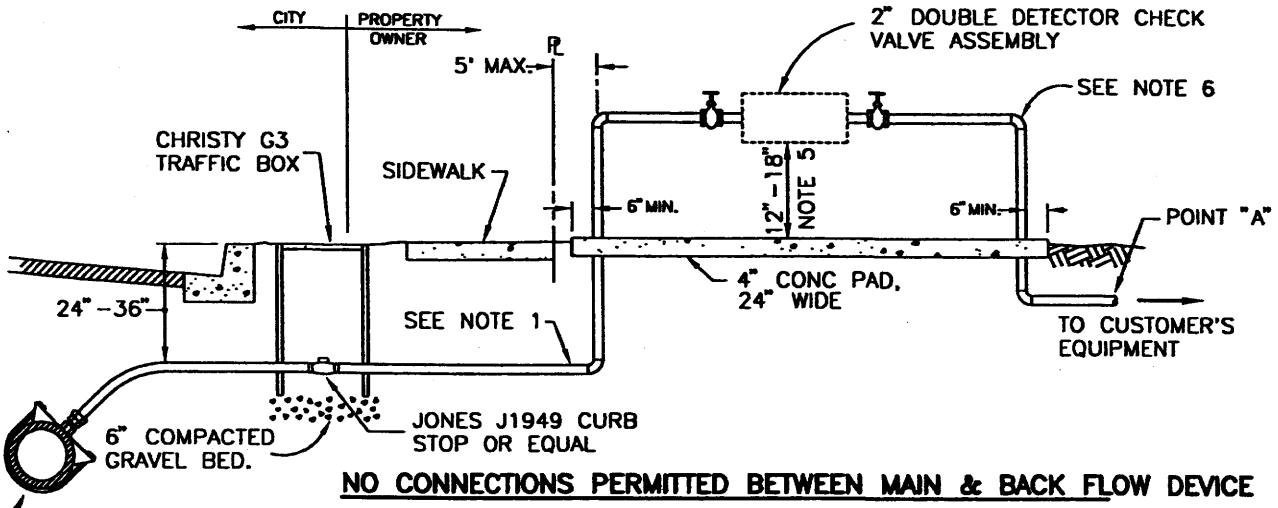
DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 311

SHEET 1 OF 2



NO CONNECTIONS PERMITTED BETWEEN MAIN & BACK FLOW DEVICE

SADDLE – FORD 202B (AC & CAST IRON), FORD 202BS (PVC C900) & CORP. STOP (FB 1000 OR FB 700) OR EQUAL. LEAVE KEY TO SIDE & OPEN.

NOTE: GATE VALVES AND TEST COCKS ARE REQUIRED.

REV. APPR. BY DATE

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NOTES:

1. PIPE FROM METER TO BACKFLOW PREVENTION DEVICE AND POINT "A" SHALL BE TYPE "K" RIGID OR BRONZED COPPER PIPE. EXPOSED COPPER SHALL BE PAINTED THE SAME COLOR AS BACKFLOW DEVICE. SEE GENERAL REQUIREMENT SECTION.
2. ALL COPPER JOINTS SHALL BE SILVER SOLDERED WITH 85–15.
3. BACKFLOW PREVENTERS SHALL BE TESTED BY A CERTIFIED TESTER IMMEDIATELY AFTER THEY ARE INSTALLED.
4. INSTALLATION SHALL BE INSPECTED AND APPROVED BY CROSS–CONNECTION CONTROL PRIOR TO ACTIVATING (PHONE 805/385–8155)
5. CLEARANCES SHALL BE MEASURED TO THE LOWEST PART OF THE DEVICE INCLUDING ANY RELIEF VALVES.
6. CONTACT FIRE DEPARTMENT (PHONE 805/385–7722) FOR ADDITIONAL CONNECTIONS AND ALARM SYSTEM REQUIREMENTS.

CITY OF Oxnard

Department of Public Works

2" FIRE LINE INSTALLATION

DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 311

SHEET 2 OF 2

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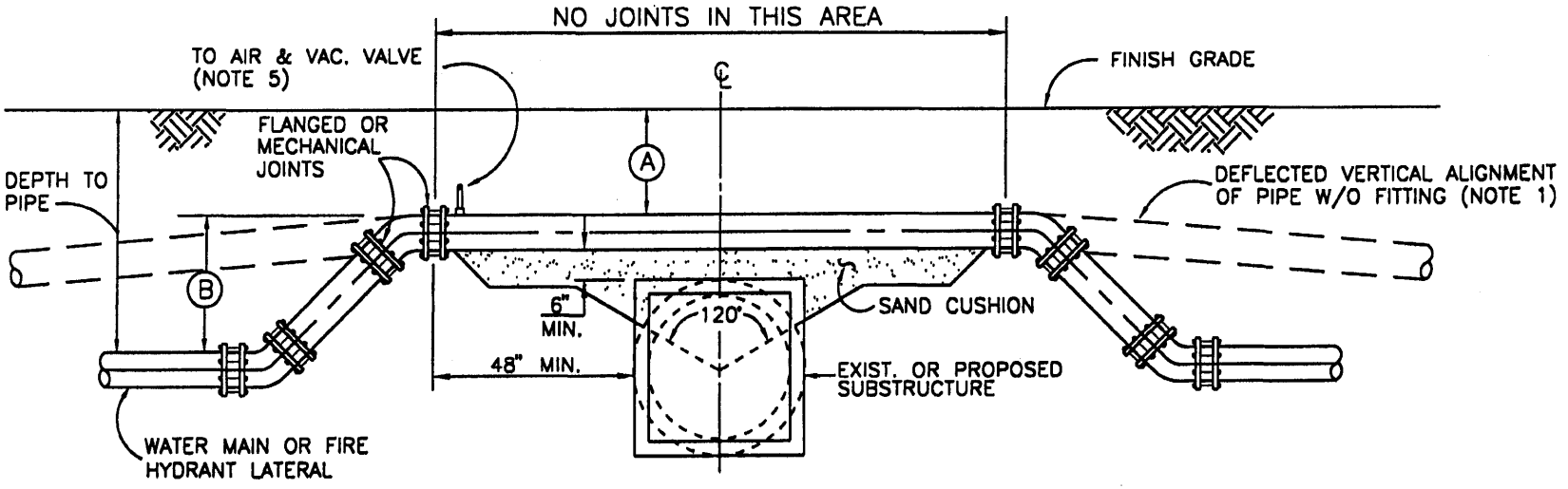
REV.	APPR. BY	DATE	

CITY OF Oxnard
Department of Public Works

DRAWN: STAFF
CKD.: STAFF
APPR. Granville M. Bowman

RELOCATION OF WATER MAIN & FIRE HYDRANT LATERALS CONDITION I

STANDARD PLAN 2002
PLATE 312
SHEET 1 OF 1



IF DIMENSION (A) IS LESS THAN 30", PIPE SHALL BE INSTALLED PER CONDITION II (PLATE 313) UNLESS APPROVED BY THE CITY ENGINEERING DEPT.

NOTES:

1. IF RETURN TO DESIGNED PIPE DEPTH BY DEFLECTION CANNOT BE ACCOMPLISHED WITHIN (40'), PIPE FITTINGS AND APPURTENANCES WILL BE REQUIRED PER THIS PLATE UNLESS OTHERWISE DIRECTED IN THE FIELD.
2. MAXIMUM ALLOWABLE ANGLE OF ELBOW = 45°.
3. MAXIMIUM ALLOWABLE PIPE JOINT DEFLECTION SHALL BE PER PIPE MANUFACTURER'S RECOMMENDATION.
4. ALL PIPE JOINTS 22 1/2° OR GREATER SHALL BE THRUST BLOCK PROTECTED.
5. AIR VACUUM RELEASE ASSEMBLY INSTALLATION REQUIRED WHEN DIMENSION (B) IS MORE THAN 1/2 PIPE DIA. (SEE PLATE 308).
6. ALL FITTINGS SHALL BE THERMO EPOXY OR MORTAR LINED, NO-OX-ID COATED AND P.E. WRAPPED.
7. ALL PIPE FOR OFFSET SHALL BE PVC CLASS 200; MORTAR LINED OR EPOXY COATED DUCTILE IRON OR CMLC WELDED STEEL PIPE.
8. RESTRAINED JOINTS MAY BE SUBSTITUTED IN LIEU OF THRUST BLOCKS. RESTRAINED JOINTS SHALL BE MANUFACTURED BY EOMAC INDUSTRIES, OR APPROVED EQUAL.
9. ALL FITTINGS SHALL BE DUCTILE IRON.
10. PVC INSTALLATIONS SHALL INCLUDE A 12 GAUGE LOCATING WIRE.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

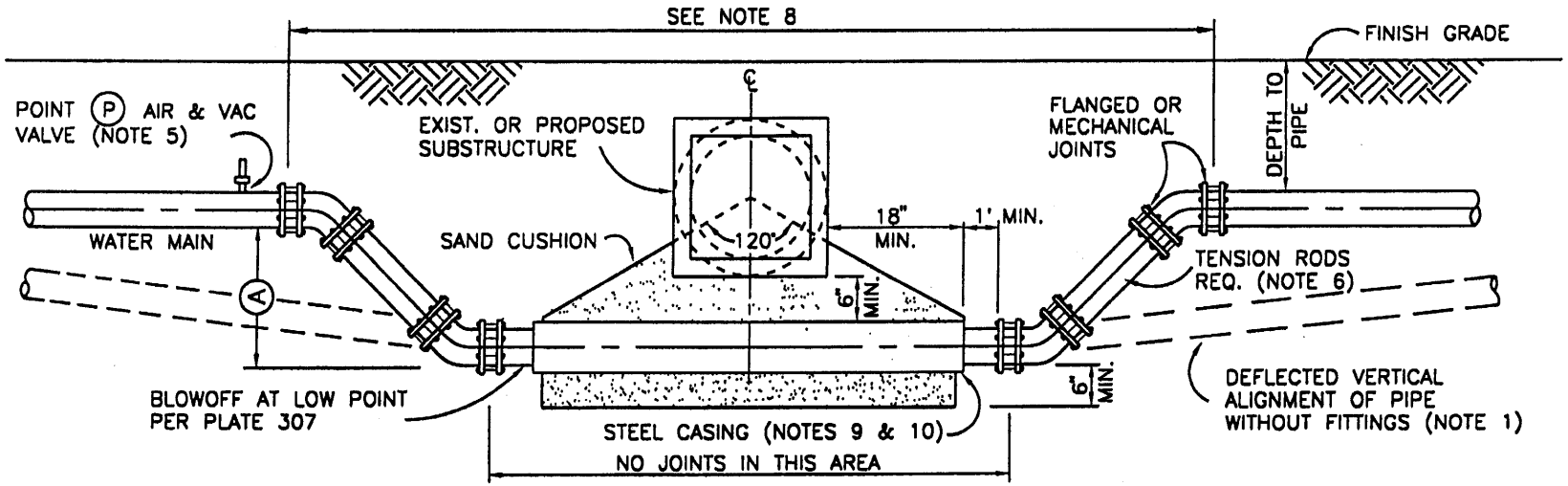
DRAWN: STAFF
CKD.: STAFF
APPR. Granville M. Bowman

RELOCATION OF WATER MAIN & FIRE HYDRANT LATERALS CONDITION H

STANDARD PLAN 2002

PLATE 313

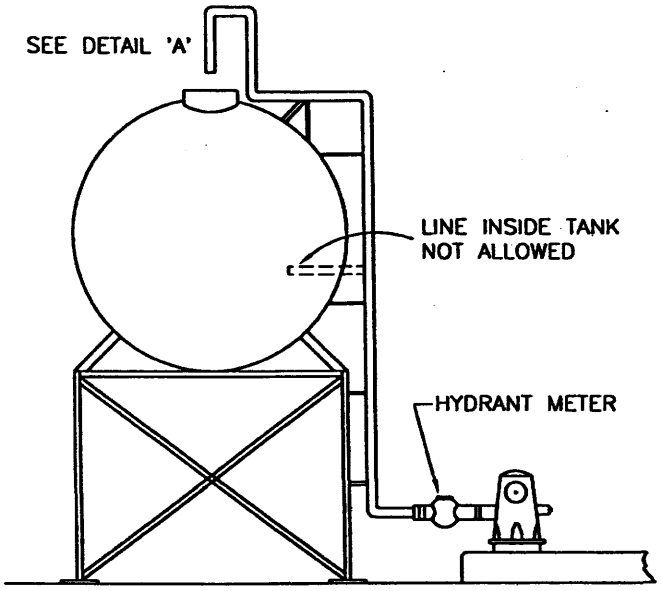
SHEET 1 OF 1

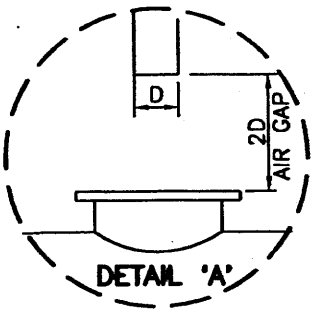


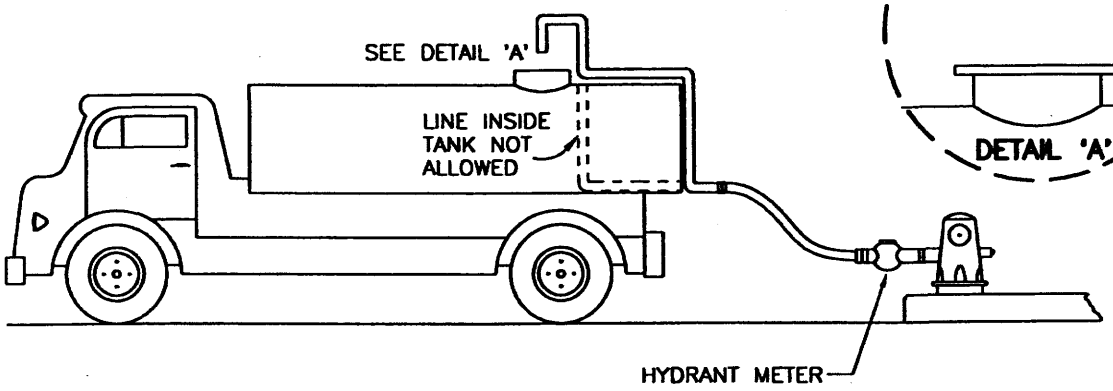
CASING TABLE		
WATER MAIN	CASING–INSIDE DIA.	THICKNESS
6 INCHES	12 INCHES	1/4 INCHES
8 INCHES	14 INCHES	1/4 INCHES
10 INCHES	16 INCHES	3/8 INCHES
12 INCHES	18 INCHES	3/8 INCHES
14 INCHES	20 INCHES	3/8 INCHES

NOTES:

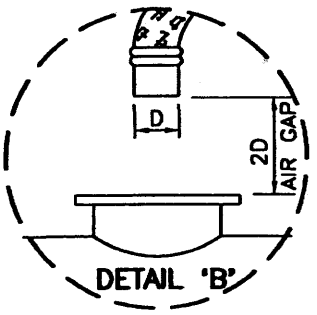
1. IF RETURN TO DESIGNED PIPE DEPTH BY DEFLECTION CANNOT BE ACCOMPLISHED WITHIN (40'), PIPE FITTINGS AND APPURTENANCES WILL BE REQUIRED PER THIS PLATE UNLESS OTHERWISE DIRECTED IN THE FIELD.
2. MAXIMUM ALLOWABLE ANGLE OF ELBOW = 45°.
3. MAXIMIUM ALLOWABLE PIPE JOINT DEFLECTION SHALL BE PER PIPE MANUFACTURER'S RECOMMENDATION.
4. ALL PIPE JOINTS 22 1/2° OR GREATER SHALL BE THRUST BLOCK PROTECTED.
5. IF POINT (P) IS A HIGH POINT AND DIMENSION (A) IS CHANGED BY 1/2 THE PIPE DIAMETER IN SUCH A WAY THAT AIR WOULD BE TRAPPED, AN AIR–VAC VALVE SHALL BE INSTALLED PER PLATE 308. NOT REQUIRED ON FIRE HYDRANT LATERALS.
6. TENSION RODS AND ANCHORS SHALL BE USED ON ALL INSTALLATIONS. TWO RODS ARE REQUIRED FROM BOTTOM TO TOP FITTING.
7. ALL FITTINGS SHALL BE THERMO EPOXY OR MORTAR LINED, NO–OX–ID COATED AND P.E. WRAPPED.
8. ALL PIPE FOR OFFSET SHALL BE PVC CLASS 200; MORTAR LINED OR EPOXY COATED DUCTILE IRON OR CMLC WELDED STEEL PIPE.
9. MORTAR PLUG SHALL PENETRATE THE ENDS OF THE CASING SURROUNDING THE WATER MAIN TO A DEPTH OF 1 FT.
10. IF 10' OR MORE OF WATERLINE IS UNDER STRUCTURE, CASING PER TABLE IS REQUIRED.
11. RESTRAINED JOINTS MAY BE SUBSTITUTED IN LIEU OF THRUST BLOCKS. RESTRAINED JOINTS SHALL SHALL BE MANUFACTORED BY ROMAC INDUSTRIES, OR EQUAL.
12. ALL FITTINGS SHALL BE DUCTILE IRON.
13. PVC INSTALLATIONS SHALL INCLUDE A 12 GAUGE LOCATING WIRE.







NOTE: BACKFLOW PREVENTOR REQUIRED IF AIR-GAP NOT PROVIDED



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CITY OF Oxnard

Department of Public Works

FIRE HYDRANT CONNECTIONS AIR GAP METHOD

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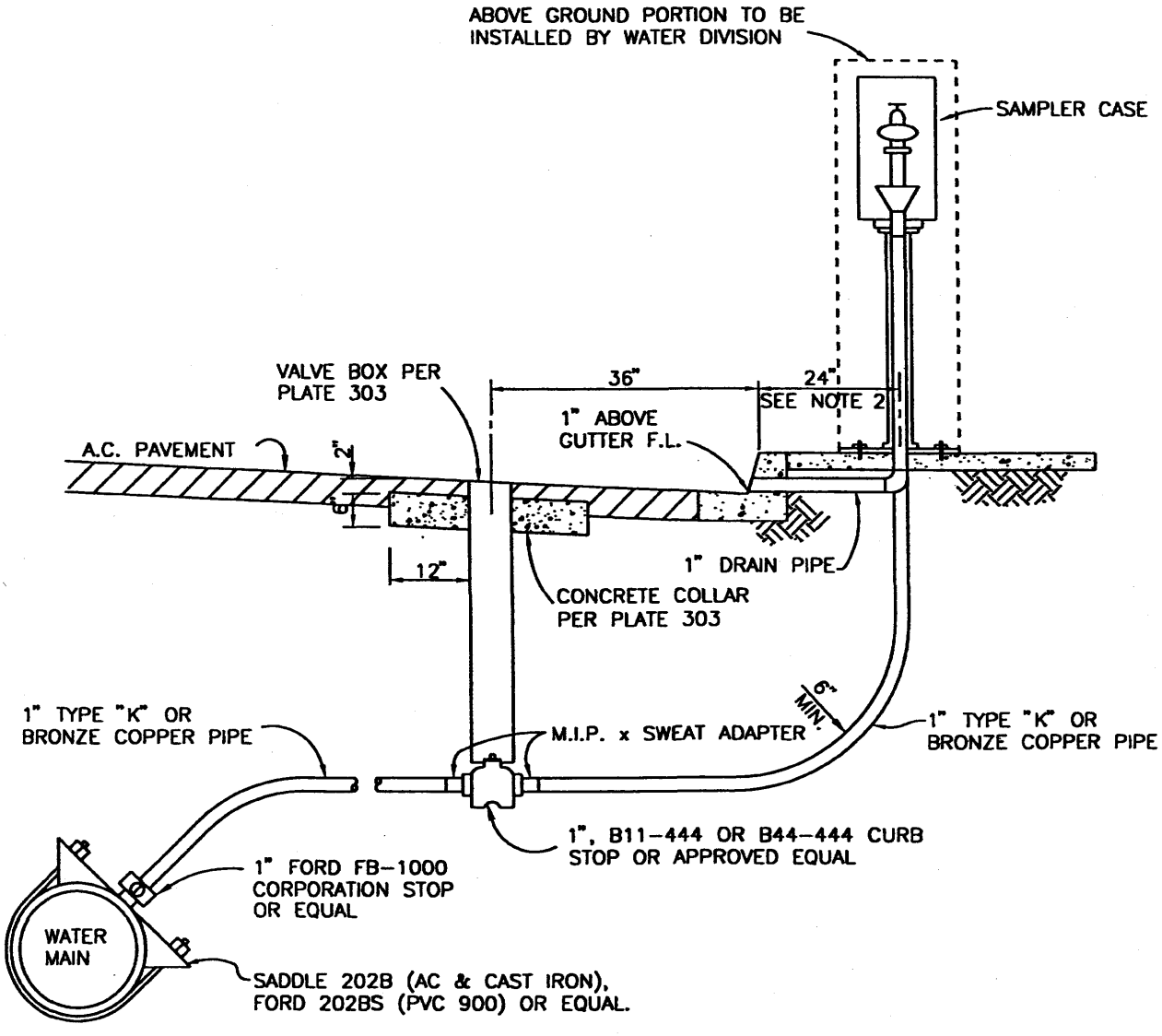
APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 314

SHEET 1 OF 1



REV. | APPR. BY | DATE

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NOTES:

1. SAMPLER MAY BE INSTALLED IN PARKWAY WITH A 24" SQ. x 6" CONCRETE PAD.
2. SAMPLER SHALL BE 18" FROM FACE OF CURB IF SIDEWALK IS ADJACENT TO CURB AND 5' OR LESS IN WIDTH.
3. CONTRACTOR TO INSTALL ALL BELOW GROUND PORTIONS OF SAMPLING STATION INCLUDING MIN. 36" DRAIN LINE AND SERVICE LINE RISERS ABOVE FINISH SIDEWALK ELEVATION.

CITY OF Oxnard

Department of Public Works

WATER SAMPLING STATION

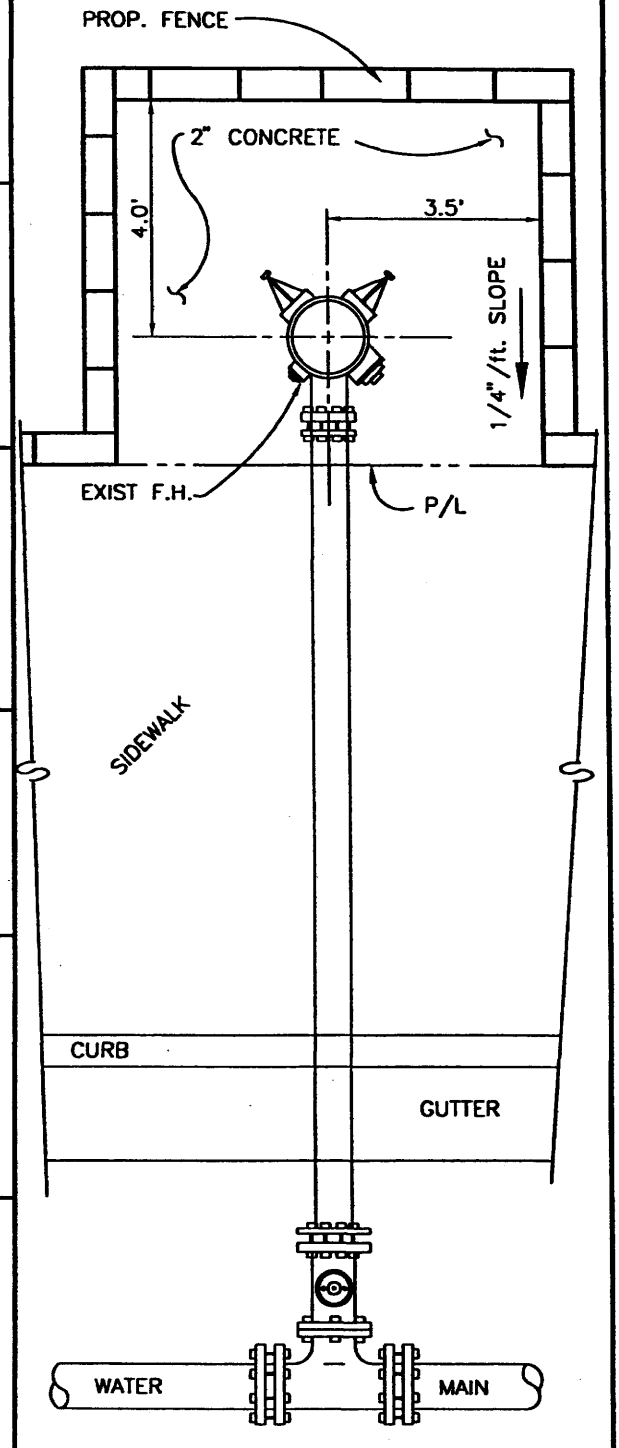
DRAWN: STAFF | CKD.: STAFF

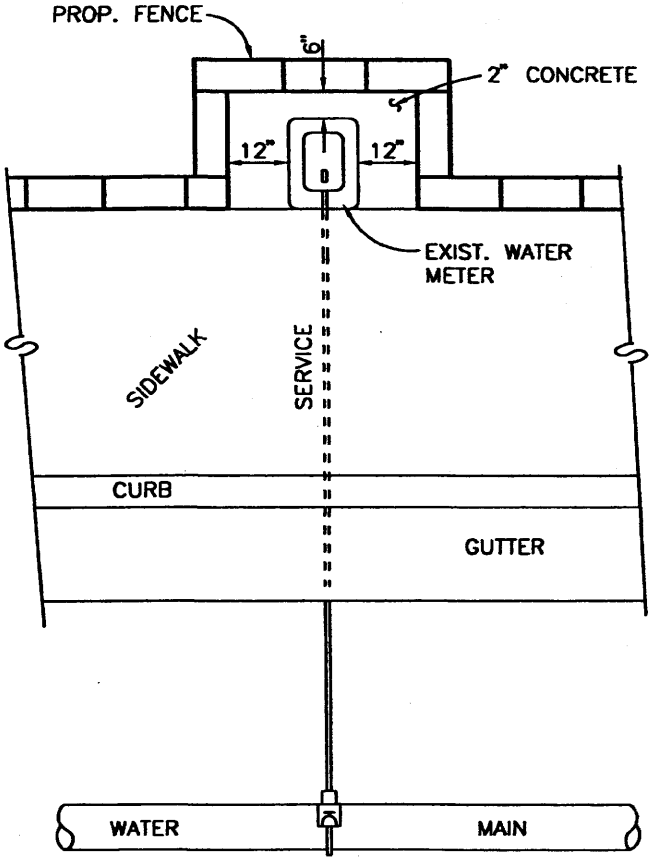
APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 315

SHEET 1 OF 1





REV.	APPR.	DATE

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CITY OF Oxnard

Department of Public Works

PROPOSED FENCING AROUND FIRE HYDRANTS & WATER METERS

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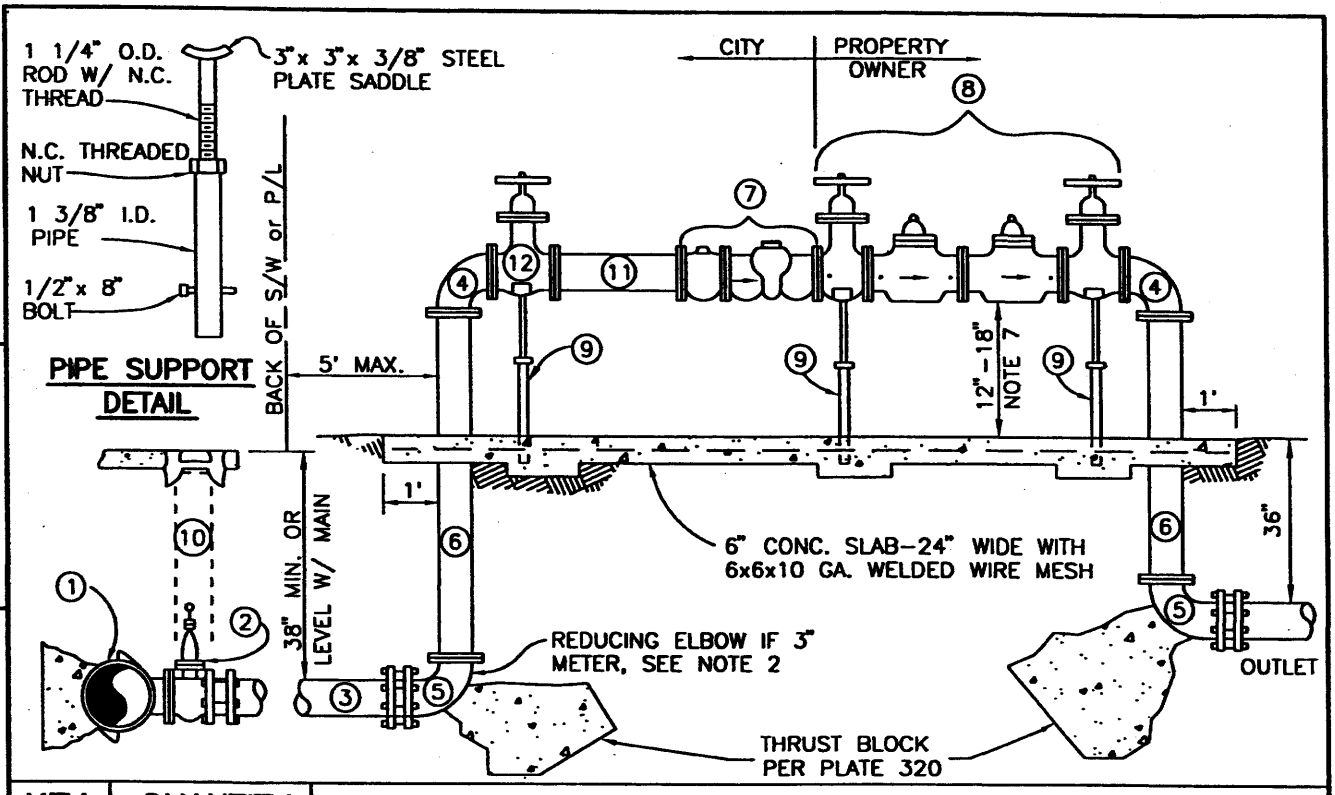
APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 316

SHEET 1 OF 1



KEY	QUANTITY	DESCRIPTION
①	1	ROMAC STAINLESS STEEL TAPPING SLEEVE OR EQUAL
②	1	TAPPING VALVE (RESILIENT SEAT) WITH FLANGE & MECHANICAL JOINT
③	1	C 900 P.V.C. PIPE CLASS 200 OR DUCTILE IRON (4" MIN.)
④	2	90° ELBOW-FLANGED BY FLANGED
⑤	2	90° ELBOW-FLANGED BY MECHANICAL JOINTS
⑥	2	THREADED FLANGED SPOOL (DUCTILE IRON)
⑦	1	METER WITH STRAINER (Meter Type to be Approved by Water Division)
⑧	1	REDUCED PRESSURE BACKFLOW PREVENTER WITH GATE VALVES (U.S.C. APPROVED)
⑨	2	PIPE SUPPORT
⑩	1	CHRISTY G3 VALVE BOX
⑪	1	THREADED FLANGED SPOOL-5 DIAMETERS LONG (DUCTILE IRON)
⑫	1	GATE VALVE

REV. APPR. BY DATE

REV. APPR. BY DATE

NOTES:

1. INSTALLATION AND FITTINGS SHALL HAVE A MIN. OF 12" SIDE CLEARANCE.
2. A 3" METER MUST BE INSTALLED WITH A 4" SERVICE & REDUCING ELBOW, INSTALLED AS SHOWN.
3. ALL FIITINGS SHALL BE THERMO EPOXY OR MORTAR LINED, NO-OX-ID COATED AND P.E. WRAPPED.
4. COMPLETE ASSEMBLY ABOVE GROUND SHALL BE PAINTED BY CONTRACTOR (SEE GENERAL REQUIREMENTS SECTION).
5. INSTALLATION WILL BE INSPECTED AND APPROVED BY CROSS CONNECTION CONTROL PRIOR TO ACTIVATING. (PHONE 805/385-8155)
6. BACKFLOW PREVENTER SHALL BE TESTED BY A CERTIFIED TESTER IMMEDIATELY AFTER THEY ARE INSTALLED
7. CLEARANCES SHALL BE MEASURED TO THE LOWEST PART OF THE DEVICE, INCLUDING RELIEF VALVES.
8. RESTRAINED JOINTS MAY BE SUBSTITUTED IN LIEU OF THURST BLOCKS. RESTRAINED JOINTS SHALL BE MANUFACTURED BY EOMAC INDUSTRIES OR APPROVED EQUAL.
9. PVC INSTALLATIONS SHALL INCLUDE A 12 GAUGE LOCATIING WIRE.

CITY OF Oxnard
Department of Public Works

3" & LARGER, IRRIGATION WATER SERVICE AND METER INSTALLATION

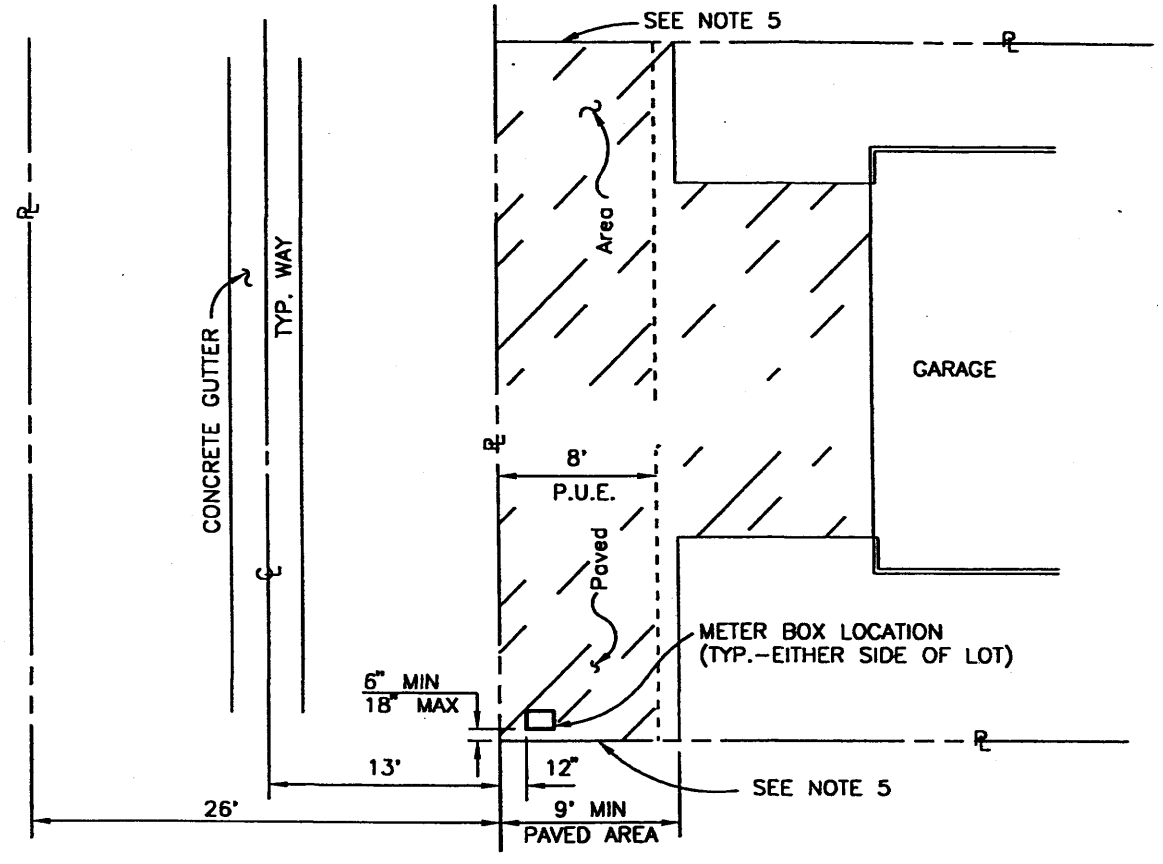
DRAWN: STAFF | CKD.: STAFF

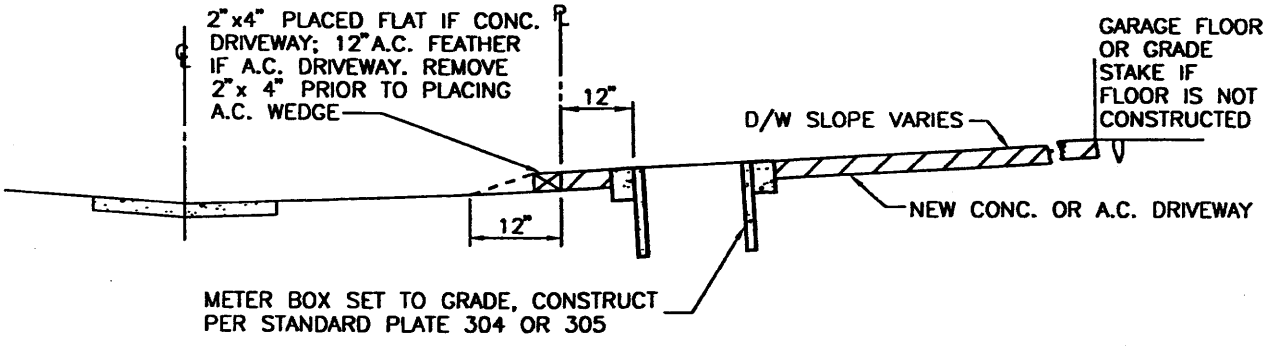
APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 317

SHEET 1 OF 1





NOTES:

1. ALL METER BOXES SHALL HAVE TRAFFIC COVERS.
2. PRIOR TO PAVING DRIVEWAY, CALL P.W. INSPECTOR TO CHECK INSTALLATION.
3. FOR MULTIPLE DWELLINGS, LOCATION OF METER BOX(ES) MAY VARY WITH LANDSCAPE PLANTERS. MULTIPLE METER SHALL BE GROUPED TOGETHER OR MANIFOLDED PER PLATE 319.
4. PLANTER CURBS REQUIRED FOR ALL PLANTERS ADJACENT TO WAYS.
5. MATCH EXISTING DRIVEWAY OR STRAIGHT GRADE TO EXISTING GRADE OF ADJACENT LOT.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard

Department of Public Works

METER BOX INSTALLATION AT BEACH TRACTS

DRAWN: STAFF | CKD.: STAFF

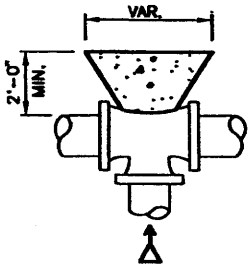
APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 318

SHEET 1 OF 1

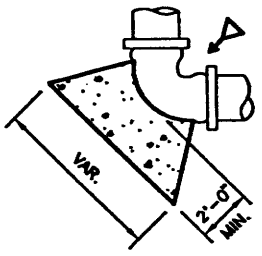
90° TEE



PIPE	2000 P.S.F.
4"	2.0 SQ. FT.
6"	4.0 "
8"	7.0 "
10"	11.0 "
12"	15.0 "
*14"	21.0 "
*16"	27.0 "

CASE 1

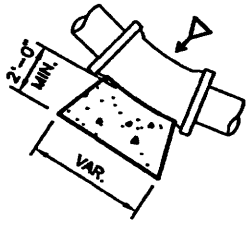
90° BEND



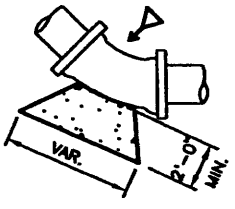
PIPE	2000 P.S.F.
4"	3.0 SQ. FT.
6"	5.0 "
8"	9.0 "
10"	15.0 "
12"	22.0 "
*14"	29.0 "
*16"	38.0 "

CASE 2

22 1/2° BEND



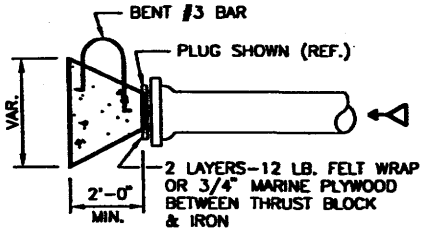
45° BEND



PIPE	2000 P.S.F.	2000 P.S.F.
4"	1.0 SQ. FT.	1.0 SQ. FT.
6"	1.5 "	3.0 "
8"	2.5 "	5.0 "
10"	4.0 "	8.0 "
12"	6.0 "	12.0 "
*14"	8.0 "	16.0 "
*16"	10.0 "	21.0 "

CASE 3

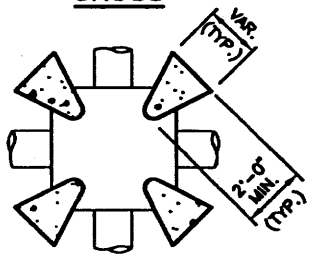
LIVE CAP or PLUG



PIPE	2000 P.S.F.
4"	2.0 SQ. FT.
6"	4.0 "
8"	7.0 "
10"	11.0 "
12"	15.0 "
*14"	21.0 "
*16"	27.0 "

CASE 4

CROSS



PIPE	2000 P.S.F.
4"	1.0/EA. SQ. FT.
6"	2.0/EA. "
8"	3.0/EA. "
10"	5.0/EA. "
12"	9.0/EA. "
*14"	10.0/EA. "
*16"	13.0/EA. "

CASE 5

GENERAL NOTES:

1. UNLESS OTHERWISE NOTED THRUST BLOCK BEARING FACES SHALL BE POURED AGAINST UNDISTURBED SOIL OR APPROVED COMPACTED BACKFILL.
2. AFTER THE TRENCH HAS BEEN BACKFILLED TO THE TOP OF PIPE, AREAS TO BE OCCUPIED BY THRUST BLOCKS SHALL BE RE-EXCAVATED AND SHAPED, AFTER SHAPING SIMPLE PLYWOOD, OR BOX WOOD FORMS SHALL BE INSERTED ADJACENT TO THE VERTICAL NON-PRESSURE BEARING SIDES OF THE MOLD. CITY INSPECTION OF THE MOLD-FORM MUST BE OBTAINED PRIOR TO CASTING THE THRUST BLOCK.
3. THE THRUST BLOCK IS TO BE CAST IN SUCH A MANNER TO CRADDLE THE PIPE OR FITTING. CONC. ENVELOPMENT SHALL BE PERPENDICULAR TO THE LINE OF THRUST.
   * = ENGINEER TO DETERMINE CONFIGURATION
   △ = DIRECTION OF THRUST
4. SELF HAUL CONCRETE MUST BE APPROVED BY INSPECTOR

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CITY OF Oxnard
Department of Public Works

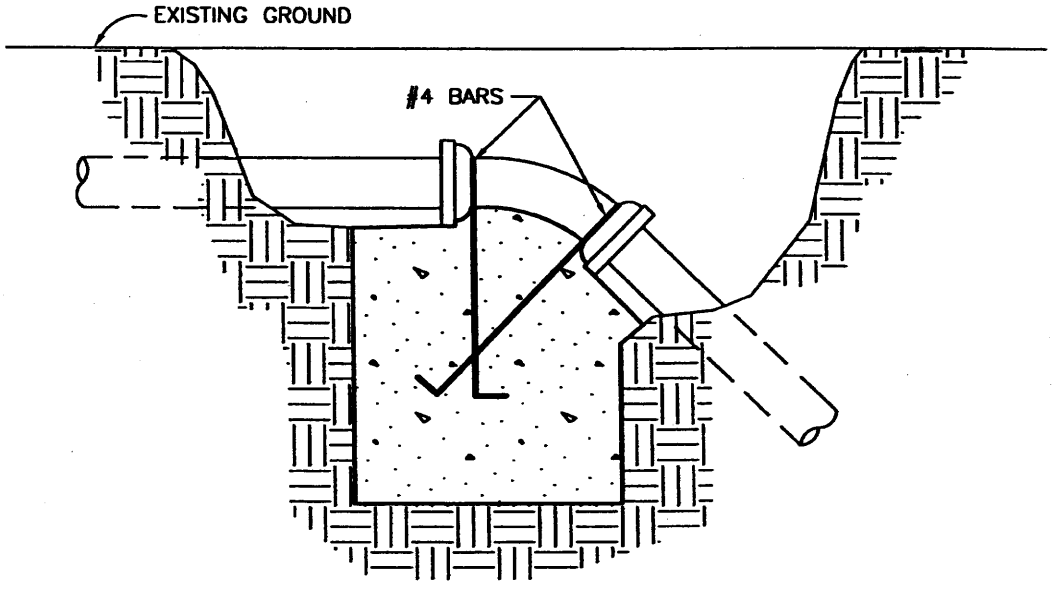
THRUST BLOCKING

DRAWN: STAFF | CKD.: STAFF | APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 320

SHEET 1 OF 2



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REV.	APPR. BY	DATE

CITY OF Oxnard

Department of Public Works

THRUST BLOCKING – VERTICAL BEND

DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Boerman

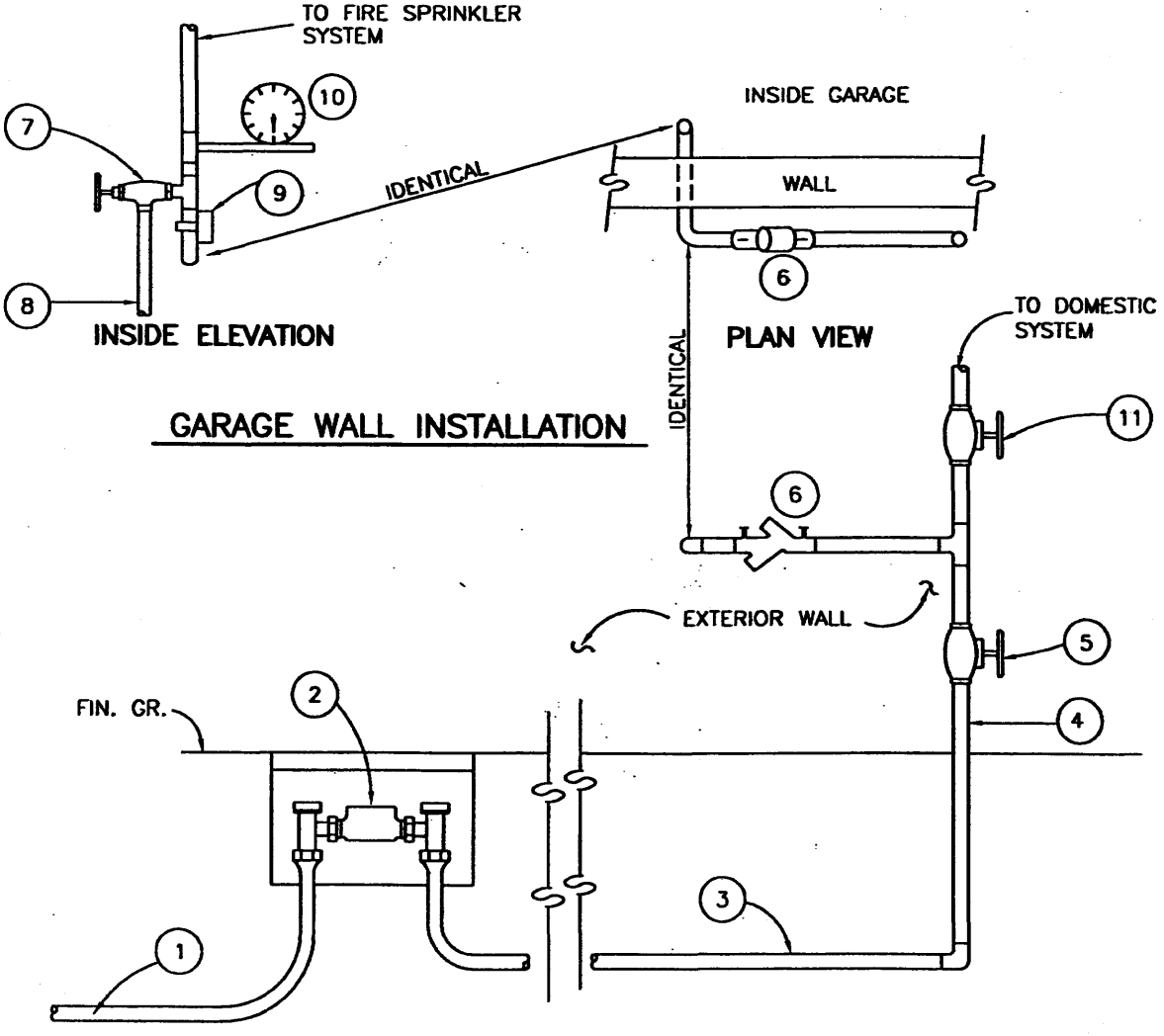
STANDARD PLAN 2002

PLATE 320

SHEET 2 OF 2

NOTES:

1. TO MUNICIPAL WATER SUPPLY PER PUBLIC WORKS PLATE 304 OR 305
2. WATER METER (1" MINIMUM) WITH ATTACHED TAILPIECE:
3. TYPE "M" COPPER OR P.V.C. PIPE (1 1/4" MIN.).
4. TYPE "M" COPPER PIPE.
5. INDICATING MAIN OR CONTROL VALVE (EXTERIOR LOCATION).
6. DOUBLE CHECK ASSEMBLY (USC APPROVED) WITH BALL VALVES (FEBCO 805Y OR APPROVED EQUAL). TEST COCKS TO BE INSTALLED FACING AWAY FROM WALL.
7. MINIMUM 1/2" DRAIN VALVE AND INSPECTORS TEST STATION.
8. DISCHARGE TO EXTERIOR.
9. FLOW SWITCH WIRED TO ALARM BELL WITH RETARD.
10. U.L./F.M. LISTED PRESSURE GUAGE.
11. DOMESTIC SHUT OFF VALVE.
12. BACKFLOW PREVENTERS SHALL BE TESTED BY A CERTIFIED TESTER IMMEDIATELY AFTER INSTALLATION.
13. INSTALLATION SHALL BE INSPECTED AND APPROVED BY CROSS CONNECTION CONTROL PRIOR TO ACVTIVATING. (PHONE 805/385-8155)



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REV.	APPR. BY	DATE

CITY OF Oxnard

Department of Public Works

RESIDENTIAL FIRE LINE SERVICE

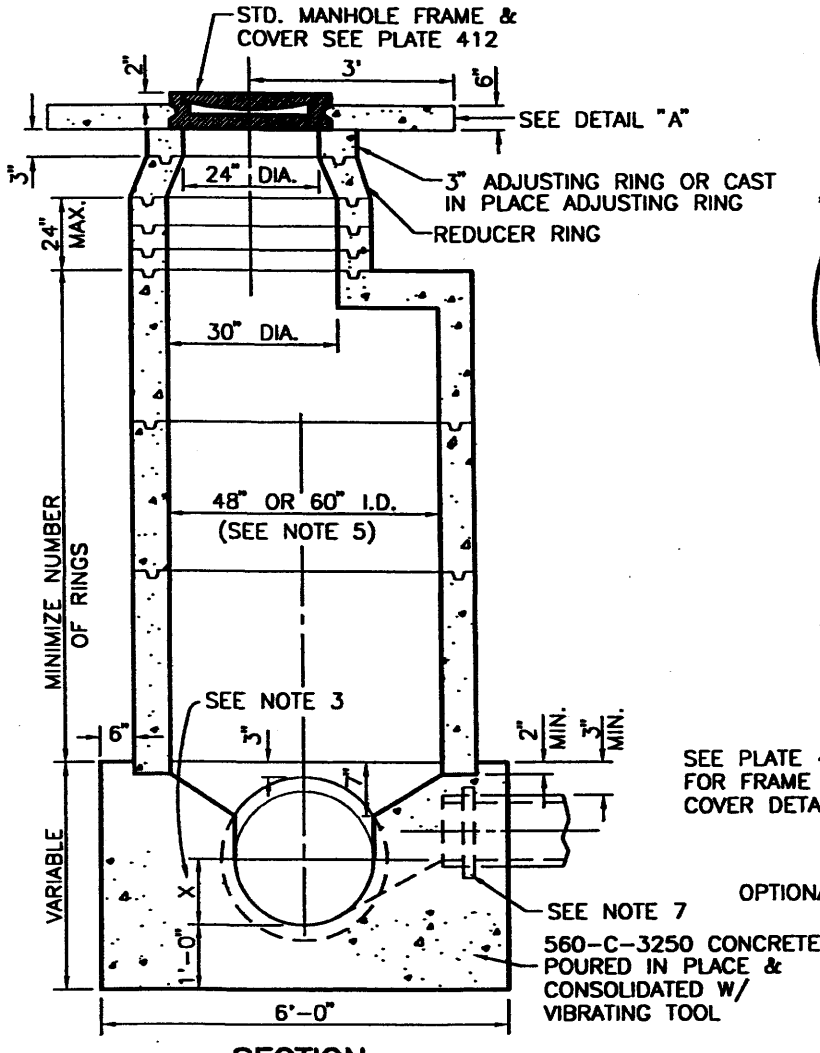
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

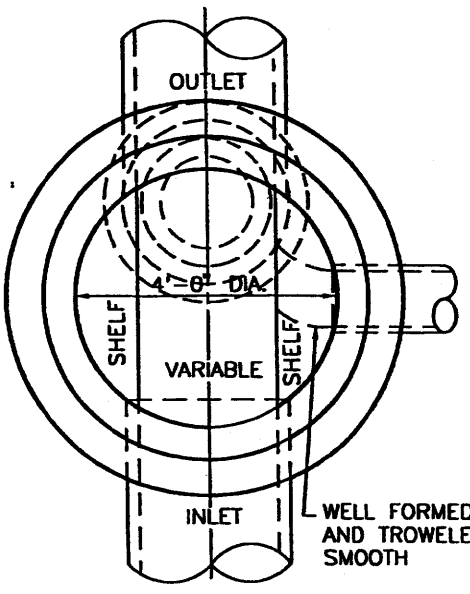
STANDARD PLAN 2002

PLATE 322

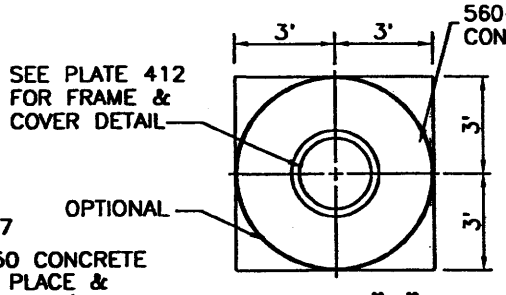
SHEET 1 OF 1



SECTION



PLAN



DETAIL "A"

MANHOLE RING RAISED TO GRADE AFTER PAVING

NOTES:

1. MANHOLE SHAFT SHALL BE LINED WITH DURAPLATE A-LOK OR APPROVED EQUAL. POURED IN PLACE BASE AND ALL OTHER UNLINED CONCRETE SURFACES SHALL HAVE A PROTECTIVE COATING PER SHEET 2.
2. SHAFT THICKNESS=6" MIN. FOR NON-REINFORCED SECTIONS, 5" MIN. FOR REINFORCED SECTIONS.
3. WHEN MAIN SEWER IS 15" DIA. OR LARGER AND LATERAL SEWER IS 10" DIA. OR LESS, X=1/2 DIA. OF THE LARGER.
4. JOINTS SHALL BE TONGUE AND GROOVE TYPE, SIMILAR OR EQUAL TO THAT MANUFACTURED BY PRE-CON PRODUCTS, LTD. OR QUIKSET UTILITY VAULTS, INC., MASTIC SEALANT SHALL BE USED AT ALL JOINTS.
5. USE 48" I.D. M.H. FOR SEWERS UP TO AND INCLUDING, 30" I.D., ALL OTHERS USE 60" I.D.
6. STRAIGHT SIDE SHALL BE PLACED ON OPPOSITE SIDE OF LARGEST INLET.
7. A TIGHT FITTING RUBBER RING IS REQUIRED ON ALL PLASTIC PIPES.
8. SEE PLATE 408 FOR SHALLOW MANHOLES 3' OR LESS IN DEPTH.
9. MANHOLE CYLINDER CONES AND GRADE-RINGS SHALL CONTAIN IPANEX CONCRETE ADMIXTURE FOR WATERPROOFING OR BE CAST WITH TYPE V CEMENT.
10. FORM BOTTOM USING SANDBAGS OR WOOD FORMS.

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REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

PRE-CAST CONCRETE MANHOLE

DRAWN: STAF | CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 400

SHEET 1 OF 2

PROTECTIVE COATING FOR SEWER STRUCTURES

1. DRY SANDBLAST ALL CONCRETE AND MORTAR SURFACES THAT HAVE CURED FOR AT LEAST SEVEN DAYS. THIS SHALL BE THE ONLY METHOD ALLOWED FOR SURFACE PREPARATION.

2. SACK ALL CONCRETE AND MORTAR SURFACES WITH 1:1 MORTAR TO REMOVE ALL SURFACE INDENTATIONS AND IMPERFECTIONS. WHEN MORTAR HAS CURED FOR TWO DAYS, REMOVE EXCESS DUST AND MORTAR WITH A STIFF NON-METALLIC BRUSH.

3. ALL INTERIOR SURFACES OF MANHOLE SHALL BE COATED WITH SANCON 100, SANCON 144, ZEBRON URETHANE COATING, OR SPRAYROQ "SPRAYWALL" POLY-URETHANE (OR APPROVED EQUAL) IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS TO A 125 MIL (⅛") CURED THICKNESS (MIN.).

4. MANHOLE INTERIORS SHALL NOT BE EXPOSED TO TEST LIQUIDS OR SEWAGE UNTIL THE COATING HAS CURED FOR 7 DAYS.

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CITY OF Oxnard

Department of Public Works

PRE CAST CONCRETE MANHOLE

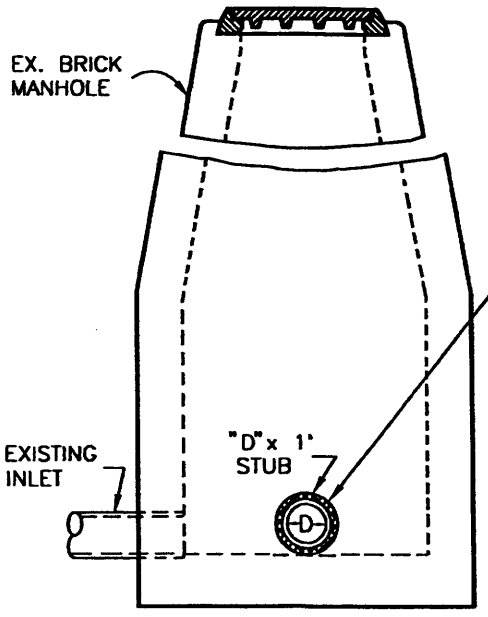
DRAWN: STAF CKD.: STAFF

APPR. Granville M. Bowman

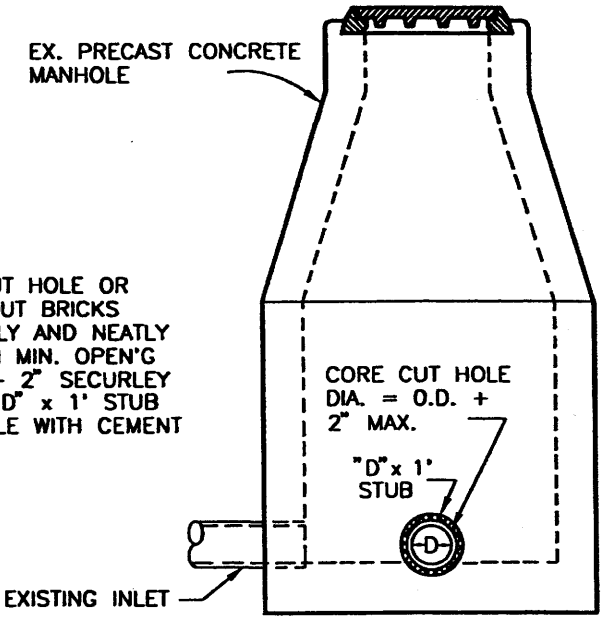
STANDARD PLAN 2002

PLATE 400

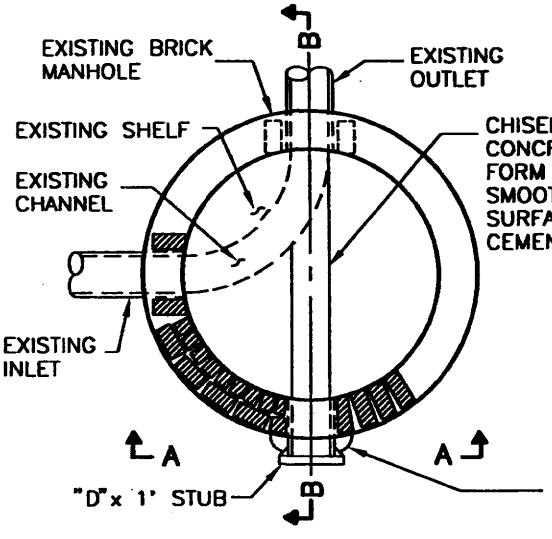
SHEET 2 OF 2



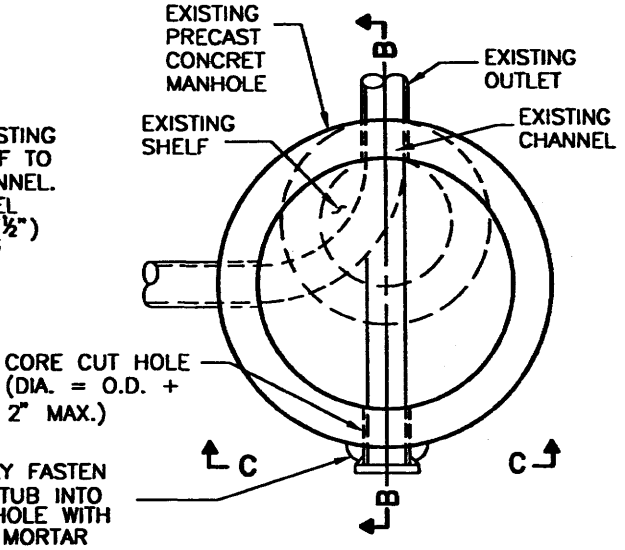
SECTIONAL ELEVATION A–A



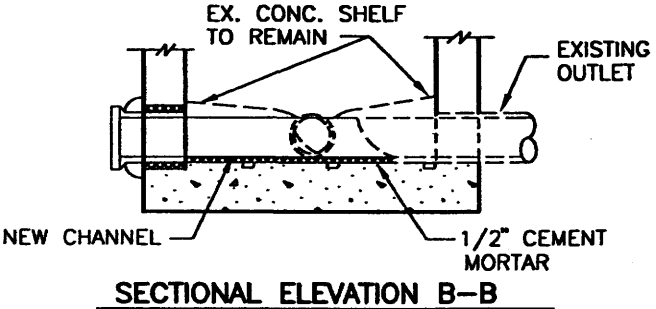
SECTIONAL ELEVATION C–C



SECTIONAL PLAN OF BASE



SECTIONAL PLAN OF BASE



SECTIONAL ELEVATION B–B
CHANNEL BASE

NOTES:

1. INVERT ELEV. OF "D" AT THE INSIDE FACE OF MANHOLE TO BE 0.10' HIGHER THAN EXISTING OUTLET INVERT ELEV.
2. THE CORE CUT HOLE SHALL BE MADE WITH EQUIPMENT SPECIALLY DESIGNED TO CUT A SMOOTH HOLE WITHOUT SPALLING OR DAMAGE TO THE REINFORCING STEEL OR STRUCTURE.
3. "D" TO BE 8 IN. MINIMUM.
4. ALL WORK SHOULD BE UNCOVERED AND CONVENIENT FOR THE INSPECTION.
5. ALL CEMENT MORTAR SHALL BE CLASS "D" PER SUB-SECTION 201-5.1 OF THE SSPWC.

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CITY OF Oxnard
Department of Public Works

MODIFYING EXISTING MANHOLES

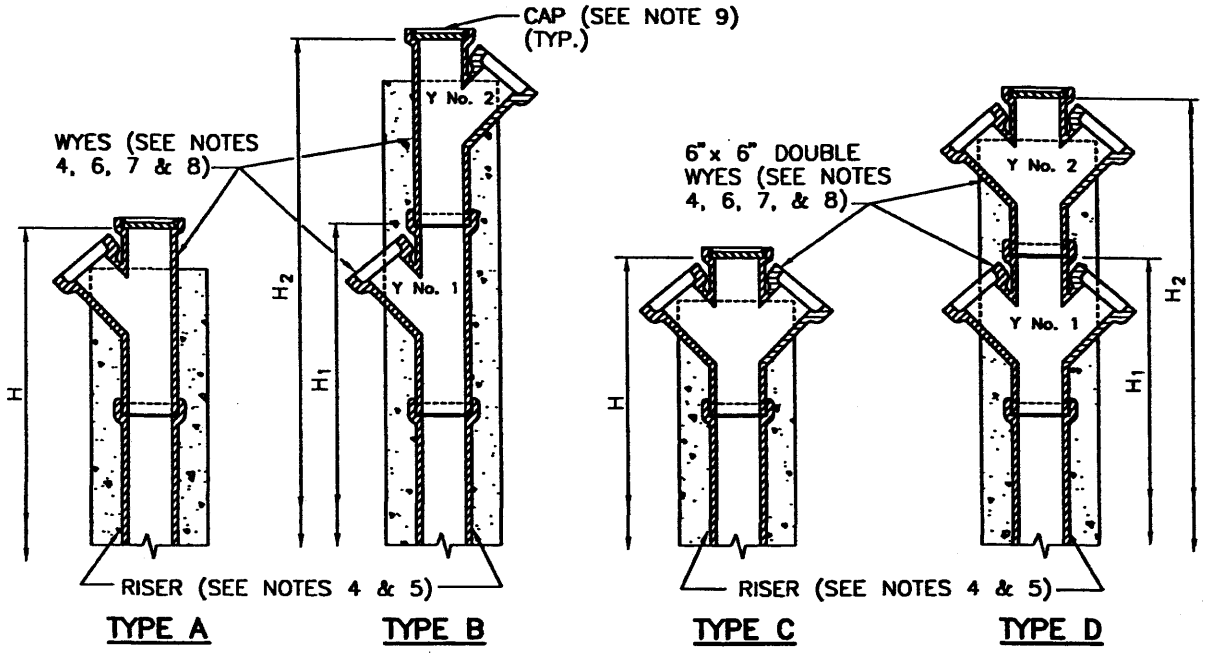
DRAWN: STAFF | CKD.: STAFF B

APPR. Granville M. Bowman

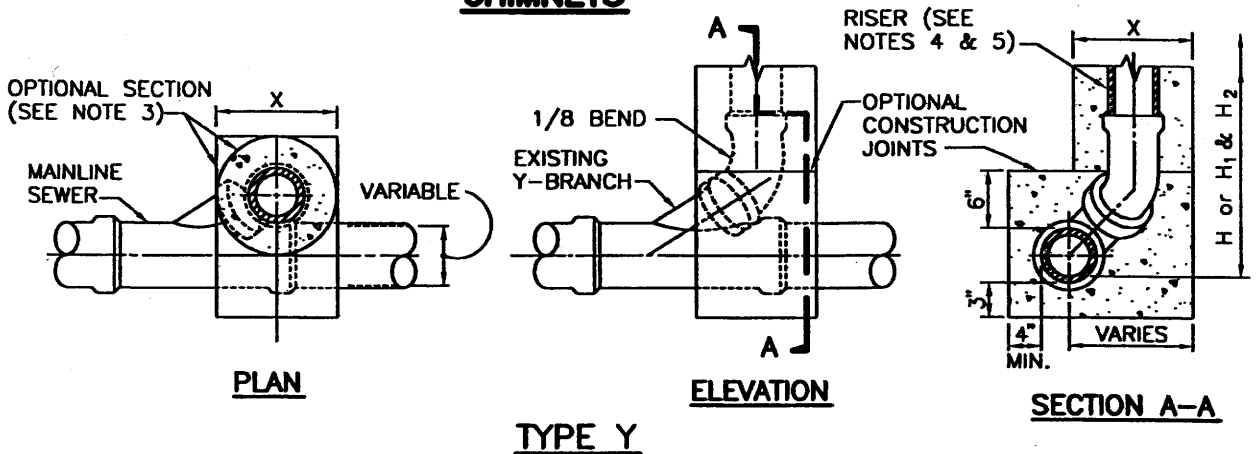
STANDARD PLAN 2002

PLATE 401

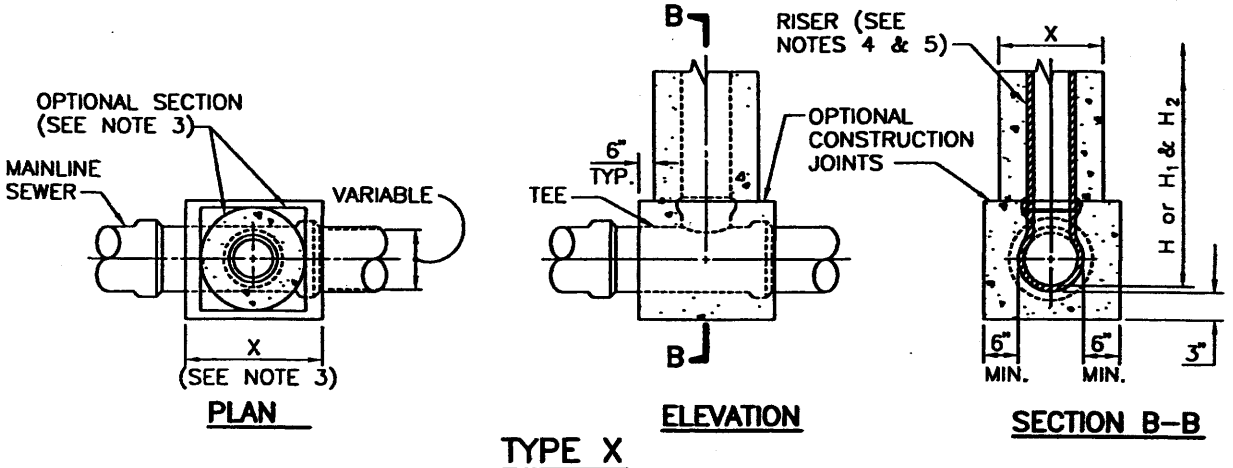
SHEET 1 OF 1



CHIMNEYS



TYPE Y



TYPE X

BASES

CITY OF Oxnard	CHIMNEYS		STANDARD PLAN 2002
	DRAWN: STAFF	CKD.: STAFF/B	PLATE 402
Department of Public Works	APPR. Granville M. Bowman		SHEET 1 OF 2

REV. APPR. BY DATE

NOTES:

1. RISER PIPE AND FITTINGS SHOWN HEREON SHALL, UNLESS INDICATED, BE OF THE SAME MATERIAL AS THE MAIN LINE SEWER, AND MAY BE ANY OF THE FOLLOWING:

   A. VC PIPE
   B. PVC PLASTIC PIPE (SDR 35)

2. THE CONTRACTOR MAY USE A TYPE OF MATERIAL DIFFERENT FROM THE MAIN LINE PROVIDED HE UTILIZES SUITABLE ADAPTERS APPROVED BY THE ENGINEER.

3. CONCRETE FOR BEDDING AND ENCASEMENT FOR PIPE AND FITTING SHALL BE CLASS 420-C-2000. THE VERTICAL CONCRETE ENCASEMENT SHALL BE PLACED UNIFORMLY AROUND THE RISERS IN ORDER TO MAINTAIN PROPER ALIGNMENT AND MAY BE EITHER CIRCULAR OR SQUARE IN CROSS SECTION AS SHOWN HEREON. X=16" FOR 6" CHIMNEYS. X=18" FOR 8" CHIMNEYS.

4. UNLESS OTHERWISE INDICATED ON THE PROJECT PLANS, CHIMNEY RISERS AND WYE BRANCHES SHALL BE 6" DIAMETER.

5. CHIMNEYS ARE SHOWN ON THE PROJECT PLANS BY ABBREVIATION "CH", FOLLOWED BY A LETTER DESIGNATING THE TYPE OF CHIMNEY, A HYPEN, AND THEN ANOTHER LETTER DESIGNATING THE TYPE OF BASE (E.G., CH A-Y). FOR CHIMNEY RISERS OTHER THAN 6", THE RISER SIZE IS INDICATED ON THE PROJECT PLANS PRECEDING THE CHIMNEY TYPE DESIGNATION (E.G., 8" CH A-X). UNLESS OTHERWISE INDICATED, THE TOP OF THE CHIMNEY SHALL BE 5 FEET BELOW THE GROUND SURFACE ABOVE THE MAIN LINE.

6. WHERE DIMENSIONS H, H_1 AND H_2 (THE MAXIMUM VERTICAL DISTANCE FROM THE INVERT OF THE MAIN LINE SEWER TO THE TOP OF EACH WYE) ARE INDICATED ON THE PROJECT PLANS (E.G., H_1=7.8', H_2=9.8'), THESE DIMENSIONS SHALL GOVERN. THESE DIMENSIONS MAY BE SHORTENED WITHIN THE LIMITS OF THE LENGTH OF THE WYE FITTING.

7. UNLESS OTHERWISE INDICATED ON THE PROJECT PLANS, WYE BRANCHES SHALL FACE PERPENDICULAR TO THE CENTER LINE OF THE MAIN LINE SEWER.

8. WYE BRANCHES ON TYPE "A" CHIMNEYS NOT JOINED TO HOUSE CONNECTION SEWERS SHALL BE INSTALLED AS INDICATED ON THE PROJECT PLANS.

9. ALL RISERS, CHIMNEY BASES WITHOUT RISERS, AND UNCONNECTED BRANCHES SHALL BE SEALED WITH A CAP AND 1" THICK TYPE "F" MORTAR AROUND THE CIRCUMFERENCE OF THE CAP.

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REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

CHIMNEYS

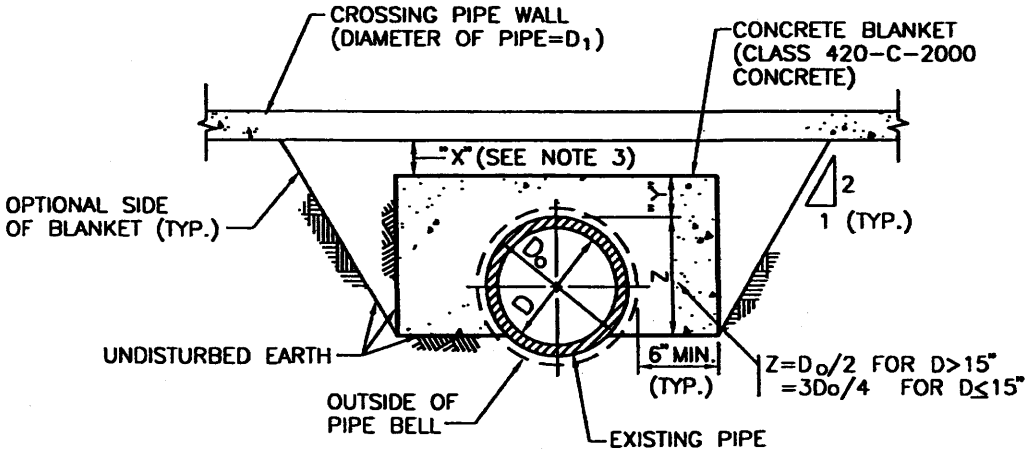
DRAWN: STAFF | CKD.: STAFF LB

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 402

SHEET 2 OF 2



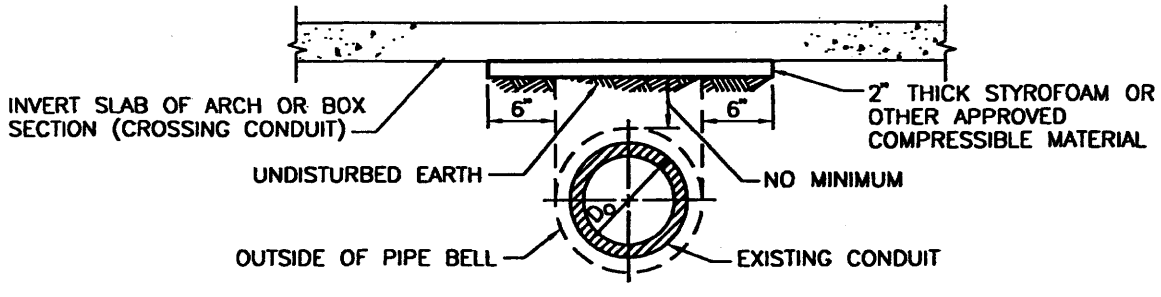
CONCRETE BLANKET

(FOR EXISTING PIPES CROSSED OVER BY A NEW PIPE)

NOTES:

1. CONCRETE BLANKET IS REQUIRED WHEN THE CLEARANCE BETWEEN THE TOP OF THE EXISTING PIPE AND THE BOTTOM OF THE CROSSING PIPE IS LESS THAN 18".
2. "Y"=D/6(6" MIN.) WHERE THE CLEARANCE BETWEEN THE TOP OF THE EXISTING PIPE AND THE BOTTOM OF THE CROSSING PIPE IS LESS THAN "Y", THE CONCRETE SHALL BE PLACED BETWEEN THE PIPES AND AROUND THE SIDES OF THE CROSSING PIPE UP TO A LEVEL EQUAL TO "Y" ABOVE THE EXISTING PIPE, OR AS REQUIRED BY NOTE 3 BELOW, WHICHEVER IS HIGHER.
3. "X"=D/12, MINIMUM, TO PROVIDE BEDDING MATERIAL FOR CROSSING CONDUIT. WHEN "X" IS LESS THAN THIS MINIMUM, THE ENTIRE TOP SURFACE OF THE BLANKET SHALL BE RAISED TO MAKE CONTACT WITH THE LOWER 90° OF THE CROSSIING PIPE.
4. THE BLANKET SHALL EXTEND LONGITUDINALLY TO THE FIRST JOINT BEYOND THE TRENCH EXCAVATION AT EACH END OF THE BLANKET, EXCEPT THAT THE BLANKET NEED NOT BE EXTENDED MORE THAN 4 FEET BEYOND THE TRENCH.
5. WHENEVER A PIPE BELL IS ENCOUNTERED WITHIN THE LIMITS OF THE BLANKET, ALL DIMENSIONS SHALL REFER TO THE BELL.

REV.	APPR. BY	DATE



COMPRESSIBLE BLANKET

(FOR EXISTING PIPES CROSSED OVER BY A NEW BOX OR ARCH)

NOTES:

1. COMPRESSIBLE BLANKET IS REQUIRED WHEN THE CLEARANCE BETWEEN THE TOP OF THE EXISTING PIPE AND THE BOTTOM OF THE CROSSING CONDUIT (BOX OR ARCH) IS LESS THAN 18".
2. THE BLANKET SHALL EXTEND LONGITUDINALLY FOR THE FULL CROSSING CONDUIT TRENCH WIDTH.

REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

BLANKET PROTECTION FOR PIPES

DRAWN: STAFF CKD.: STAFF

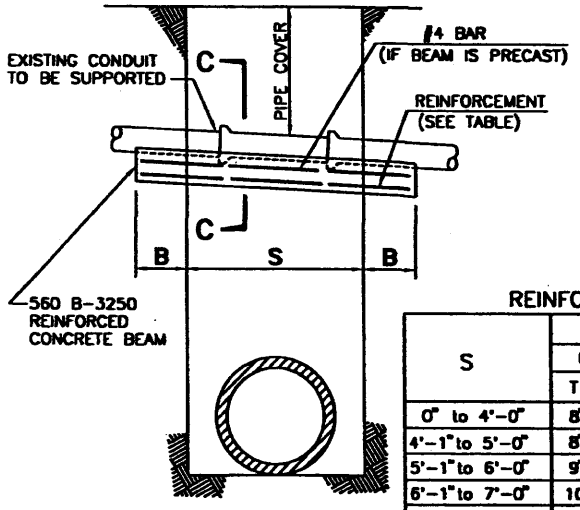
APPR. Granville M. Bowman

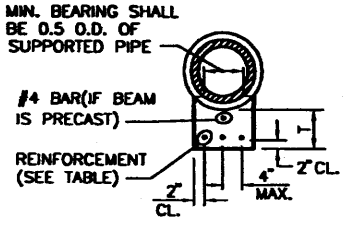
STANDARD PLAN 2002

PLATE 403

SHEET 1 OF 1

CASE 1
REINFORCED CONCRETE BEAM
FOR 4" TO 24" I.D. PIPE





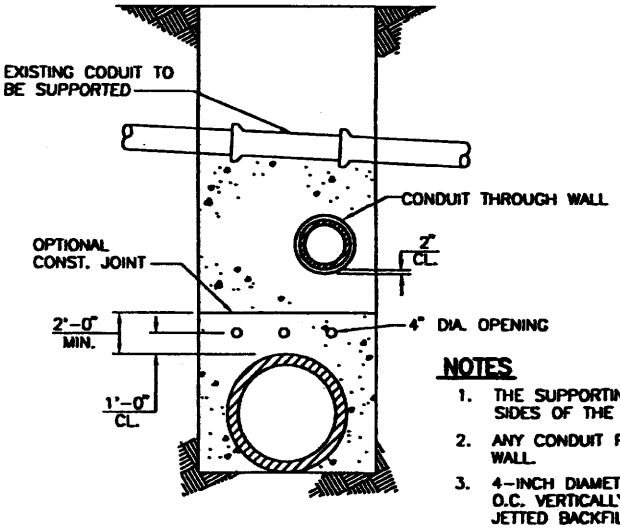
SECTION C-C

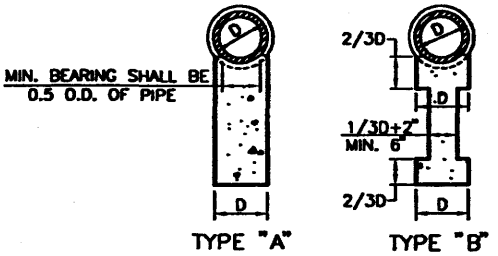
NOTES
1. WIDTH OF BEAM SHALL EQUAL O.D. OF SUPPORTED PIPE. MINIMUM WIDTH SHALL BE 6".
2. IF SUPPORTED PIPE IS BEDDED IN CONCRETE, BEAM WIDTH SHALL BE EQUAL BEDDING WIDTH.
3. IF BEAM IS PRECAST, ENDS OF BEAM SHALL BE FULLY BEDDED IN 420-C-2000 CONCRETE FOR LENGTH "B". THE BEDDING SHALL HAVE A MINIMUM THICKNESS OF 4". CLASS "C" MORTAR SHALL BE PLACED BETWEEN TOP OF BEAM AND SUPPORTED PIPE TO PROVIDE MINIMUM BEARING SHOWN.
4. THIS CASE IS PERMITTED ONLY IF THE TRENCH WALLS ARE FIRM AND UNYIELDING.
5. MAXIMUM SPACING OF BARS SHALL BE 4" O.C.

REINFORCED CONCRETE BEAM (DIMENSIONS AND REINFORMENT)

S	PIPE COVER														
	0' to 8'-0"			8'-1" to 12'-0"			12'-1" to 16'-0"			16'-1" to 20'-0"			20'-1" to 25'-0"		
	T	BARS	B	T	BARS	B	T	BARS	B	T	BARS	B	T	BARS	B
0" to 4'-0"	8"	#4	1'-6"	8"	#4	1'-6"	9"	#4	1'-6"	10"	#4	1'-6"	10½"	#4	1'-6"
4'-1" to 5'-0"	8"	#4	1'-6"	9½"	#4	1'-6"	11"	#4	1'-6"	12"	#4	1'-6"	12½"	#5	1'-6"
5'-1" to 6'-0"	9"	#4	1'-6"	11"	#5	1'-6"	12½"	#5	1'-6"	13½"	#5	2'-0"	14½"	#5	2'-0"
6'-1" to 7'-0"	10"	#5	1'-6"	12½"	#5	2'-0"	14½"	#5	2'-0"	15½"	#5	2'-0"	16½"	#6	2'-0"
7'-1" to 8'-0"	11"	#5	1'-6"	14"	#5	2'-0"	16"	#5	2'-0"	17½"	#6	2'-6"	19"	#6	2'-6"
8'-1" to 9'-0"	12½"	#5	2'-0"	15½"	#6	2'-6"	17½"	#6	2'-6"	19½"	#6	2'-6"	21"	#6	2'-6"
9'-1" to 10'-0"	13½"	#6	2'-0"	17"	#6	2'-6"	19½"	#6	3'-0"	21½"	#6	3'-0"	23"	#6	3'-0"
10'-1" to 11'-0"	14½"	#6	2'-6"	18½"	#6	3'-0"	21"	#6	3'-0"	23½"	#6	3'-0"	25"	#7	3'-0"
11'-1" to 12'-0"	15½"	#6	2'-6"	20"	#6	3'-0"	23"	#7	3'-6"	25½"	#7	3'-6"	27"	#7	3'-6"
12'-1" to 13'-0"	17"	#6	3'-0"	21½"	#7	3'-6"	24½"	#7	3'-6"	27½"	#7	4'-0"	29"	#7	4'-0"
13'-0" to 14'-0"	18"	#7	3'-0"	23"	#7	3'-6"	26½"	#7	4'-0"	29½"	#7	4'-0"	33½"	#7	4'-0"
14'-1" to 15'-0"	19"	#7	3'-0"	25"	#7	4'-0"	28"	#7	4'-0"	31½"	#7	4'-6"			
15'-1" to 16'-0"	20½"	#7	3'-6"	26½"	#7	4'-0"	30"	#8	4'-6"						
16'-1" to 17'-0"	21½"	#7	3'-6"	28"	#8	4'-6"									
17'-1" to 18'-0"	22½"	#8	4'-0"	29½"	#8	4'-6"									

CASE 2
CONCRETE WALL





WALL SECTION

NOTES
1. THE SUPPORTING WALL SHALL HAVE A FIRM BEARING ON THE SUBGRADE AND AGAINST THE SIDES OF THE EXCAVATION.
2. ANY CONDUIT PASSING THROUGH THE WALL SHALL HAVE 2-INCH CLEARANCE FROM THE WALL.
3. 4-INCH DIAMETER OPENINGS THROUGH THE WALL AT 2 FT. O.C. HORIZONTALLY AND AT 5 FT. O.C. VERTICALLY SHALL BE PROVIDED TO PREVENT UNEQUAL PRESSURE RESULTING FROM JETTED BACKFILL.
4. IF SUPPORTED PIPE IS BEDDED IN CONCRETE, MINIMUM THICKNESS OF WALL SHALL EQUAL BEDDING WIDTH.
5. BRICK WITH MORTAR JOINTS MAY BE USED IN LIEU OF CONCRETE FOR WALLS UP TO 5 FT. IN HEIGHT OR LENGTH.

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Department of Public Works

SUPPORTS FOR CONDUIT ACROSS TRENCHES

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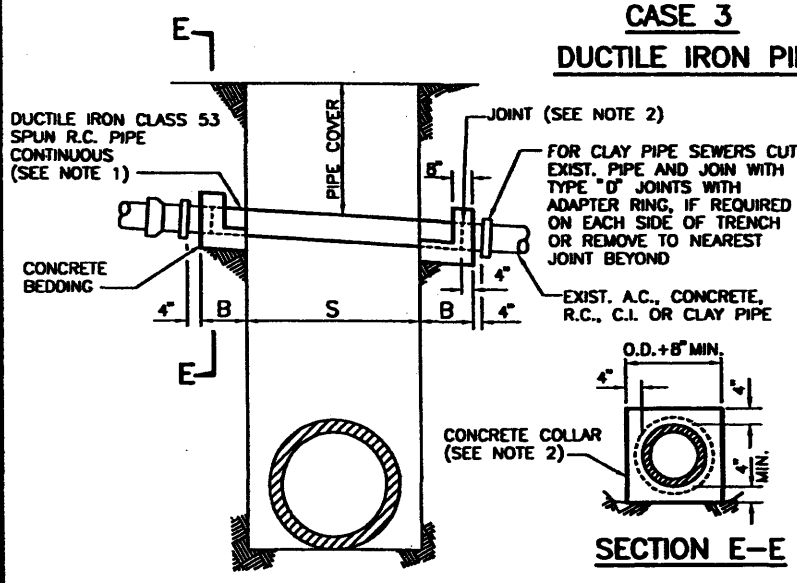
APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 404

SHEET 1 OF 2

CASE 3
DUCTILE IRON PIPE



SECTION E-E

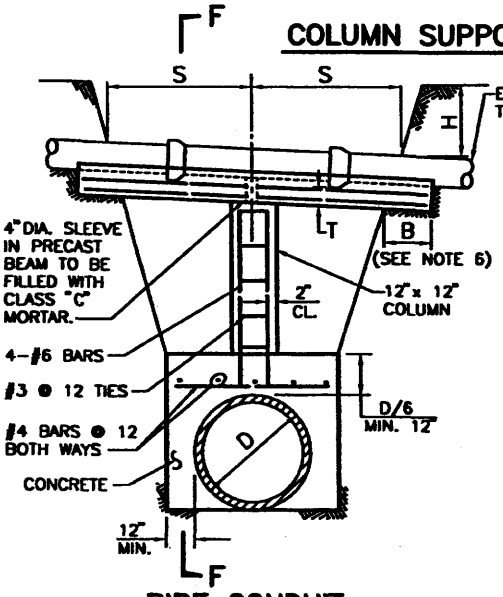
ALLOWABLE SPANS AND MIN. REQUIRED BEARING FOR DUCTILE IRON PIPE

DEPTH OF COVER	6" PIPE		8" PIPE		10" PIPE	
	S(Max)	B(Min)	S(Max)	B(Min)	S(Max)	B(Min)
0' TO 8'-0"	11'-0"	1'-6"	13'-6"	1'-6"	16'-6"	2'-0"
8'-1" to 16'-0"	8'-0"	1'-6"	10'-0"	2'-0"	12'-0"	2'-6"
16'-1" to 25'-0"	7'-0"	1'-6"	9'-0"	2'-0"	10'-6"	2'-6"

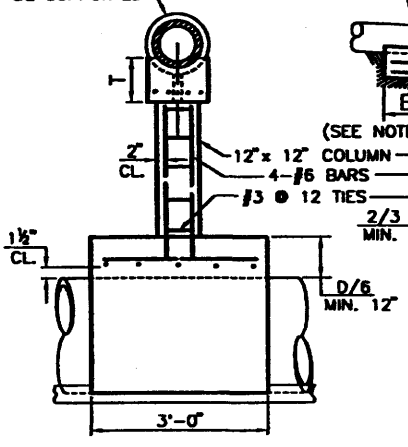
NOTES

1. 2000-D SPUN R.C. PIPE OF SAME DIAMETER AS THE EXISTING PIPE MAY BE USED ONLY WHEN THE EXISTING PIPE IS A.C., CONCRETE OR R.C. PIPE AND THE TRENCH WIDTH IS 5'-0" OR LESS.
2. THE CONCRETE COLLAR JOINT SHALL BE USED FOR JOINTS IN STORM DRAIN PIPE.

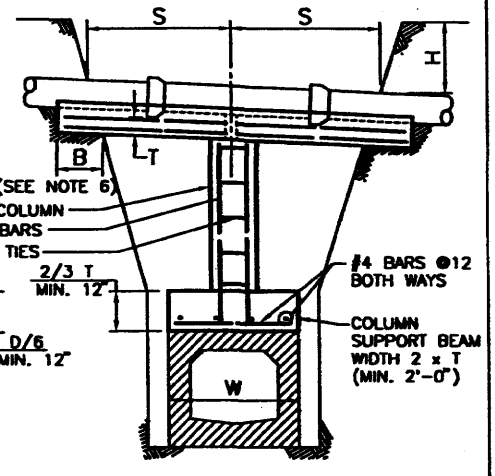
CASE 4
COLUMN SUPPORT WITH REINFORCED CONCRETE BEAM



PIPE CONDUIT



SECTION F-F



R.C. BOX CONDUIT

NOTES

1. SPAN "S" SHALL BE MAXIMUM 18 FT. FOR EARTH COVER 8 FT. OR LESS, 12 FT. FOR EARTH COVER 16 FT. OR LESS, AND 10 FT. FOR OVER 16 FT. EARTH COVER.
2. ALL CONCRETE SHALL BE 560-B-3250.
3. WHEN THE PIPE TO BE SUPPORTED CROSSES THE TRENCH ON A SKEW ANGLE, THE WALL OR BEAM WHICH SUPPORTS THE COLUMN SHALL BE CONSTRUCTED AT RIGHT ANGLE TO THE TRENCH.
4. SUPPORT SYSTEM MAY BE USED OVER CAST-IN-PLACE STRUCTURES.
5. BACKFILL ABOVE THE SUPPORT BEAM SHALL NOT BE PLACED UNTIL 72 HOURS AFTER THE SUPPORT IS POURED.
6. REINFORCED CONCRETE BEAM DIMENSIONED AND REINFORCED PER TABLE UNDER CASE 1.

GENERAL NOTES

1. "S" IS THE SPAN OF THE PIPE SUPPORT ALONG IT'S CENTERLINE.
2. "B" IS THE LENGTH OF BEARING OF THE SUPPORT AGAINST UNDISTURBED EARTH MEASURED ALONG THE PIPE CENTERLINE.
3. CASE 2 SHALL BE USED FOR PARTIAL CROSSINGS, EXCEPT THAT WHERE THE DISTANCE FROM A SEWER CHIMNEY TO UNDISTURBED EARTH IS 18 INCHES OR LESS, THE TRENCH BACKFILL MAY BE DENSIFIED TO 18 INCHES ABOVE A HOUSE CONNECTION SEWER AND THEN RE-EXCAVATED FOR THE PIPE INSTALLATION.
4. ANY SEWER OR STORM DRAIN EXPOSED OR PARTIALLY EXPOSED IN A TUNNEL EXCAVATION SHALL BE SUPPORTED WITH A WALL CASE 2.
5. IF BEDDING IS REMOVED FROM THE EXISTING PIPE THAT WILL REMAIN IN PLACE, THE PIPE SHALL BE EMBEDDED WITH CONCRETE.
6. UNLESS OTHERWISE INDICATED, CONCRETE SHALL BE CLASS 420-C-2000.

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Department of Public Works

SUPPORTS FOR CONDUIT ACROSS TRENCHES

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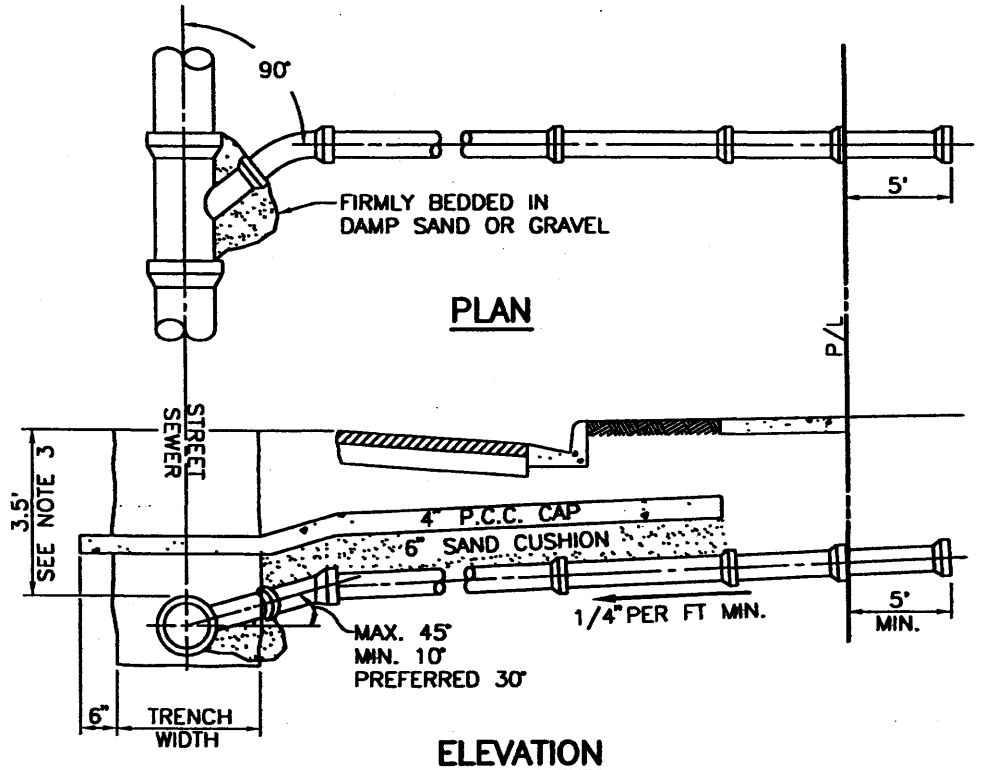
STANDARD PLAN 2002

PLATE 404

SHEET 2 OF 2



NOTES:

1. ON EXISTING SEWER, INSTALL APPROVED STANDARD SADDLE OR PREMOLDED "Y" AND STRONGBACK CALDER COUPLING. THE MAIN SHALL BE CORED WHEN USING A SADDLE.
2. IF SLOPE EXCEEDS 45°, SEE PLATE 406.
3. WHEN COVER OVER EXISTING SEWER MAIN OR LATERAL IS LESS THAN 3.0', A P.C.C. CAP IS REQUIRED TO TRENCH WIDTH PLUS 6" EACH SIDE OF TRENCH ON MAIN AND LATERALS.
4. INSTALL A PREFORMED "Y" OR MANHOLE IF THE SERVICE LATERAL IS LARGER THAN 1/2 I.D. OF THE MAIN SEWER I.D..
5. MARK "S" ON CURB FACE.
6. LATERAL SHALL BE PERPENDICULAR TO THE MAIN WHENEVER POSSIBLE.
7. PIPE MATERIAL FOR LATERAL WITHIN STREET RIGHT-OF-WAY SHALL BE V.C.P. OR PVC (SDR 35).

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CITY OF Oxnard
Department of Public Works

HOUSE CONNECTION (6" & BELOW)

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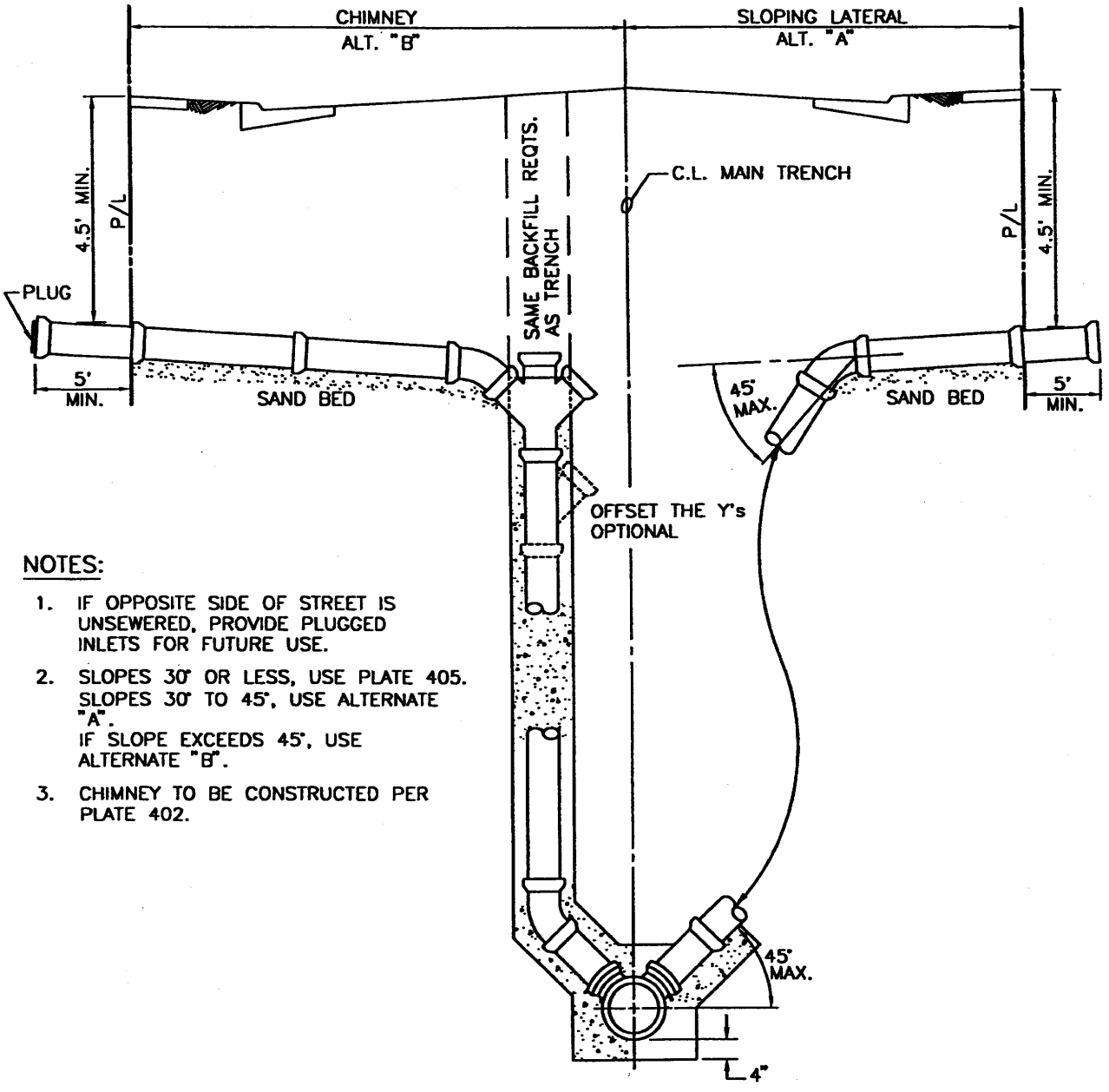
STANDARD PLAN 2002

PLATE 405

SHEET 1 OF 1



ELEVATION

NOTES:

1. IF OPPOSITE SIDE OF STREET IS UNSEWERED, PROVIDE PLUGGED INLETS FOR FUTURE USE.
2. SLOPES 30° OR LESS, USE PLATE 405.
   SLOPES 30° TO 45°, USE ALTERNATE "A".
   IF SLOPE EXCEEDS 45°, USE ALTERNATE "B".
3. CHIMNEY TO BE CONSTRUCTED PER PLATE 402.

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Department of Public Works

STEEP SERVICE LATERAL

DRAWN: STAFF | CKD.: STAFF LB

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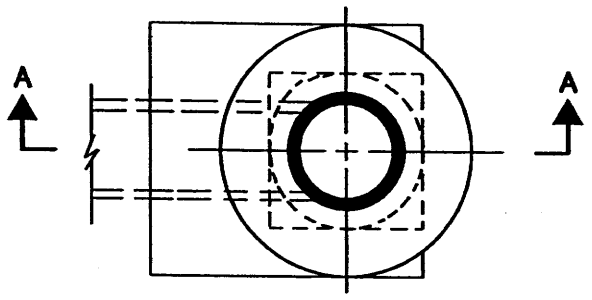
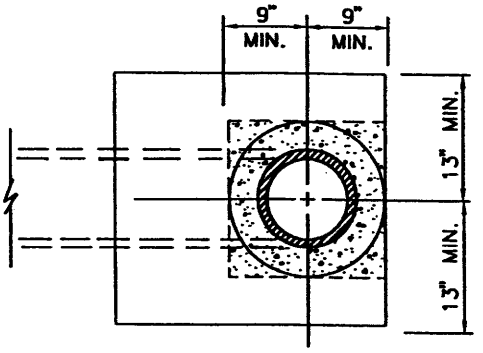
STANDARD PLAN 2002

PLATE 406

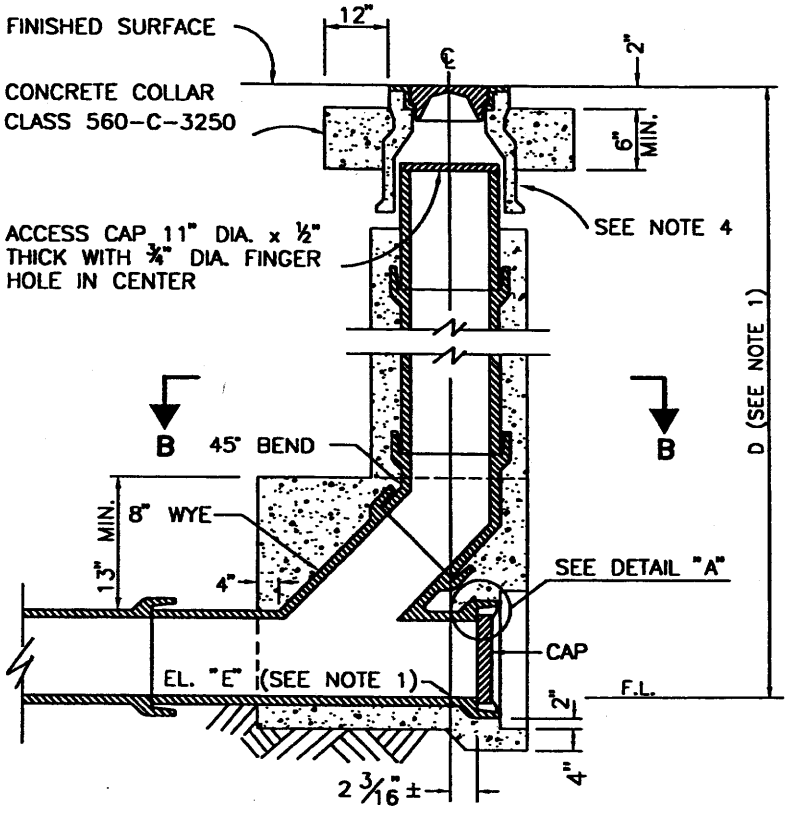
SHEET 1 OF 1



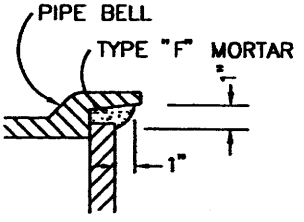
PLAN



SECTION B–B



SECTION A–A



DETAIL "A"

NOTES:

1. SEE PROJECT PLANS FOR VALUES OF DIMENSION "D" AND ELEVATION "E".
2. PIPE AND FITTINGS EXCEPT, AS OTHERWISE SHOWN HEREON, SHALL BE OF THE SAME MATERIAL AS THE SEWER UNLESS APPROVED ADAPTORS ARE UTILIZED AND MAY BE ANY OF THE FOLLOWING:
   A. VC PIPE
   B. PVC PLASTIC PIPE (SDR 35).
3. PIPES AND FITTINGS SHALL BE PROPERLY ALIGNED AND MAINTAINED WHILE CONCRETE IS BEING PLACED AND ALLOWED TO HARDEN. JOINTS FOR PIPES AND FITTINGS SHALL BE MADE PRIOR TO PLACING CONCRETE. CONCRETE FOR BEDDING, ENCASEMENT, AND WALL SUPPORT FOR PIPES AND FITTINGS SHALL BE PLACED UNIFORMLY AROUND THE PIPE AND FITTINGS AS SHOWN HEREON TO MAINTAIN PROPER ALIGNMENT AND SHALL BE CLASS 420–C–2000.
4. THE FRAME AND COVER SHALL BE MADE OF GRAY CAST IRON AS MANUFACTURED BY ALHAMBRA FOUNDRY A–1241 OR APPROVED EQUAL OR CHRISTY 3G GATE VALVE BOX MARKED SEWER.
5. THE CONTRACTOR, AT HIS OPTION, MAY PLACE EITHER A CIRCULAR OR SQUARE CONCRETE PIPE WALL SUPPORTS AS SHOWN HEREON.

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Department of Public Works

TERMINAL CLEANOUT

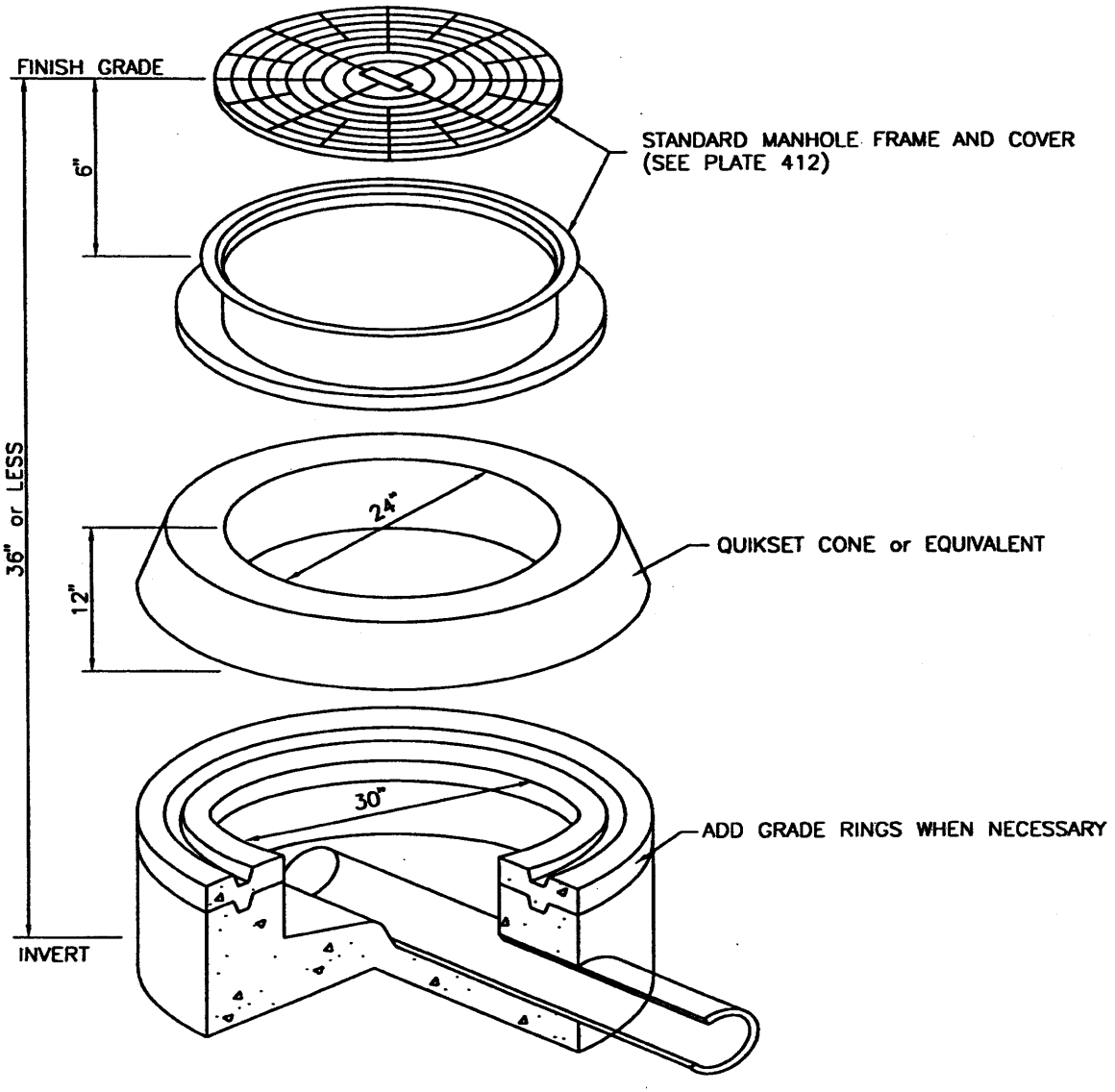
DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 407

SHEET 1 OF 1



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NOTES:

1. SEE PLATE 400 FOR ADDITIONAL NOTES NOT MODIFIED BY THIS PLATE
2. USE CONCENTRIC CONES UNLESS OTHERWISE SPECIFIED.

CITY OF Oxnard
Department of Public Works

SHALLOW MANHOLE

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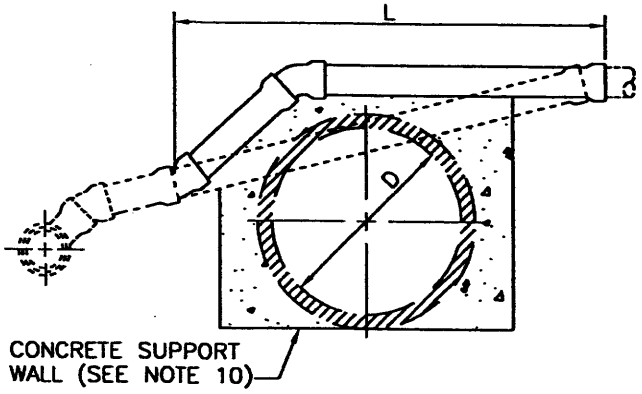
APPR. Granville M. Bowman

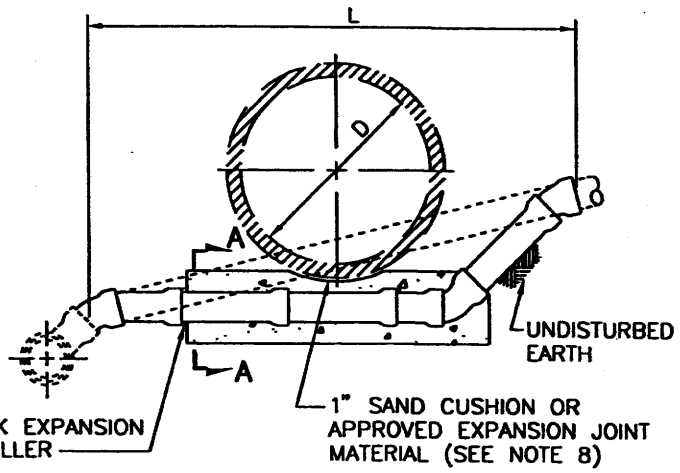
STANDARD PLAN 2002

PLATE 408

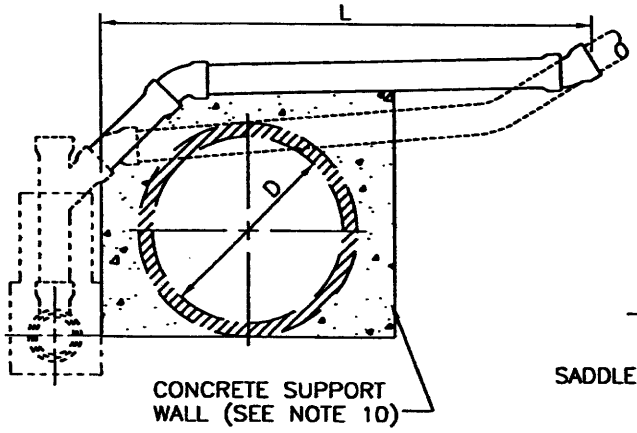
SHEET 1 OF 1



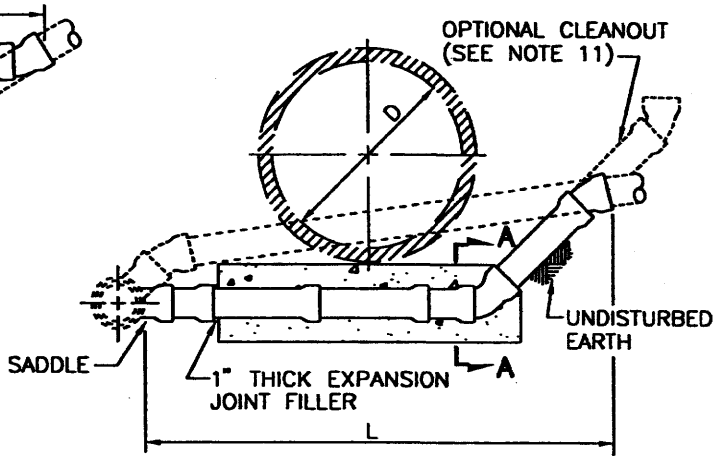
CASE A



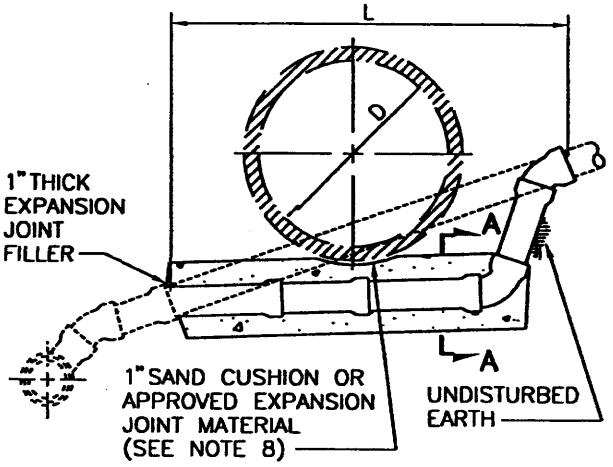
CASE D



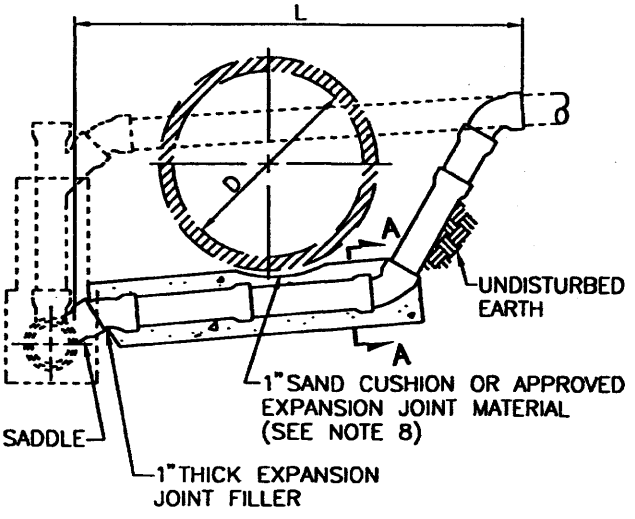
CASE B



CASE E



CASE C



CASE F

STORM DRAIN LINE (GRAVITY) & SEWER LINE (GRAVITY)

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CITY OF Oxnard

Department of Public Works

HOUSE CONNECTION REMODELING

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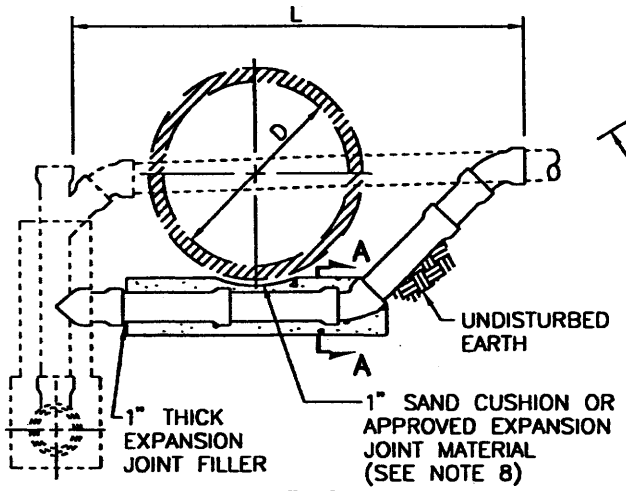
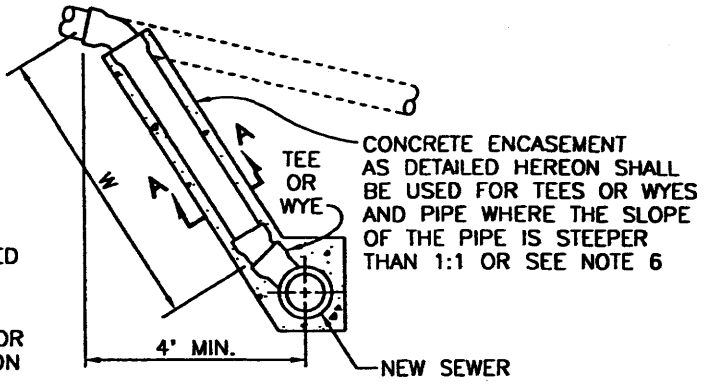
STANDARD PLAN 2002

PLATE 409

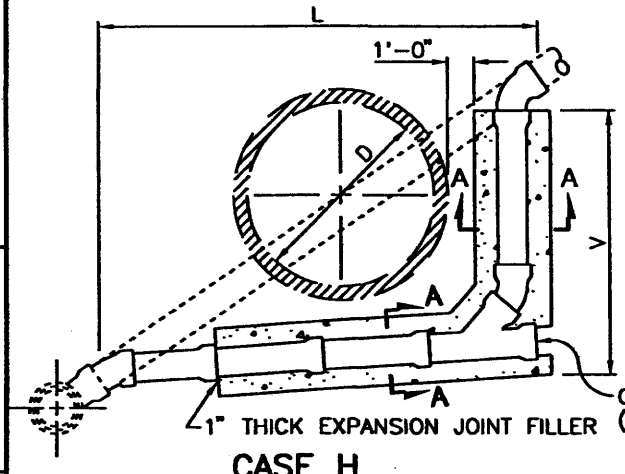
SHEET 1 OF 3



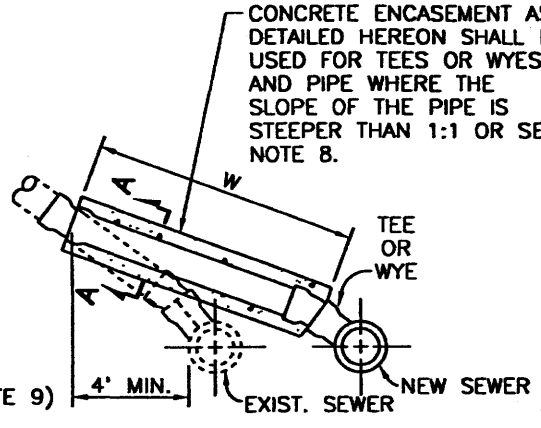
CASE G



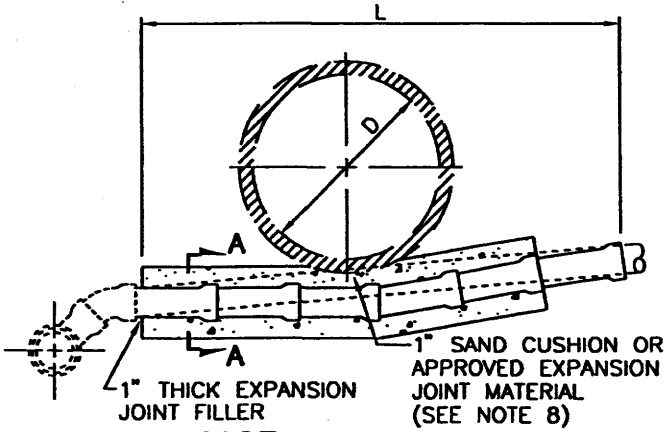
CASE R



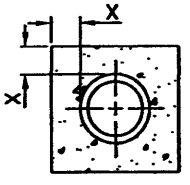
CASE H



CASE S



CASE K



NOMINAL DIA. OF PIPE (INCHES)	MAXIMUM DIMENSIONS X (INCHES)
6	3
8	4
10	5
12	6

SECTION A–A
CONCRETE ENCASEMENT DETAILS
(SEE NOTE 5)

STORM DRAIN LINE (GRAVITY) & SEWER LINE (GRAVITY)

CITY OF Oxnard
Department of Public Works

HOUSE CONNECTION REMODELING

DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowmon

STANDARD PLAN 2002

PLATE 409

SHEET 2 OF 3

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NOTES:

1. EXCEPT AS OTHERWISE INDICATED HEREON OR ON THE PROJECT PLANS, ALL HOUSE CONNECTION REMODELING SHALL CONFORM TO THE APPLICABLE PORTIONS OF STANDARD PLATE 405 HOUSE CONNECTION SEWER.
2. SEE PROJECT PLANS FOR VALUES OF D, L, V AND W. (DIMENSION L IS THE HORIZONTAL LENGTH OF THE HOUSE CONNECTION REMODELING).
3. EXISTING SEWERS ARE INDICATED BY DASHED LINES. HOUSE CONNECTION SEWERS TO BE CONSTRUCTED ARE INDICATED BY SOLID LINES AND SHALL BE OF THE SAME MATERIAL AS THE EXISTING SEWER. THE CONTRACTOR MAY CONSTRUCT THE SEWER WITH OTHER MATERIAL ALLOWED PER STANDARD PLATE 405 PROVIDED HE UTILIZES APPROVED ADAPTORS.
4. 1/16 (22½°) OR 1/8 (45°) BENDS SHALL BE USED TO REMODEL OR CONSTRUCT ANY SEWER ON A CURVE OR AT ANY CHANGE IN ALIGNMENT. WHERE PHYSICAL OR GEOMETRIC LIMITATIONS PRECLUDE THE USE OF 1/16 OR 1/8 BENDS, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR APPROVAL HIS PROPOSED METHOD OF REMODELING OR CONSTRUCTION.
5. ALL HOUSE CONNECTION SEWERS TO BE CONSTRUCTED UNDER A PROPOSED STORM DRAIN SHALL BE ENCASED IN CONCRETE AS SHOWN HEREON. WHEN THE HOUSE CONNECTION SEWER SLOPE EXCEEDS 1:1, THE CONTRACTOR MAY, AT HIS OPTION, PLACE A CIRCULAR CROSS SECTION WITH MINIMUM COVER EQUAL TO DIMENSION "X" AS SHOWN ON SECTION A–A HEREON IN LIEU OF A SQUARE CROSS SECTION OF CONCRETE. CONCRETE BEDDING AND ENCASEMENT SHALL BE CLASS 420–C–2000, AND SHALL EXTEND TO THE FIRST PIPE JOINT AT LEAST 1 FOOT BEYOND THE OUTSIDE DIAMETER OF EACH SIDE OF THE PROPOSED CONDUIT.
6. FOR CASES R AND S, WHEN THE SLOPE OF THE PIPE EXCEED 1:1, THE CONTRACTOR MAY, AT HIS OPTION, CONSTRUCT A CHIMNEY CONFORMING TO STANDARD PLATE 402 ON THE NEW SEWER IN LIEU OF CONSTRUCTING THE ENCASEMENT SHOWN HEREON.
7. FOR CASE E AND F, SADDLES SHALL BE CONNECTED EITHER TO THE LENGTH OF PIPE CONTAINING THE EXISTING TEE OR WYE OR TO THE ADJACENT DOWNSTREAM PIPE LENGTH.
8. CONDUITS TO BE INSTALLED OVER OR WITHIN ONE INCH OF ANY CONCRETE ENCASEMENT OR STRUCTURE, WHETHER EXISTING OR TO BE PLACED IN CONFORMITY WITH THE REQUIREMENTS HEREIN, SHALL BE INSTALLED ON A ONE–INCH SAND CUSHION OR APPROVED EXPANSION JOINT MATERIAL. CONCRETE ENCASEMENT INSTALLED PURSUANT TO THIS STANDARD PLAN SHALL BE SEPARATED FROM EXISTING CONDUIT WITH ONE–INCH THICK EXPANSION JOINT MATERIAL.
9. THOSE PORTIONS OF AN ABANDONED PIPE LOCATED BENEATH OR WITHIN 6 INCHES OF A RELOCATED HOUSE CONNECTION SEWER SHALL BE REMOVED. THE EXCAVATION SHALL BE REFILLED TO THE GRADE OF THE NEW PIPE INVERT WITH CLASS 100–E–100 CONCRETE. THE CONTRACTOR MAY AT HIS OPTION, SUBSTITUTE MECHANICALLY COMPACTED BACKFILL IN LIEU OF THE CLASS 100–E–100 CONCRETE. THOSE PORTIONS OF ABANDONED PIPE NOT REMOVED SHALL BE SEALED. WHERE CAPS ARE USED, THEY SHALL BE SEALED BY FILLING THE SPACE ABOVE THE CAP WITH SAND AND A ONE INCH THICK COATING OF TYPE "F" MORTAR.
10. SUPPORT WALLS SHALL CONFORM TO STANDARD PLATE 404.
11. WHEN INDICATED ON THE PROJECT PLANS OR THE SPECIAL SPECIFICATIONS, A CLEANOUT SHALL BE CONSTRUCTED IN CONJUNCTION WITH CASE E AS FOLLOWS:
    A. SUBSTITUTE A "Y" FOR THE 1/8 BEND.
    B. PLACE A 1/8 BEND ON THE UPPER END OF THE "Y".
    C. CAP TOP OF 1/8 BEND WITH A CAP AND SEAL WITH ONE INCH THICK TYPE "F" MORTAR AROUND THE CIRCUMFERENCE OF THE CAP.

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CITY OF Oxnard

Department of Public Works

HOUSE CONNECTION REMODELING

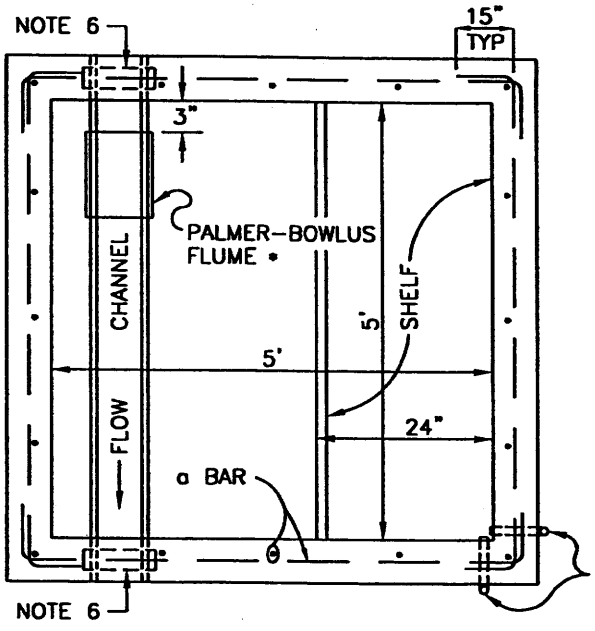
DRAWN: STAFF | CKD.: STSFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 409

SHEET 3 OF 3

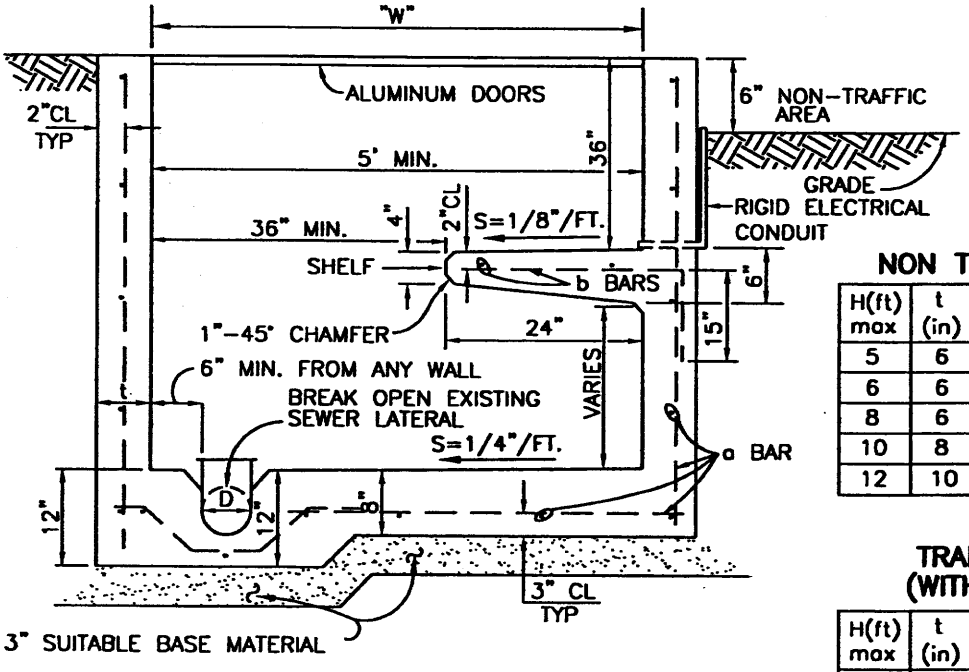


PLAN VIEW

* PLASTI-FAB PALMER-BOWLUS FLUME OR APPROVED EQUAL

NOTES:

1. SHELVES TO HAVE A NON-SKID SURFACE.
2. "D"-DIAMETER OF SEWER LINE AND MEASURING FLUME.
3. SEE TABLE FOR "t", AND "a" AND "b" BARS.
4. ALL ELECTRICAL WIRING WITHIN THE VAULT SHALL BE ENCASED IN RIGID CONDUIT.
5. LOCATION MUST BE APPROVED BY THE SOURCE CONTROL PROGRAM OF THE WASTWATER DIVISION.
6. TIGHT-FITTING RUBBER O-RING FOR SEALING PLASTIC PIPE TO THE CONCRETE WALL.
7. PROTECTIVE COATING PER PLATE 400.



SECTION

NON TRAFFIC AREA VAULT

H(ft) max	t (in)	REINFORCEMENT	
		a BARS	b BARS
5	6	#3 @ 18"	#3 @ 14"
6	6	#3 @ 14"	#3 @ 14"
8	6	#4 @ 12"	#3 @ 14"
10	8	#4 @ 10"	#3 @ 14"
12	10	#4 @ 8"	#3 @ 14"

TRAFFIC AREA VAULT (WITH H-20 LOADING)

H(ft) max	t (in)	REINFORCEMENT	
		a BARS	b BARS
5	6	#4 @ 10"	#3 @ 14"
6	6	#4 @ 8"	#3 @ 14"
8	8	#4 @ 6"	#3 @ 14"
10	9	#4 @ 6"	#3 @ 14"
12	10	#5 @ 6"	#3 @ 14"

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CITY OF Oxnard
Department of Public Works

INDUSTRIAL WASTE FLOW MONITORING VAULT

DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Boxman

STANDARD PLAN 2002

PLATE 410

SHEET 1 OF 2

FLOW MONITORING VAULT

VAULT DIMENSIONS:

1. MINIMUM VAULT SIZE TO BE 5'-0"X 5'-0"
2. FOR SEWER LATERALS DEEPER THAN 5', VAULT SIZE TO BE MIN. 6'-0"X 6'-0".
3. VAULT SIZES TO BE DETERMINED ACCORDING TO THE FOLLOWING FORMULA:
   WIDTH = D+4' MIN. WIDTH = 5'-0"
   LENGTH = 3D+2' MIN. LENGTH = 5'-0"

VAULT LOCATION:

1. CONTACT "ENVIRONMENTAL CONTROL SUPERVISOR" PRIOR TO CONSTRUCTION FOR APPROVAL OF VAULT LOCATION. PHONE 488-3517. CONFIRM THAT THE STANDARD DRAWING CONTAINS THE LATEST REVISIONS.
2. VAULTS TO BE LOCATED AWAY FROM TRAFFIC AREAS IF POSSIBLE. HOWEVER, IF INSTALLED IN TRAFFIC AREA, MUST BE CAPABLE OF CARRYING H-20 LOADING. RECESSED LOCKABLE HASP REQUIRED FOR TRAFFIC AREAS.
3. VAULTS USING PALMER-BOWLUS FLUMES TO BE LOCATED ACCORDING TO CRITERIA IN TABLE A AND OTHER SPECIAL PROVISIONS.

TABLE "A"
MIN. AND MAX. RECOMMENDED FLOW RATES FOR FOR FREE FLOW THROUGH PLASTI-FAB PALMER-BOWLUS FLUMES

UPSTREAM PIPE DIAMETER	MAXIMUM SLOPE ALLOWABLE FOR UPSTREAM PIPE	MIN. HEAD FT.	MIN. FLOW RATE		MAX. HEAD FT.	MAX. FLOW RATE	
			M.G.D.	C.F.S.		M.G.D.	C.F.S.
6"	0.022	0.11	0.023	0.035	0.36	0.203	0.315
8"	0.020	0.15	0.048	0.074	0.49	0.433	0.670
10"	0.018	0.18	0.079	0.122	0.61	0.752	1.160
12"	0.016	0.22	0.128	0.198	0.73	1.180	1.830
15"	0.015	0.27	0.216	0.334	0.91	2.060	3.180
18"	0.014	0.33	0.355	0.549	1.09	3.240	5.010
21"	0.014	0.38	0.504	0.780	1.28	4.810	7.440
24"	0.013	0.44	0.721	1.120	1.46	6.700	10.400
27"	0.013	0.49	0.945	1.460	1.64	8.950	13.800
30"	0.013	0.55	1.260	1.950	1.82	11.600	18.000

OTHER SPECIAL PROVISIONS:

1. THE MAXIMUM UPSTREAM DEPTH SHALL NOT EXCEED 0.90D (D IS THE UPSTREAM PIPE DIAMETER).
2. THE MAXIMUM UPSTREAM SUBMERGENCE SHALL NOT EXCEED 85% OF THE MAXIMUM UPSTREAM DEPTH. THUS, THE DEPTH OF FLOW IN THE UPSTREAM CHANNEL BEFORE INSTALLING THE FLUME (NORMAL DEPTH) SHALL NOT EXCEED 0.75D.
3. THE FLUME WILL FUNCTION PROPERLY IF THE VELOCITY HEAD AT DEPTH FOR MAXIMUM FLOW IS NOT GREATER THAN 1.5X THE NORMAL DEPTH.
4. THE DOWNSTREAM OUTLET PIPE SLOPE SHALL NOT BE LESS THAN THE UPSTREAM PIPE SLOPE BUT MAY BE GREATER IF DESIRED.
5. THE DOWMSTREAM OUTLET PIPE SHALL BE FREE OF OBSTRUCTIONS.
6. UPSTREAM TURBULENCE SHALL BE AVOIDED. NO BENDS, DROP MANHOLES, FLOW JUNCTIONS, ETC., ARE PERMITTED WITHIN 25 PIPE DIAMETERS (D) OF THE METERING STRUCTURE.
7. FOR PLASTIC SEWER PIPE, PLACE TIGHT-FITTING RUBBER RING OVER THE PIPE AT THE MIDPOINT WHERE THE PIPE PASSES THROUGH THE CONCRETE WALL.

VAULT DOORS:

1. DOORS TO BE "BILCO", MODEL "KD" ALUMINUM DOORS OR EQUIVALENT. LOCKABLE HASP TO BE PROVIDED.
2. DOORS TO OPEN PARALLEL TO FLOW.

VAULT SHELF:

1. CONSTRUCT SHELF FULL LENGTH OF VAULT
2. SHELF TO BE CAPABLE OF SUPPORTING 150 P.S.F.
3. SHELF SURFACE TO HAVE NON-SKID ADHESIVE APPLIED
4. OPTIONAL PRECAST SHELF IS TO BE MONOLITHICALLY CAST WITH VAULT.

VAULT DIMENSIONS:

1. OWNER TO FURNISH AND INSTALL APPLICABLE SIZE CALIBRATED FLUME, WEIR, FLOW METER OR SIMILAR CITY-APPROVED DEVICESUITABLE FOR MEASUREMENT OF FLOW RATE AND TOTAL VOLUME. A "CERTIFICATE OF CALIBRATION" MUST BE FURNISHED BY THE MANUFACTURER. THE FLOW MEASURING DEVICE WILL HAVE TO BE RECALIBRATED AT 6 MO. INTERVALS BY THE MANUFACTURER OR APPROVED TESTING LAB WITH A "CERTIFICATE OF CALIBRATION" FURNISHED TO THE CITY.
2. INSTALLATION TO BE DONE ACCORDING TO THE MANUFACTURING SPECIFICATIONS.
3. FLOW SAMPLER TO BE LOCATED DOWNSTREAM OF THE FLUME.

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REV. APPR. BY DATE

CITY OF Oxnard
Department of Public Works

INDUSTRIAL WASTE FLOW MONITORING VAULT

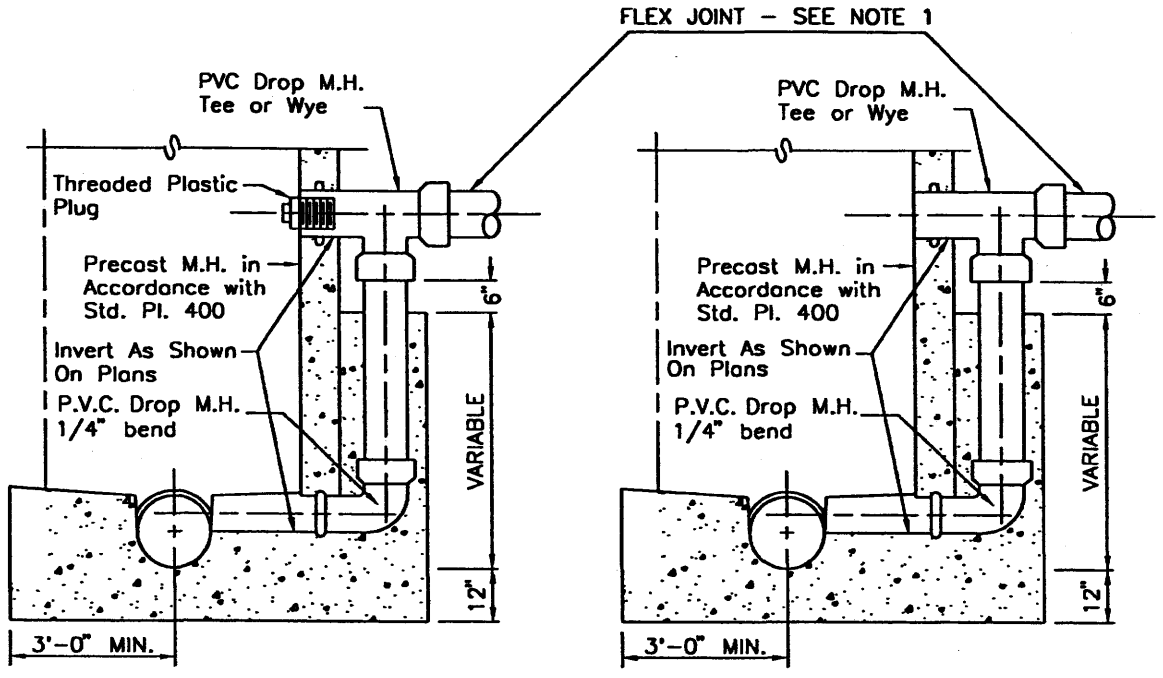
DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 410

SHEET 2 OF 2

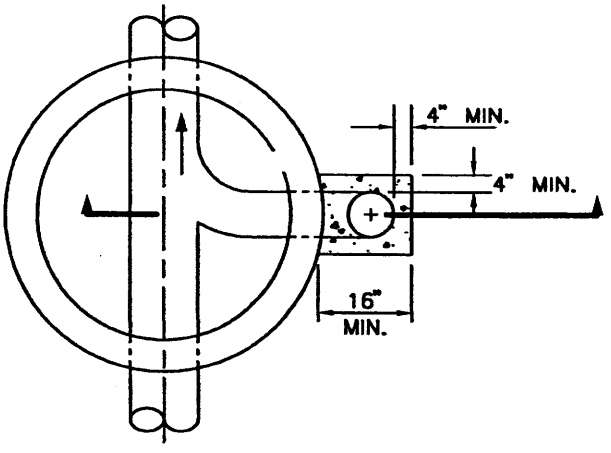


SECTION VIEW

PRESSURE FLOW CASE

SECTION VIEW

GRAVITY FLOW CASE



PLAN VIEW

NOTES:

1. PROVIDE FLEX JOINT WITHIN 1' OF TEE
2. FOR NEW CONSTRUCTION, FOUNDATION FOR DROP SECTION TO BE POURED INTEGRAL WITH M.H. BASE.
3. FOR PLASTIC SEWERS, PLACE TIGHT FITTING RUBBER RING OVER PIPE AT MID-POINT WHERE IT PASSES THROUGH CONCRETE WALL.
4. P.C. CONCRETE SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
5. SEE PLATE 400 FOR ADDITIONAL DETAILS OF MANHOLE CONSTRUCTION.

REV. APPR. BY DATE

REV. APPR. BY DATE

CITY OF Oxnard

Department of Public Works

DROP MANHOLE

DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

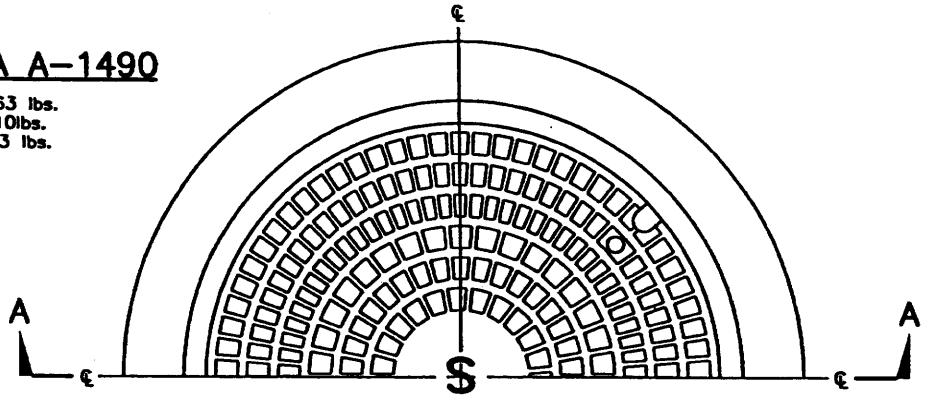
STANDARD PLAN 2002

PLATE 411

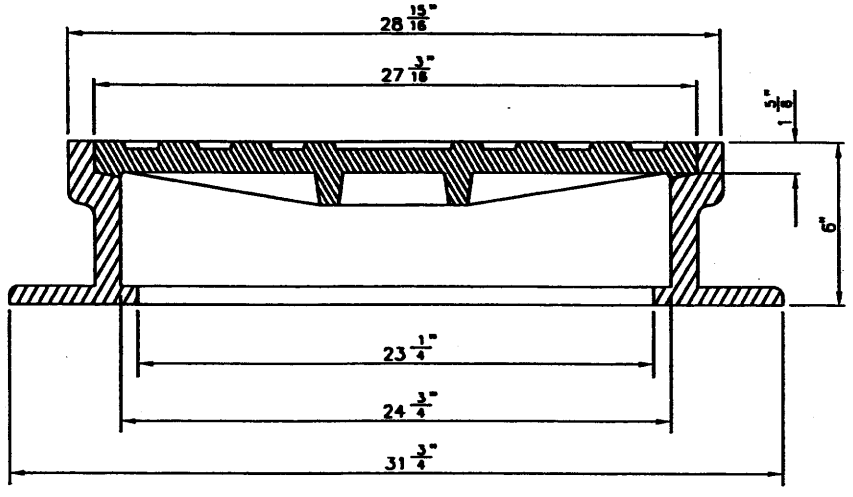
SHEET 1 OF 1

ALHAMBRA A-1490

COVER WT. = 263 lbs.
FRAME WT. = 210lbs.
TOTAL WT. = 473 lbs.



PLAN



SECTION A-A

NOTES:

1. MANHOLE FRAMES AND COVERS SHALL BE MADE OF GRAY CAST IRON CONFORMING TO ASTM A-48-64 AND PAINTED WITH ASPHALTUM PAINT. ALHAMBRA 1490 OR APPROVED EQUAL.
2. FOUNDRY MARK SHALL BE SHOWN ON THE FRAME AND ON THE BOTTOM OF THE COVER.
3. COVERS SHALL BEAR THE LETTER "D" FOR STORM DRAINS AND "S" FOR SEWERS. THE LETTERS SHALL BE APPROXIMATELY 2 1/2" HIGH WITH 1/2" LINE WIDTH AND PLACED IN THE CENTER OF THE COVER. COVERS SHALL ALSO BEAR THE AGENCY'S IDENTIFICATION IN ACCORDANCE WITH INSTRUCTIONS FURNISHED BY THE AGENCY. ALL LETTERS SHALL BE FLUSH WITH THE FINISHED SURFACE OF THE COVER.
4. COVERS FOR MANHOLES LOCATED IN EASEMENTS, PARKWAYS, AND ALL OTHER PLACES EXCEPT PAVED STREETS OR ALLEYS SHALL BE PROVIDED WITH ALLEN SOCKET SET SCREW LOCKING DEVICES. THE CONTRACTOR SHALL DRILL AND TAP TWO HOLES TO A DEPTH OF 1 INCH AT 90 DEGREES TO PICK HOLE AND INSTALL 3/4-BY-3/4-INCH ALLEN SOCKET SET SCREWS.
5. THE WEIGHT OF THE COVER SHALL NOT VARY MORE THAN FIVE PERCENT FROM THAT SHOWN.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

MANHOLE FRAME AND COVER

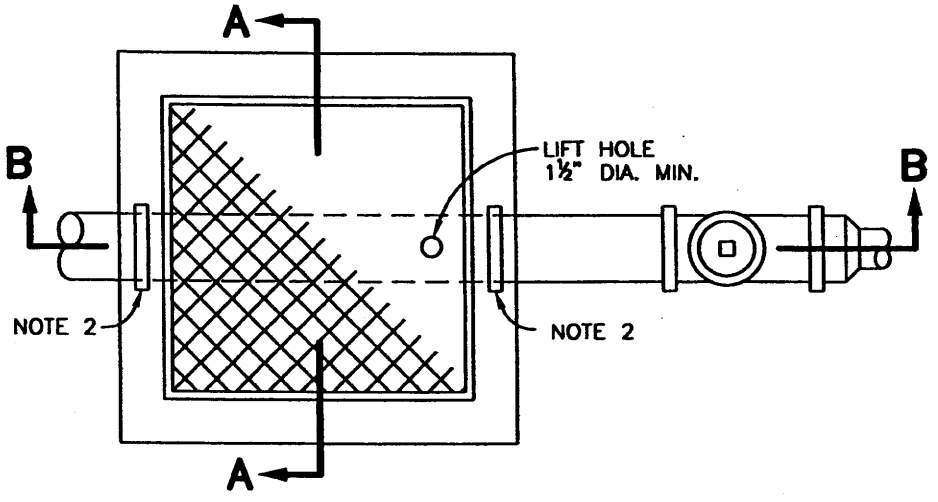
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowmon

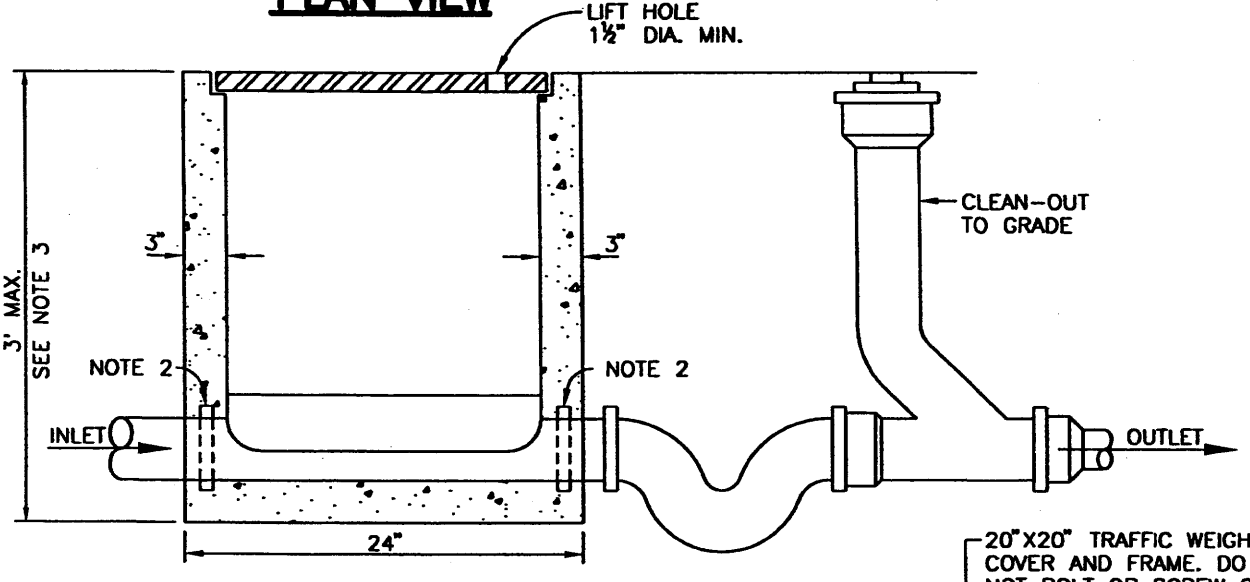
STANDARD PLAN 2002

PLATE 412

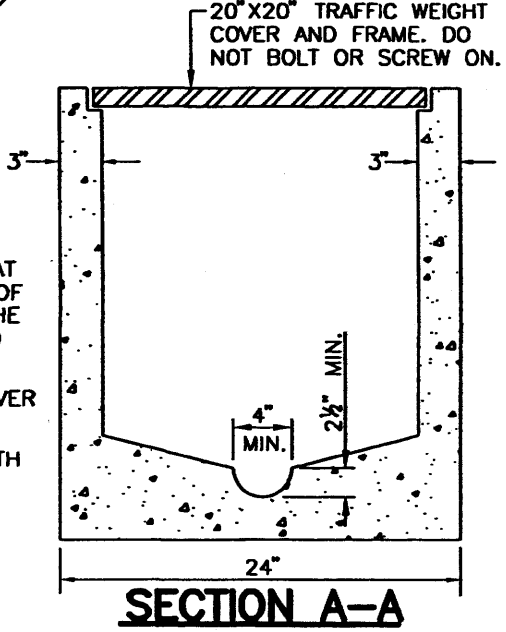
SHEET 1 OF 1



PLAN VIEW



SECTION B-B



SECTION A-A

NOTES:

1. APPROVAL FOR THE LOCATION OF THE SAMPLING WELL SHALL BE OBTAINED FROM THE SOURCE CONTROL PROGRAM PRIOR TO INSTALLATION. WHEN INSTALLING THE SAMPLE WELL, BE SURE THAT THE INVERT OF THE SAMPLING WELL IS LEVEL WITH THE INVERT OF THE INLET AND OUTLET PIPES. ELEVATE THE SIDEWALLS ABOVE THE SURROUNDING GROUND SURFACE TO EXCLUDE STORM WATER AND OR SURFACE RUNOFF.
2. FOR PLASTIC SEWER PIPE, PLACE TIGHT FITTING RUBBER RING OVER PIPE AT MIDPOINT WHERE IT PASSES THROUGH CONCRETE WALL.
3. USE PRE-CAST CONCRETE MANHOLE PER PLATE 400 WHEN DEPTH IS GREATER THAN 3 FEET.
4. FINAL INSPECTION BY SOURCE CONTROL.
5. PROTECTIVE COATING PER PLATE 400.

REV.	APPR. BY	DATE

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CITY OF Oxnard
Department of Public Works

SAMPLING WELL

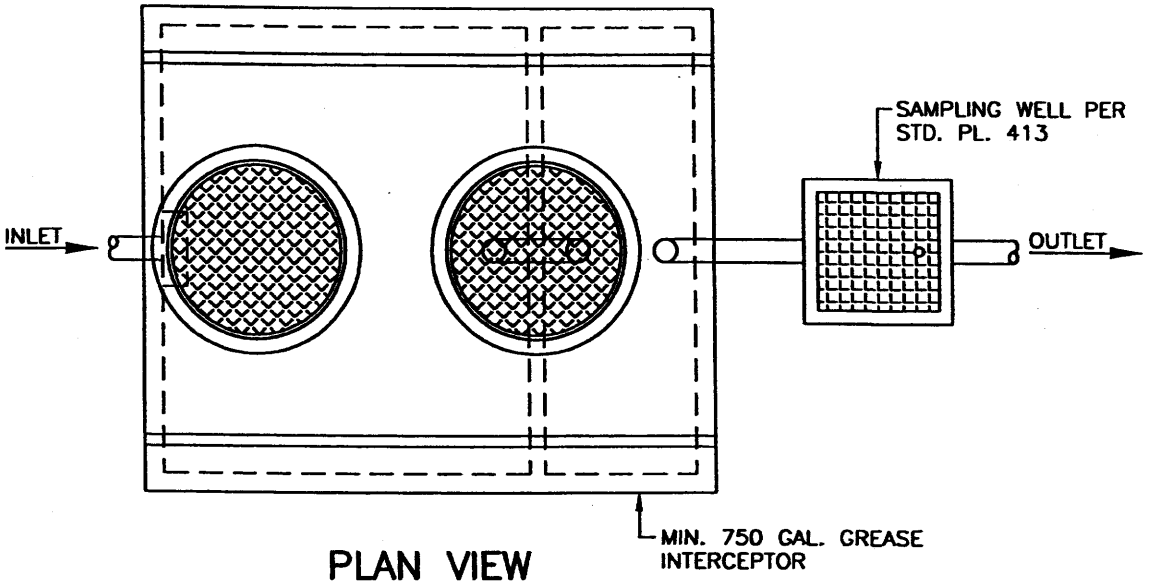
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

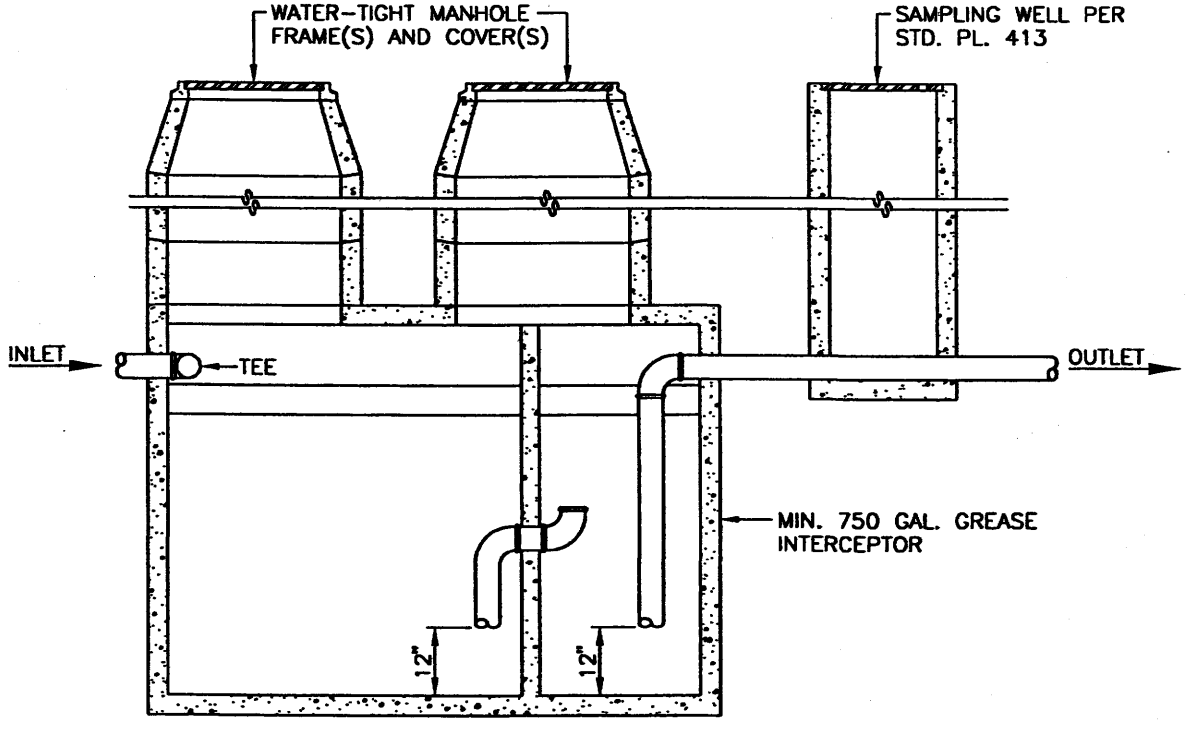
STANDARD PLAN 2002

PLATE 413

SHEET 1 OF 1



PLAN VIEW



LONGITUDINAL SECTION

NOTE:

1. PROTECTIVE COATING PER PLATE 400.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

GREASE INTERCEPTOR
INTERNAL PLUMBING CONFIGURATION

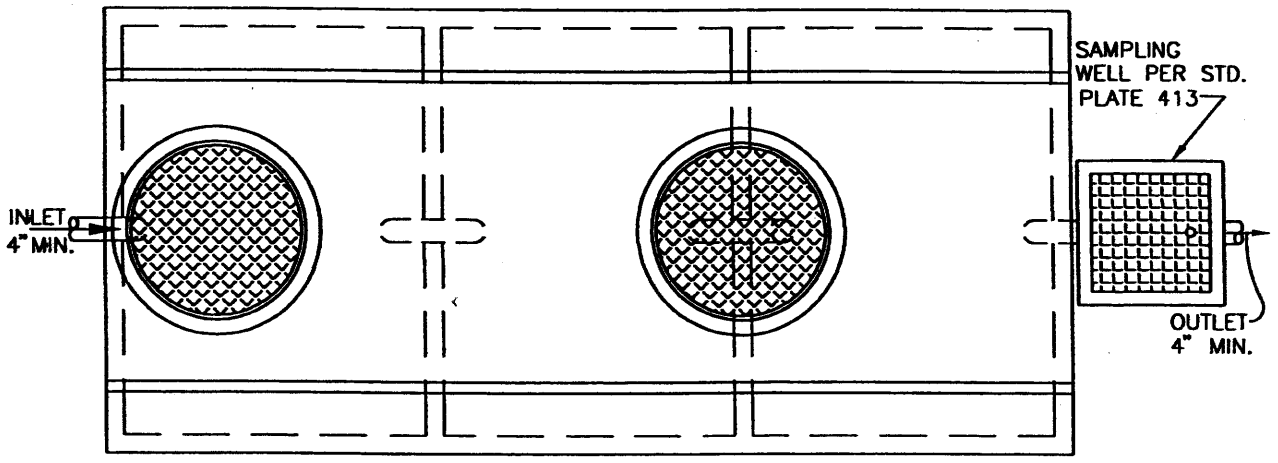
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowmon

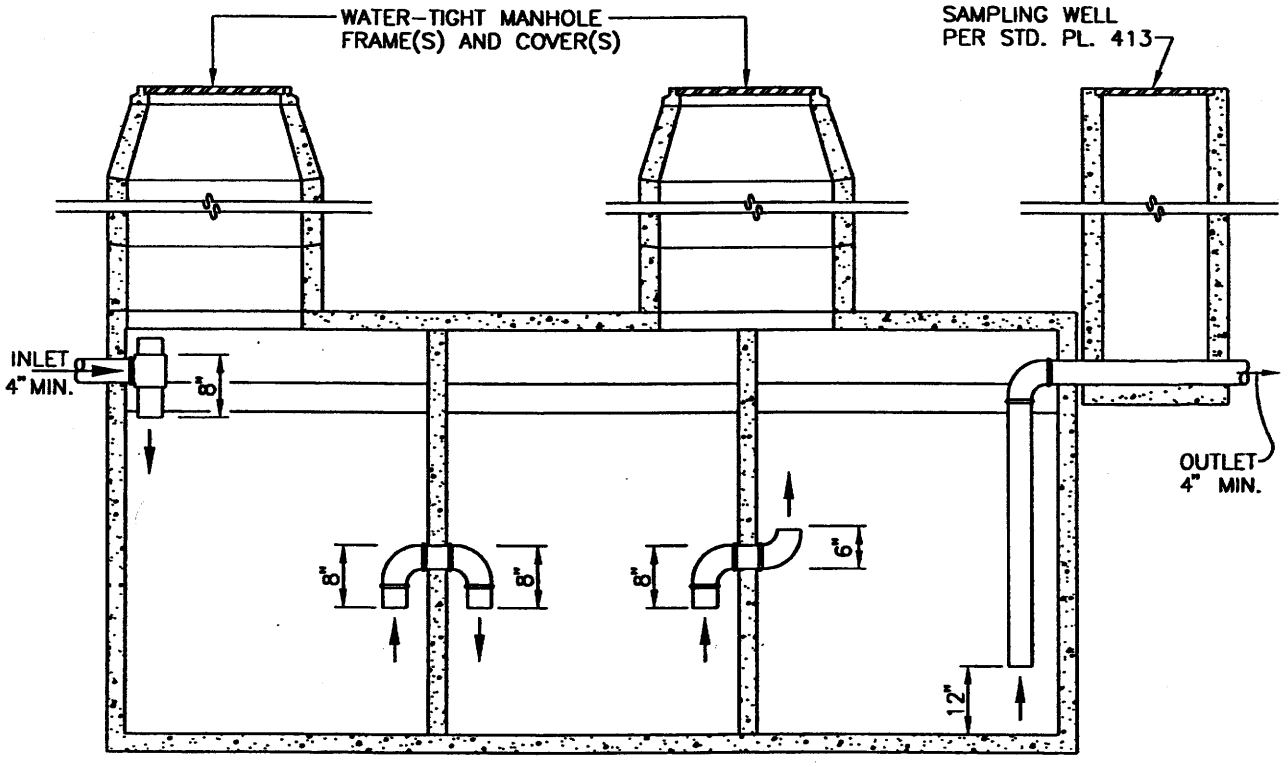
STANDARD PLAN 2002

PLATE 415

SHEET 1 OF 1



PLAN VIEW



LONGITUDINAL SECTION

NOTE:

1. PROTECTIVE COATING PER PLATE 400.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard

Department of Public Works

GRAVITY SEPARATOR DEVICE INTERNAL PLUMBING CONFIGURATION

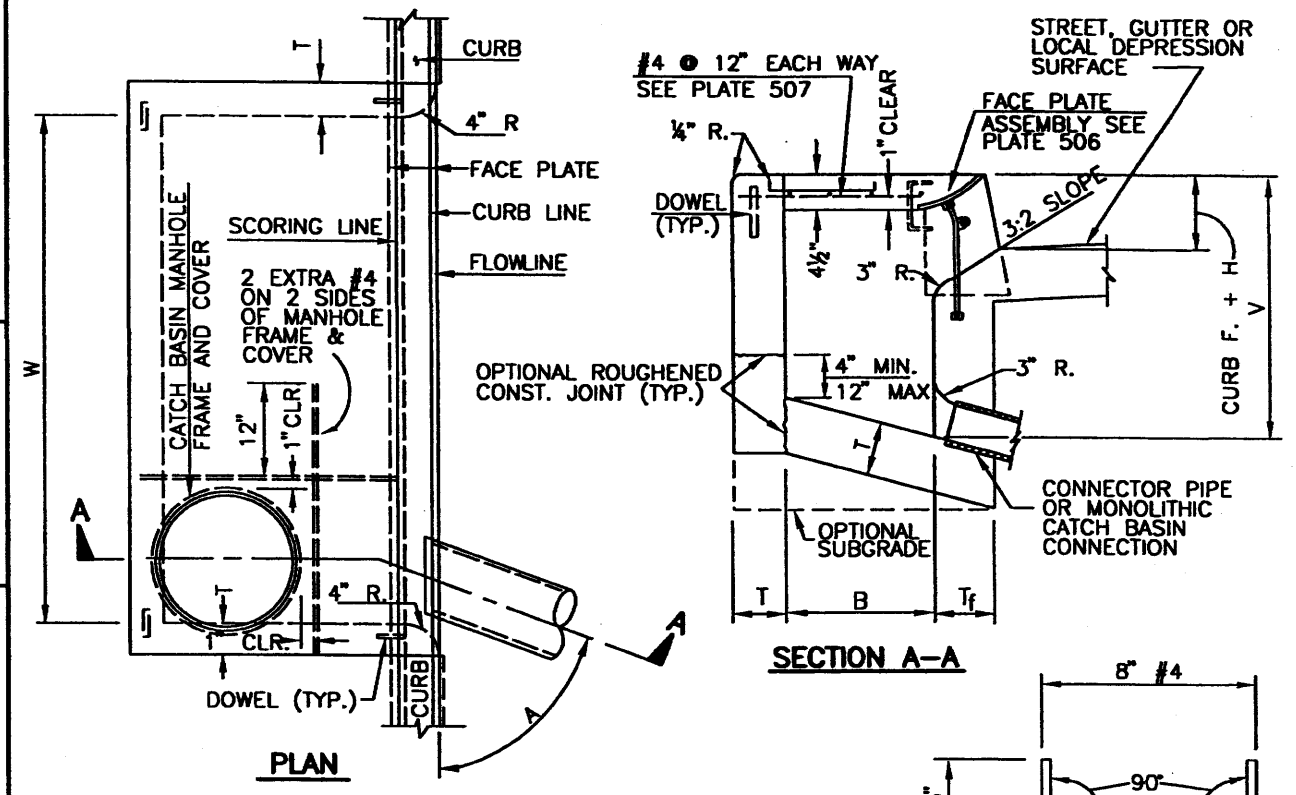
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 416

SHEET 1 OF 1



STRUCTURAL DATA

WALL AND SLAB DIMENSIONS AND REINFORCEMENT REQUIREMENTS

MAX. W	MAX. V	T	T_f	REINFORCEMENT REQUIRED IN: FRONT WALL	REAR WALL	BOTTOM SLAB	END WALL
3.5'	8'	6"	6"	NO REINFORCEMENT REQUIRED			
3.5'	12'	8"	8"				
7'	6'	6"	6"				
7'	12'	8"	8"				
14'	4'	6"	6"				
14'	8'	6"	8"				
14'	12'	8"	10"				
21' AND 28'	4'	6"	6"				
	6'	6"	8"				
	8'	8"	8"				
	10'	8"	10"				
	12'	8"	10"				

FOR W > 28', V > 12' OR B > 4' SEE PROJECT PLANS

REINFORCEMENT REQUIRED SEE PLATE 507

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CITY OF Oxnard

Department of Public Works

CURB OPENING CATCH BASIN

DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 501

SHEET 1 OF 2

NOTES:

1. WHERE THE BASIN IS TO BE CONSTRUCTED WITHIN THE LIMITS OF EXISTING OR PROPOSED SIDEWALK OR IS CONTIGUOUS TO SUCH SIDEWALK, THE TOP SLAB OF THE BASIN MAY BE POURED EITHER MONOLITHIC WITH THE SIDEWALK OR SEPARATELY, USING THE SAME CLASS OF CONCRETE AS THE BASIN. WHEN POURED MONOLITHICALLY, THE SIDEWALK SHALL BE PROVIDED WITH A WEAKENED PLANE OR A 1" DEEP SAWCUT CONTINUOUSLY AROUND THE EXTERNAL PERIMETER OF THE CATCH BASIN WALLS, INCLUDING ACROSS THE FULL WIDTH OF THE SIDEWALK. SURFACE OF ALL EXPOSED CONCRETE SHALL CONFORM IN SLOPE, GRADE, COLOR, FINISH, AND SCORING TO EXISTING OR PROPOSED CURB AND WALK ADJACENT TO THE BASIN.

2. ALL CURVED CONCRETE SURFACES SHALL BE FORMED BY CURVED FORMS, AND SHALL NOT BE SHAPED BY PLASTERING.

3. FLOOR OF BASIN SHALL BE GIVEN A STEEL TROWEL FINISH AND SHALL HAVE A LONGITUDINAL AND LATERAL SLOPE OF 1:12 MINIMUM AND 1:3 MAXIMUM, EXCEPT WHERE THE GUTTER GRADE EXCEEDS 8 PERCENT, IN WHICH CASE THE LONGITUDINAL SLOPE OF THE FLOOR SHALL BE THE SAME AS THE GUTTER GRADE. SLOPE FLOOR FROM ALL DIRECTIONS TO THE OUTLET.

4. DIMENSIONS:

   B = 3'-2"

   V = THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE CURB AND THE INVERT OF THE CATCH BASIN AT THE OUTLET = 4.5'.

   V_U = THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE CURB AND THE INVERT AT THE UPSTREAM END OF THE BASIN . V_U SHALL BE DETERMINED BY THE REQUIREMENTS OF NOTE 3, BUT SHALL NOT BE LESS THAN CURB FACE PLUS 12".

   V_I = THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE CURB AND THE INVERT OF THE INLET, NOTED ON THE PROJECT PLANS.

   H =2" UNLESS NOTED ON THE PROJECT PLANS.

   W = NOTED ON THE PROJECT PLANS AND SHALL BE 3.5', 7', 10, 14, OR 21'.

   A = THE ANGLE, IN DEGREES, INTERCEPTED BY THE CENTERLINE OF THE CONNECTOR PIPE AND THE CATCH BASIN WALL TO WHICH THE CONNECTOR PIPE IS ATTACHED.

5. PLACE CONNECTOR PIPES AS INDICATED ON THE PROJECT PLANS. UNLESS OTHERWISE SPECIFIED, THE CONNECTOR PIPE SHALL BE LOCATED AT THE DOWNSTREAM END OF THE BASIN. WHERE THE CONNECTOR PIPE IS SHOWN AT A CORNER, THE CENTERLINE OF THE PIPE SHALL INTERSECT THE INSIDE CORNER OF THE BASIN. THE PIPE MAY BE CUT AND TRIMMED AT A SKEW NECCESSARY TO INSURE MINIMUM 3" PIPE EMBEDMENT, ALL AROUND, WITHIN THE CATCH BASIN WALL, AND 3" RADIUS OF ROUNDING OF STRUCTURE CONCRETE, ALL AROUND, ADJACENT TO PIPE ENDS. A MONOLITHIC CATCH BASIN CONNECTION SHALL BE USED TO JOIN THE CONNECTOR PIPE TO THE CATCH BASIN WHENEVER ANGLE "A" IS LESS THAN 70 DEGREES OR GREATER THAN 110 DEGREES, OR WHENEVER THE CONNECTOR PIPE IS LOCATED IN A CORNER. THE OPTIONAL USE OF A MONOLITHIC CATCH BASIN CONNECTION IN ANY CASE IS PERMITTED. MONOLITHIC CATCH BASIN CONNECTIONS MAY BE CONSTRUCTED TO AVOID CUTTING STANDARD LENGTHS OF PIPE.

6. DOWELS ARE REQUIRED AT EACH CORNER AND AT 7' ON CENTER (MAX.) ALONG THE BACKWALL.

7. ALL CATCH BASINS SHALL INCLUDE INSTALLATION OF A PLACARD STATING "DON'T DUMP - DRAINS TO OCEAN". PLACARD SHALL BE PLACED ON THE LEFT SIDE OF BASIN OPENING. PLACARDS ARE AVAILABLE FROM STORMWATER QUALITY PROGRAM.

8. THE FOLLOWING STANDARD PLANS ARE INCORPORATED HEREIN:
   - 508 MONOLITHIC CATCH BASIN CONNECTION
   - 507 CATCH BASIN REINFORCEMENT
   - 506 CATCH BASIN FACE PLATE ASSEMBLY AND PROTECTION BAR
   - 510 CATCH BASIN MANHOLE FRAME AND COVER

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

CURB OPENING CATCH BASIN

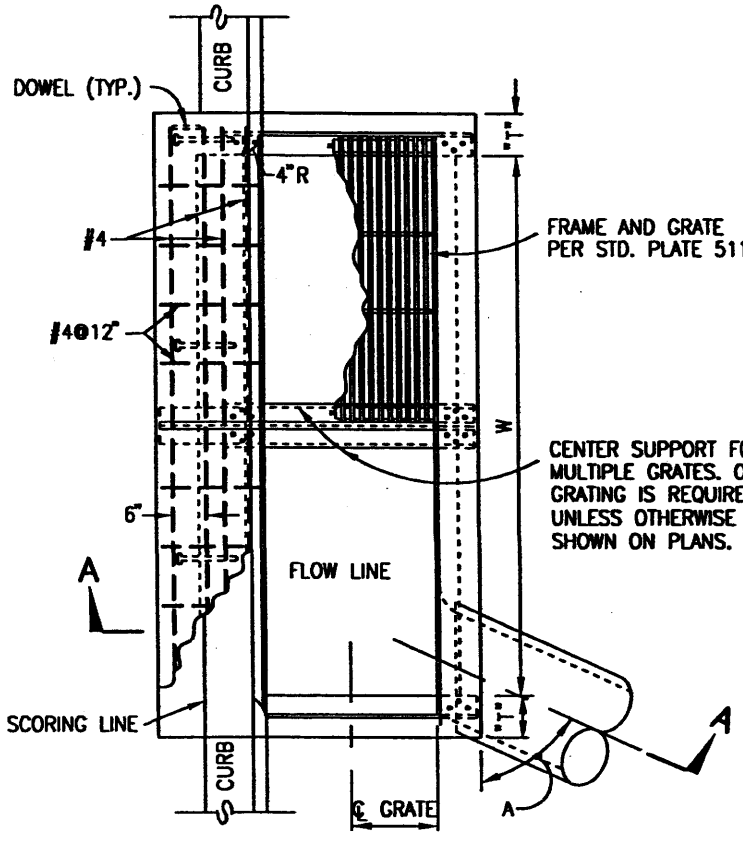
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

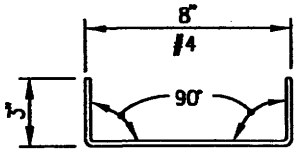
STANDARD PLAN 2002

PLATE 501

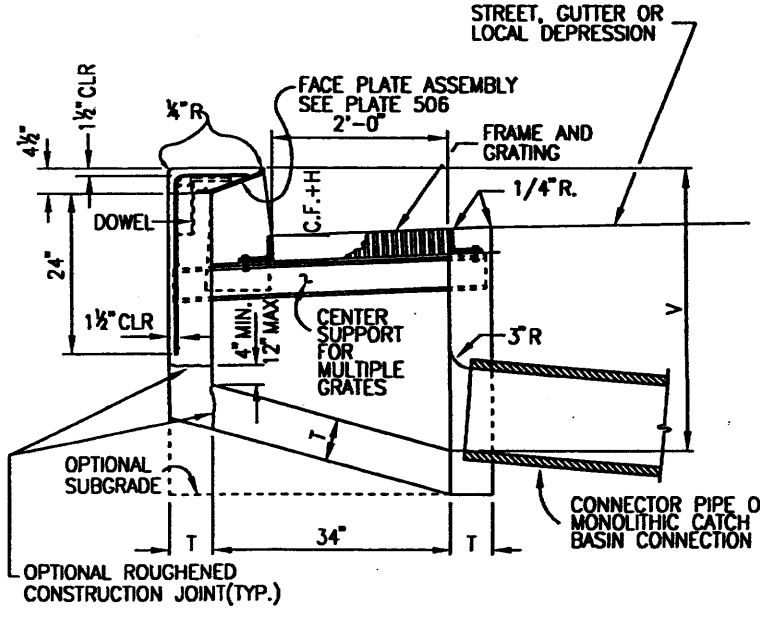
SHEET 2 OF 2



PLAN



DOWEL DETAIL



SECTION A–A

STRUCTURAL DATA WALL AND SLAB DIMENSIONS AND REINFORCEMENT REQUIREMENTS			
NO. OF GRATES	MAXIMUM V	T	REINFORCEMENT FOR WALLS AND SLABS
1–2	4'	6"	NOT REQUIRED
1–2	8'	8"	
1–2	10'	10"	
1–2	12'	10"	REQUIRED
3–4	4'	6"	NOT REQUIRED
3–4	7'	8"	
3–4	8'	8"	REQUIRED
3–4	12'	10"	
5–6	4'	6"	NOT REQUIRED
5–6	6'	8"	
5–6	8'	8"	REQUIRED
5–6	12'	10"	
>6	4'	6"	
>6	8'	8"	
>6	12'	10"	

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CITY OF Oxnard

Department of Public Works

CURB OPENING CATCH BASIN WITH GRATING(S)

DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 502

SHEET 1 OF 2

NOTES:

1. WHERE THE BASIN IS TO BE CONSTRUCTED WITHIN THE LIMITS OF EXISTING OR PROPOSED SIDEWALK OR IS CONTIGUOUS TO SUCH SIDEWALK, THE TOP SLAB OF THE BASIN MAY BE POURED EITHER MONOLITHIC WITH THE SIDEWALK OR SEPARATELY, USING THE SAME CLASS OF CONCRETE AS THE BASIN. WHEN POURED MONOLITHICALLY, THE SIDEWALK SHALL BE PROVIDED WITH A WEAKENED PLANE OR A 1" DEEP SAWCUT CONTINUOUSLY AROUND THE EXTERNAL PERIMETER OF THE CATCH BASIN WALLS, INCLUDING ACROSS THE FULL WIDTH OF THE SIDEWALK. SURFACE OF ALL EXPOSED CONCRETE SHALL CONFORM IN SLOPE, GRADE, COLOR, FINISH, AND SCORING TO EXISTING OR PROPOSED CURB AND WALK ADJACENT TO THE BASIN.

2. ALL CURVED CONCRETE SURFACES SHALL BE FORMED BY CURVED FORMS, AND SHALL NOT BE SHAPED BY PLASTERING.

3. FLOOR OF BASIN SHALL BE GIVEN A STEEL TROWEL FINISH AND SHALL HAVE A LONGITUDINAL AND LATERAL SLOPE OF 1:12 MINIMUM AND 1:3 MAXIMUM, EXCEPT WHERE THE GUTTER GRADE EXCEEDS 8 PERCENT, IN WHICH CASE THE LONGITUDINAL SLOPE OF THE FLOOR SHALL BE THE SAME AS THE GUTTER GRADE. SLOPE FLOOR FROM ALL DIRECTIONS TO THE OUTLET.

4. DIMENSIONS:

   V = THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE CURB AND THE INVERT OF THE CATCH BASIN AT THE OUTLET = 4.5'.

   V_U = THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE CURB AND THE INVERT AT THE UPSTREAM END OF THE BASIN. V_U SHALL BE DETERMINED BY THE REQUIREMENTS OF NOTE 3, BUT SHALL NOT BE LESS THAN CURB FACE PLUS 12".

   V_I = THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE CURB AND THE INVERT OF THE INLET, NOTED ON THE PROJECT PLANS.

   H = 2" UNLESS NOTED ON THE PROJECT PLANS.

   W = 2'-11 3/8" FOR ONE GRATING: ADD 3'-5 3/8" FOR EACH ADDITIONAL GRATING.

   A = THE ANGLE, IN DEGREES, INTERCEPTED BY THE CENTERLINE OF THE CONNECTOR PIPE AND THE CATCH BASIN WALL TO WHICH THE CONNECTOR PIPE IS ATTACHED.

5. PLACE CONNECTOR PIPES AS INDICATED ON THE PROJECT PLANS. UNLESS OTHERWISE SPECIFIED, THE CONNECTOR PIPE SHALL BE LOCATED AT THE DOWNSTREAM END OF THE BASIN. WHERE THE CONNECTOR PIPE IS SHOWN AT A CORNER, THE CENTERLINE OF THE PIPE SHALL INTERSECT THE INSIDE CORNER OF THE BASIN. THE PIPE MAY BE CUT AND TRIMMED AT A SKEW NECCESSARY TO INSURE MINIMUM 3" PIPE EMBEDMENT, ALL AROUND, WITHIN THE CATCH BASIN WALL, AND 3" RADIUS OF ROUNDING OF STRUCTURE CONCRETE, ALL AROUND, ADJACENT TO PIPE ENDS. A MONOLITHIC CATCH BASIN CONNECTION SHALL BE USED TO JOIN THE CONNECTOR PIPE TO THE CATCH BASIN WHENEVER ANGLE "A" IS LESS THAN 70 DEGREES OR GREATER THAN 110 DEGREES, OR WHENEVER THE CONNECTOR PIPE IS LOCATED IN A CORNER. THE OPTIONAL USE OF A MONOLITHIC CATCH BASIN CONNECTION IN ANY CASE IS PERMITTED. MONOLITHIC CATCH BASIN CONNECTIONS MAY BE CONSTRUCTED TO AVOID CUTTING STANDARD LENGTHS OF PIPE.

6. DOWELS ARE REQUIRED AT EACH CORNER AND AT 7' ON CENTER (MAX.) ALONG THE BACKWALL.

7. ALL CATCH BASINS SHALL INCLUDE INSTALLATION OF A PLACARD STATING "DON'T DUMP - DRAINS TO OCEAN". PLACARD SHALL BE PLACED ON THE LEFT SIDE OF BASIN OPENING. PLACARDS ARE AVAILABLE FROM STORMWATER QUALITY PROGRAM.

8. THE FOLLOWING STANDARD PLANS ARE INCORPORATED HEREIN:
   - 508 MONOLITHIC CATCH BASIN CONNECTION
   - 507 CATCH BASIN REINFORCEMENT
   - 506 CATCH BASIN FACE PLATE ASSEMBLY AND PROTECTION BAR
   - 511 FRAME AND GRATING FOR CATCH BASINS

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard — Department of Public Works

CURB OPENING CATCH BASIN WITH GRATING(S)

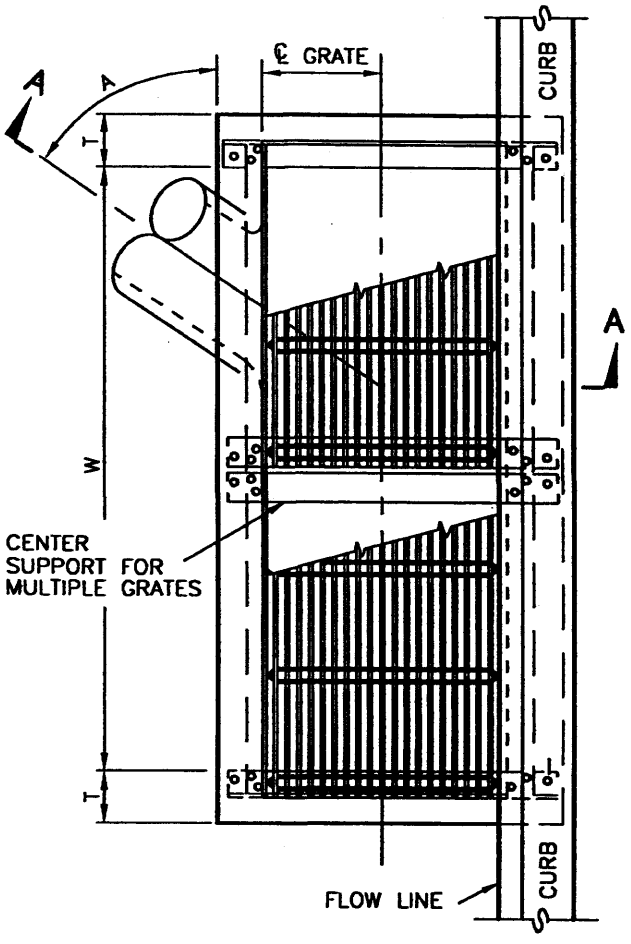
DRAWN: STAFF | CKD.: STAFF

APPR. Granville R. Bowman

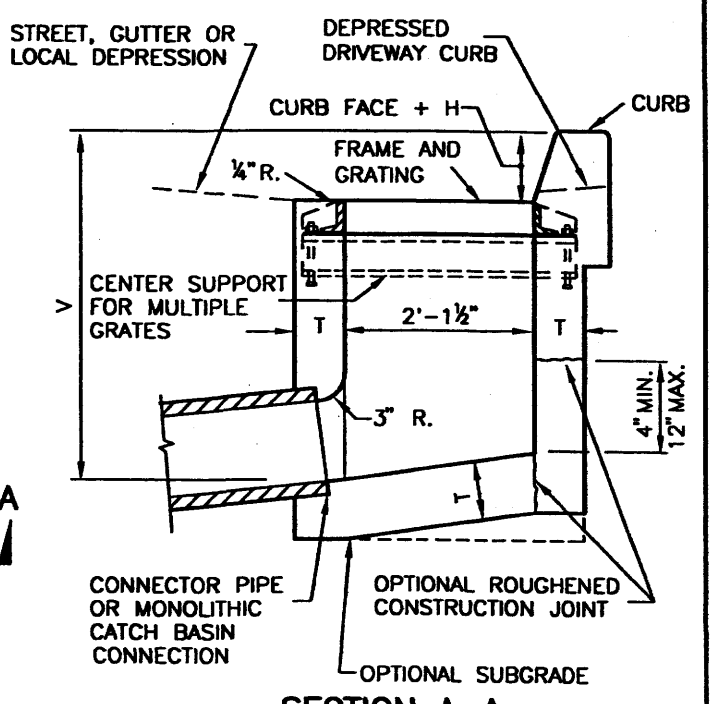
STANDARD PLAN 2002

PLATE 502

SHEET 2 OF 2



PLAN



SECTION A–A

STRUCTURAL DATA			
WALL AND SLAB DIMENSIONS AND REINFORCEMENT REQUIREMENTS			
NO. OF GRATES	MAX. V	T	REINFORCEMENT FOR WALLS AND SLABS
1–2	4'	6"	NOT REQUIRED
1–2	8'	8"	
1–2	10'	10"	
1–2	12'	10"	REQUIRED
3–4	4'	6"	NOT REQUIRED
3–4	7'	8"	
3–4	8'	8"	REQUIRED
3–4	12'	10"	
5–6	4'	6"	NOT REQUIRED
5–6	6'	8"	
5–6	8'	8"	REQUIRED
5–6	12'	8"	
>6	4'	6"	
>6	8'	8"	
>6	12'	10"	

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

CURBSIDE GRATING CATCH BASIN

DRAWN: STAFF CKD.: STAFF CB

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 503

SHEET 1 OF 2

NOTES:

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

2. ALL CURVED CONCRETE SURFACES SHALL BE FORMED BY CURVED FORMS, AND SHALL NOT BE SHAPED BY PLASTERING.

3. FLOOR OF BASIN SHALL BE GIVEN A STEEL TROWEL FINISH AND SHALL HAVE A LONGITUDINAL AND LATERAL SLOPE OF 1:12 MINIMUM AND 1:3 MAXIMUM, EXCEPT WHERE THE GUTTER GRADE EXCEEDS 8 PERCENT, IN WHICH CASE THE LONGITUDINAL SLOPE OF THE FLOOR SHALL BE THE SAME AS THE GUTTER GRADE. SLOPE FLOOR FROM ALL DIRECTIONS TO THE OUTLET.

4. DIMENSIONS:

   V = THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE CURB AND THE INVERT OF THE CATCH BASIN AT THE OUTLET = 4.5'.

   V_1 = THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE CURB AND THE INVERT AT THE INLET . NOTED ON THE PROJECT PLANS.

   V_U = THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE CURB AND THE INVERT AT THE UPSTREAM END OT THE OF THE BASIN, AND SHALL BE DETERMINED BY THE REQUIREMENTS OF NOTE 3, BUT SHALL NOT BE LESS THAN CURB FACE PLUS 12".

   H = 2" UNLESS NOTED ON THE PROJECT PLANS.

   W = 2'-11 3/8" FOR ONE GRATING ADD 3'-5 3/8" FOR EACH ADDITIONAL GRATING.

   A = THE ANGLE, IN DEGREES, INTERCEPTED BY THE CENTERLINE OF THE CONNECTOR PIPE AND THE CATCH BASIN WALL TO WHICH THE CONNECTOR PIPE IS ATTACHED.

5. PLACE CONNECTOR PIPES AS INDICATED ON THE PROJECT PLANS. UNLESS OTHERWISE SPECIFIED, THE CONNECTOR PIPE SHALL BE LOCATED AT THE DOWNSTREAM END OF THE BASIN. WHERE THE CONNECTOR PIPE IS SHOWN AT A CORNER, THE CENTERLINE OF THE PIPE SHALL INTERSECT THE INSIDE CORNER OF THE BASIN. THE PIPE MAY BE CUT AND TRIMMED AT A SKEW NECCESSARY TO INSURE MINIMUM 3" PIPE EMBEDMENT, ALL AROUND, WITHIN THE CATCH BASIN WALL, AND 3" RADIUS OF ROUNDING OF STRUCTURE CONCRETE, ALL AROUND, ADJACENT TO PIPE ENDS. A MONOLITHIC CATCH BASIN CONNECTION SHALL BE USED TO JOIN THE CONNECTOR PIPE TO THE CATCH BASIN WHENEVER ANGLE "A" IS LESS THAN 70 DEGREES OR GREATER THAN 110 DEGREES, OR WHENEVER THE CONNECTOR PIPE IS LOCATED IN A CORNER. THE OPTIONAL USE OF A MONOLITHIC CATCH BASIN CONNECTION IN ANY CASE IS PERMITTED. MONOLITHIC CATCH BASIN CONNECTIONS MAY BE CONSTRUCTED TO AVOID CUTTING STANDARD LENGTHS OF PIPE.

6. DOWELS ARE REQUIRED AT EACH CORNER AND AT 7' ON CENTER (MAX.) ALONG THE BACKWALL.

7. ALL CATCH BASINS SHALL INCLUDE INSTALLATION OF A PLACARD STATING "DON'T DUMP - DRAINS TO OCEAN". PLACARD SHALL BE PLACED ON THE LEFT SIDE OF BASIN OPENING. PLACARDS ARE AVAILABLE FROM STORMWATER QUALITY PROGRAM.

8. THE FOLLOWING STANDARD PLANS ARE INCORPORATED HERIN:
   508 MONOLITHIC CATCH BASIN CONNECTION
   507 CATCH BASIN REINFORCEMENT
   511 FRAME AND GRATING FOR CATCH BASINS

9. ONE GRATING IS REQUIRED UNLESS OTHERWISE SHOWN ON THE PROJECT PLANS.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

CURBSIDE GRATING CATCH BASIN

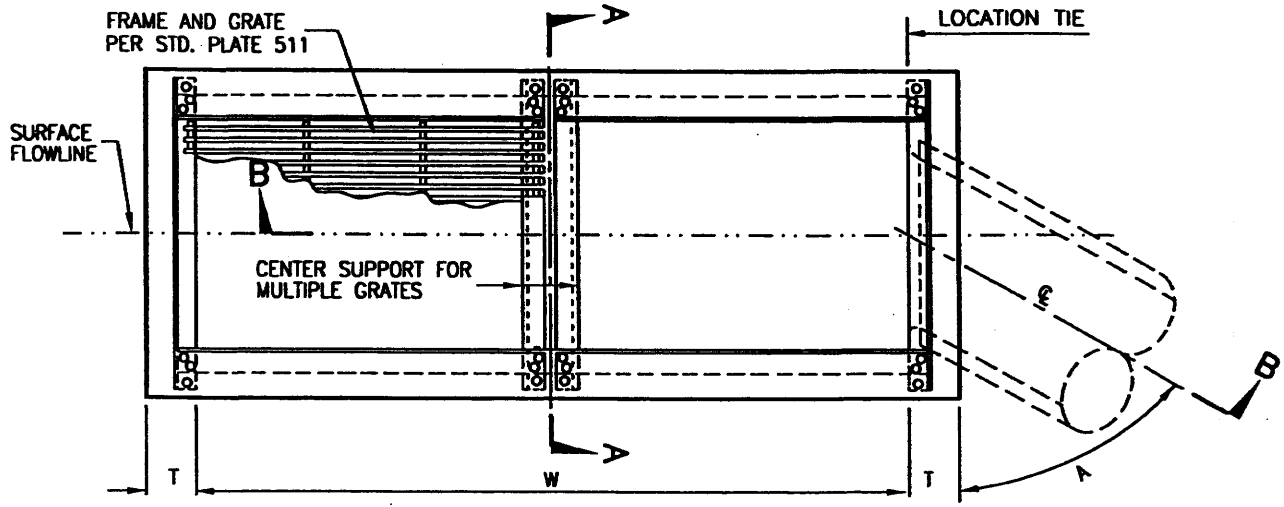
DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

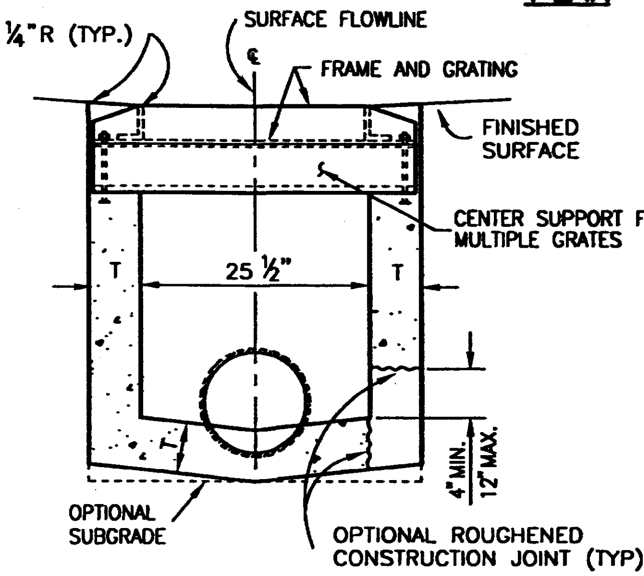
STANDARD PLAN 2002

PLATE 503

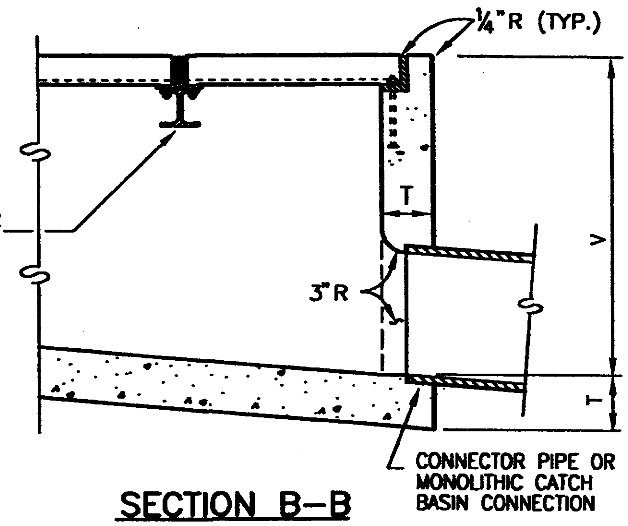
SHEET 2 OF 2



PLAN



SECTION A–A



SECTION B–B

STRUCTURAL DATA			
WALL AND SLAB DIMENSIONS AND REINFORCEMENT REQUIREMENTS			
NO. OF GRATES	MAX. V	T	REINFORCEMENT FOR WALLS AND SLABS
1–2	4'	6"	
1–2	8'	8"	NOT REQUIRED
1–2	10'	10"	
1–2	12'	10"	REQUIRED
3–4	4'	6"	NOT REQUIRED
3–4	7'	8"	
3–4	8'	8"	REQUIRED
3–4	12'	10"	
5–6	4'	6"	NOT REQUIRED
5–6	6'	8"	
5–6	8'	8"	
5–6	12'	10"	
>6	4'	6"	REQUIRED
>6	8'	8"	
>6	12'	10"	

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF *Oxnard*

GRATED CATCH BASIN–ALLEY (LONGITUDINAL)

DRAWN: STAFF | CKD.: STAFF

Department of Public Works

APPR. [signature] Granville M. Bowman

STANDARD PLAN 2002

PLATE 504

SHEET 1 OF 2

NOTES:

1. ALL CURVED CONCRETE SURFACES SHALL BE FORMED BY CURVED FORMS, AND SHALL NOT BE SHAPED BY PLASTERING.

2. FLOOR OF BASIN SHALL BE GIVEN A STEEL TROWEL FINISH AND SHALL HAVE A LONGITUDINAL AND LATERAL SLOPE OF 1:12 MINIMUM AND 1:3 MAXIMUM, EXCEPT WHERE THE GUTTER GRADE EXCEEDS 8 PERCENT, IN WHICH CASE THE LONGITUDINAL SLOPE OF THE FLOOR SHALL BE THE SAME AS THE GUTTER GRADE. SLOPE FLOOR FROM ALL DIRECTIONS TO THE OUTLET.

3. DIMENSIONS:

   V = 3.5 FT.

   V_U = THE DEPTH AT THE UPSTREAM END OF THE BASIN AND SHALL BE DETERMINED BY THE REQUIREMENTS OF NOTE 2, BUT SHALL NOT BE LESS THAN 2.5'.

   V_I = THE DEPTH AT THE INVERT OF THE INLET. NOTED ON PLANS.

   W = 2'−11⅜" FOR ONE GRATING ADD 3'−5 ⅜" FOR EACH ADDITIONAL GRATING.

   A = THE ANGLE, IN DEGREES, INTERCEPTED BY THE CENTERLINE OF THE CONNECTOR PIPE AND THE CATCH BASIN WALL TO WHICH THE CONNECTOR PIPE IS ATTACHED.

4. PLACE CONNECTOR PIPES AS INDICATED ON THE PROJECT PLANS. UNLESS OTHERWISE SPECIFIED, THE CONNECTOR PIPE SHALL BE LOCATED AT THE DOWNSTREAM END OF THE BASIN. WHERE THE CONNECTOR PIPE IS SHOWN AT A CORNER, THE CENTERLINE OF THE PIPE SHALL INTERSECT THE INSIDE CORNER OF THE BASIN. THE PIPE MAY BE CUT AND TRIMMED AT A SKEW NECCESSARY TO INSURE MINIMUM 3" PIPE EMBEDMENT, ALL AROUND, WITHIN THE CATCH BASIN WALL, AND 3" RADIUS OF ROUNDING OF STRUCTURE CONCRETE, ALL AROUND, ADJACENT TO PIPE ENDS. A MONOLITHIC CATCH BASIN CONNECTION SHALL BE USED TO JOIN THE CONNECTOR PIPE TO THE CATCH BASIN WHENEVER ANGLE "A" IS LESS THAN 70 DEGREES OR GREATER THAN 110 DEGREES, OR WHENEVER THE CONNECTOR PIPE IS LOCATED IN A CORNER. THE OPTIONAL USE OF A MONOLITHIC CATCH BASIN CONNECTION IN ANY CASE IS PERMITTED. MONOLITHIC CATCH BASIN CONNECTIONS MAY BE CONSTRUCTED TO AVOID CUTTING STANDARD LENGTHS OF PIPE.

5. ALL CATCH BASINS SHALL INCLUDE INSTALLATION OF A PLACARD STATING "DON'T DUMP – DRAINS TO OCEAN". PLACARD SHALL BE PLACED ON THE LEFT SIDE OF BASIN OPENING. PLACARDS ARE AVAILABLE FROM STORMWATER QUALITY PROGRAM.

6. THE FOLLOWING STANDARD PLANS ARE INCORPORATED HEREIN:
   508 MONOLITHIC CATCH BASIN CONNECTION
   507 CATCH BASIN REINFORCEMENT
   511 FRAME AND GRATING FOR CATCH BASINS

7. ONE GRATING IS REQUIRED UNLESS OTHERWISE SHOWN ON THE PROJECT PLANS.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard

Department of Public Works

GRATED CATCH BASIN–ALLEY (LONGITUDINAL)

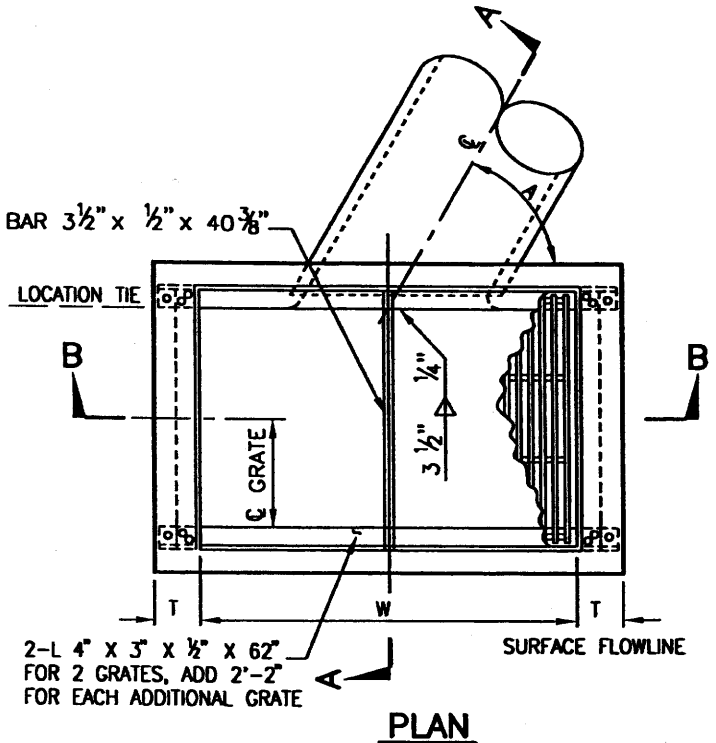
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

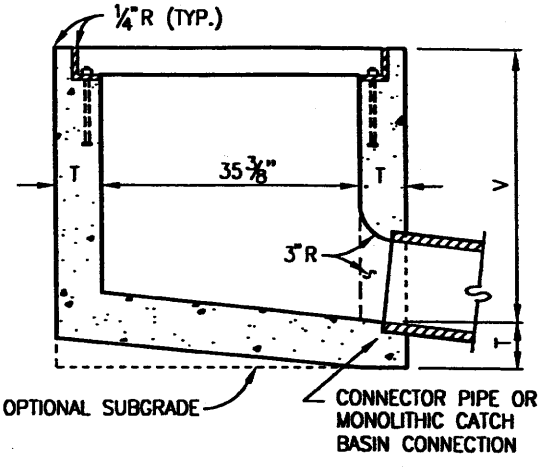
STANDARD PLAN 2002

PLATE 504

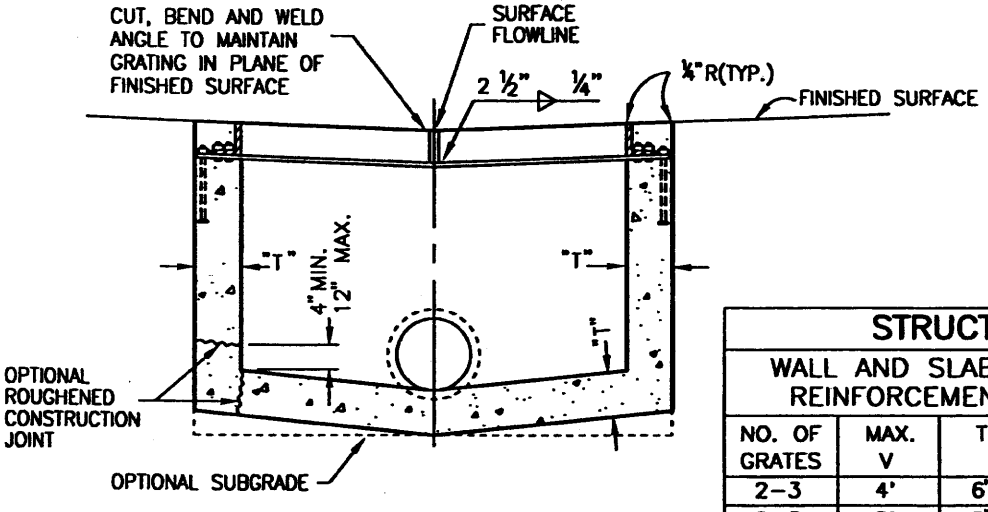
SHEET 2 OF 2



PLAN



SECTION A–A



SECTION B–B

STRUCTURAL DATA

WALL AND SLAB DIMENSIONS AND REINFORCEMENT REQUIREMENTS

NO. OF GRATES	MAX. V	T	REINFORCEMENT FOR WALLS AND SLABS
2–3	4'	6"	NOT REQUIRED
2–3	8'	8"	
2–3	10'	10"	
2–3	12'	10"	REQUIRED
4–6	4'	6"	NOT REQUIRED
4–6	7'	8"	
4–6	8'	8"	REQUIRED
4–6	12'	10"	
7–9	4'	6"	NOT REQUIRED
7–9	6'	8"	
7–9	8'	8"	REQUIRED
7–9	12'	10"	
>9	4'	6"	
>9	8'	8"	
>9	12'	10"	

REV. | APPR. BY | DATE

REV. | APPR. BY | DATE

CITY OF Oxnard

Department of Public Works

GRATED CATCH BASIN–ALLEY (TRANSVERSE)

DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 505

SHEET 1 OF 2

NOTES:

1. ALL CURVED CONCRETE SURFACES SHALL BE FORMED BY CURVED FORMS, AND SHALL NOT BE SHAPED BY PLASTERING.

2. FLOOR OF BASIN SHALL BE GIVEN A STEEL TROWEL FINISH AND SHALL HAVE A LONGITUDINAL AND LATERAL SLOPE OF 1:12 MINIMUM AND 1:3 MAXIMUM. SLOPE FLOOR FROM ALL DIRECTIONS TO THE OUTLET.

3. DIMENSIONS:

   V = 3'-6" UNLESS NOTED ON PROJECT PLANS.

   V_I = THE DEPTH AT THE INVERT OF THE INLET. NOTED ON PLANS.

   W = 4'-3½" FOR TWO GRATINGS; ADD 2'-2" FOR EACH ADDITIONAL GRATING.

   A = THE ANGLE, IN DEGREES, INTERCEPTED BY THE CENTERLINE OF THE CONNECTOR PIPE AND THE CATCH BASIN WALL TO WHICH THE CONNECTOR PIPE IS ATTACHED.

4. PLACE CONNECTOR PIPES AS INDICATED ON THE PROJECT PLANS. UNLESS OTHERWISE SPECIFIED, THE CONNECTOR PIPE SHALL BE LOCATED AT THE DOWNSTREAM END OF THE BASIN. WHERE THE CONNECTOR PIPE IS SHOWN AT A CORNER, THE CENTERLINE OF THE PIPE SHALL INTERSECT THE INSIDE CORNER OF THE BASIN. THE PIPE MAY BE CUT AND TRIMMED AT A SKEW NECCESSARY TO INSURE MINIMUM 3" PIPE EMBEDMENT, ALL AROUND, WITHIN THE CATCH BASIN WALL, AND 3" RADIUS OF ROUNDING OF STRUCTURE CONCRETE, ALL AROUND, ADJACENT TO PIPE ENDS. A MONOLITHIC CATCH BASIN CONNECTION SHALL BE USED TO JOIN THE CONNECTOR PIPE TO THE CATCH BASIN WHENEVER ANGLE "A" IS LESS THAN 70 DEGREES OR GREATER THAN 110 DEGREES, OR WHENEVER THE CONNECTOR PIPE IS LOCATED IN A CORNER. THE OPTIONAL USE OF A MONOLITHIC CATCH BASIN CONNECTION IN ANY CASE IS PERMITTED. MONOLITHIC CATCH BASIN CONNECTIONS MAY BE CONSTRUCTED TO AVOID CUTTING STANDARD LENGTHS OF PIPE.

5. ALL CATCH BASINS SHALL INCLUDE INSTALLATION OF A PLACARD STATING "DON'T DUMP – DRAINS TO OCEAN". PLACARD SHALL BE PLACED ON THE LEFT SIDE OF BASIN OPENING. PLACARDS ARE AVAILABLE FROM STORMWATER QUALITY PROGRAM.

6. THE FOLLOWING STANDARD PLANS ARE INCORPORATED HERIN:

   508 MONOLITHIC CATCH BASIN CONNECTION
   507 CATCH BASIN REINFORCEMENT
   511 FRAME AND GRATING FOR CATCH BASINS

7. TWO GRATINGS ARE REQUIRED UNLESS SHOWN ON THE PROJECT PLANS.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard

Department of Public Works

GRATED CATCH BASIN–ALLEY (TRANSVERSE)

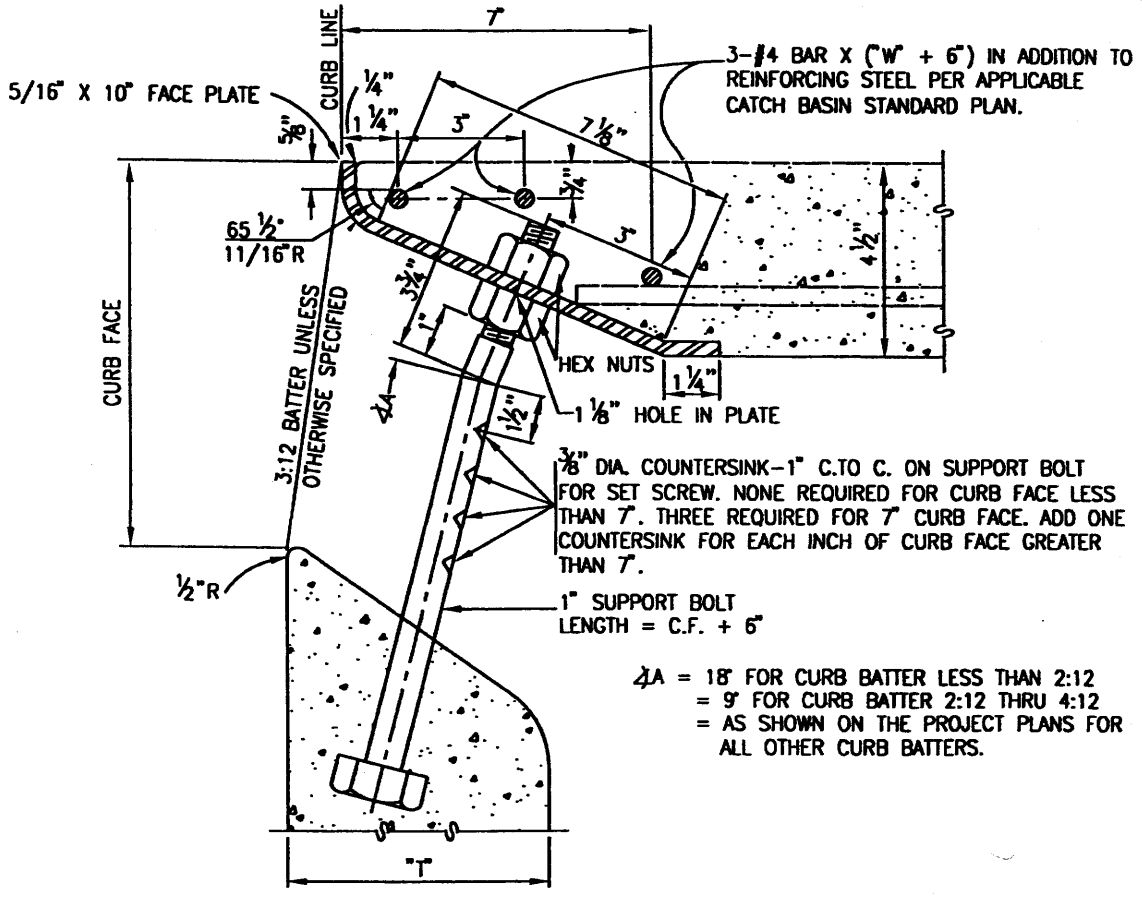
DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 505

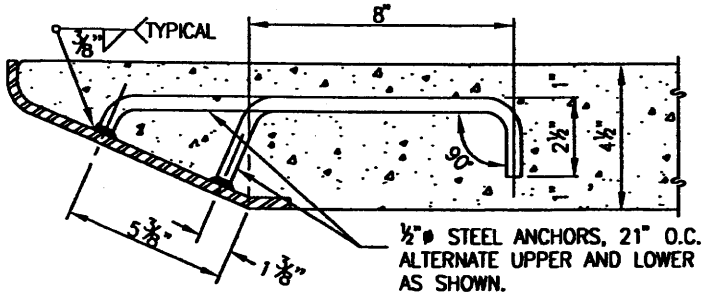
SHEET 2 OF 2



3-#4 BAR X ("W" + 6") IN ADDITION TO REINFORCING STEEL PER APPLICABLE CATCH BASIN STANDARD PLAN.

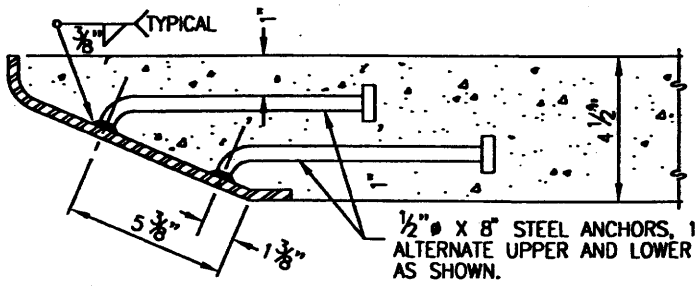
∠A = 18° FOR CURB BATTER LESS THAN 2:12
= 9° FOR CURB BATTER 2:12 THRU 4:12
= AS SHOWN ON THE PROJECT PLANS FOR ALL OTHER CURB BATTERS.

SECTION



1/2"ø STEEL ANCHORS, 21" O.C. MAX. ALTERNATE UPPER AND LOWER ANCHORS AS SHOWN.

HOOK ANCHOR – 4½" TOP SLAB



1/2"ø X 8" STEEL ANCHORS, 15" O.C. MAX. ALTERNATE UPPER AND LOWER ANCHORS AS SHOWN.

ROUND-HEAD ANCHOR – 4½" TOP SLAB

CITY OF Oxnard
Department of Public Works

DETAIL OF CATCH BASIN OPENING

DRAWN: STAFF | CKD.: STAFF

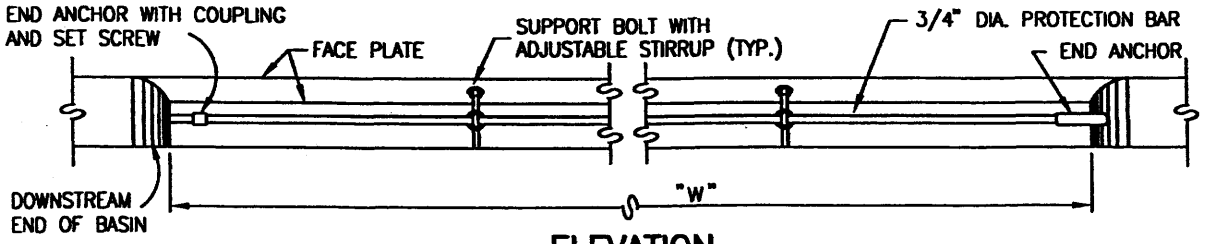
APPR. Granville M. Bowman

STANDARD PLAN 2002

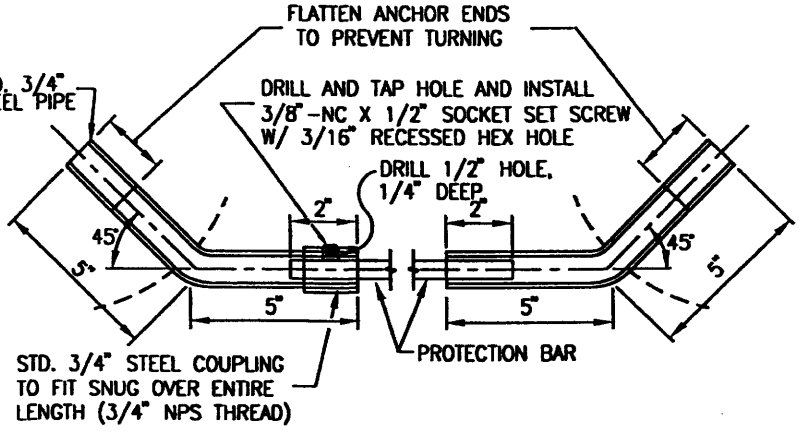
PLATE 506

SHEET 1 OF 3

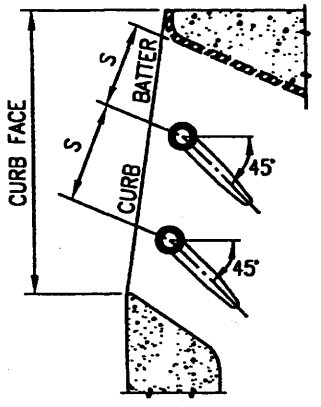
REV.	APPR. BY	DATE



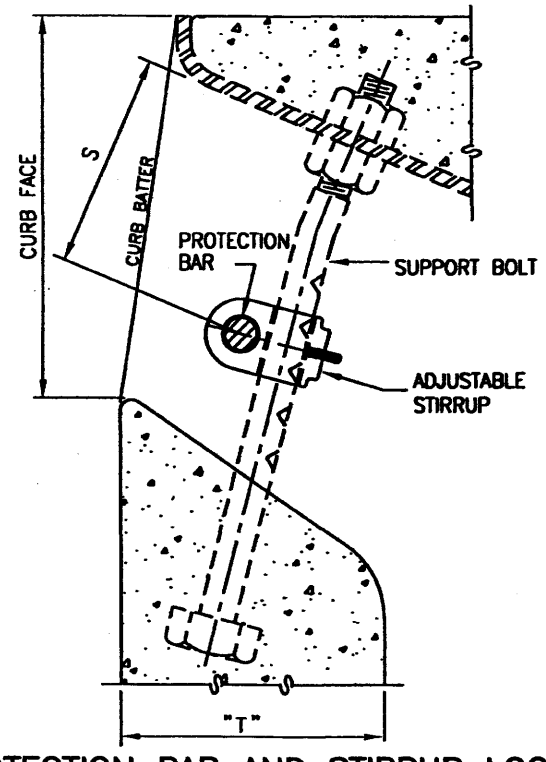
ELEVATION



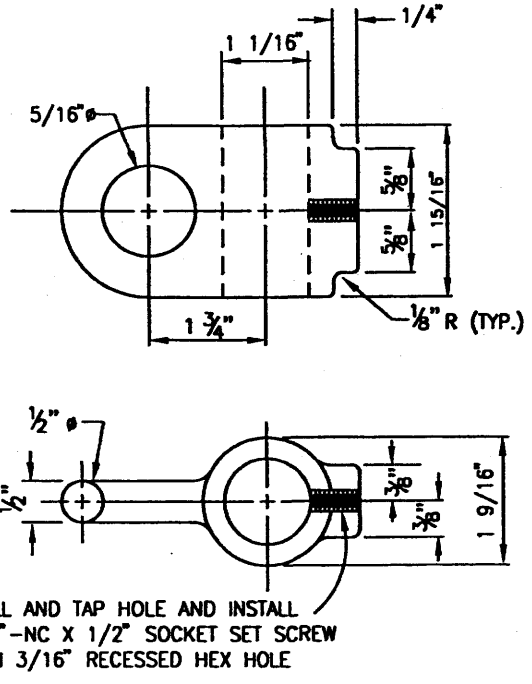
END ANCHOR DETAIL



DOUBLE PROTECTION BAR DETAIL



PROTECTION BAR AND STIRRUP LOCATION



STIRRUP DETAIL

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard

DETAIL OF CATCH BASIN OPENING

DRAWN: STAFF | CKD.: STAFF GB

Department of Public Works

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 506

SHEET 2 OF 3

NOTES:

GENERAL

1. ALL PARTS SHALL BE STEEL EXCEPT THE SET SCREWS, WHICH SHALL BE STAINLESS STEEL OR BRASS.

2. EXCLUDING SET SCREWS, ALL EXPOSED METAL PARTS SHALL BE GALVANIZED AFTER FABRICATION.

3. THE CURB FACE SHALL BE NOTED ON THE PROJECT PLANS.

4. THE CURB BATTER SHALL BE 3:12 UNLESS OTHERWISE NOTED ON THE PROJECT PLANS.

FACE PLATE

5. FACE PLATE LENGTHS SHALL BE CATCH BASIN "W" PLUS 12 INCHES.

6. WHEN THE LENGTH OF THE FACE PLATE IS BETWEEN 22 FT. AND 43 FT., 2 SECTIONS MAY BE USED. WHEN THE LENGTH EXCEEDS 43 FT., 3 SECTIONS MAY BE USED. SECTIONS SHALL BE BUTT WELDED TOGETHER IN THE FIELD, THOROUGHLY CLEANED, PRIMED, AND TWO COATS OF ALUMINUM PAINT APPLIED. ALL OTHER WELDING SHALL BE DONE BEFORE GALVANIZING.

7. WHERE CATCH BASINS ARE TO BE CONSTRUCTED ON CURVES, THE MAXIMUM CHORD LENGTH FOR THE FACE PLATE SHALL BE SUCH THAT THE MAXIMUM PERPENDICULAR DISTANCE TO THE TRUE CURVE SHALL NOT EXCEED ONE INCH. WHERE MORE THAN ONE CHORD IS REQUIRED, CHORD LENGTHS SHALL BE EQUAL. CHORD SECTIONS SHALL BE BUTT WELDED TOGETHER.

8. ROUND HEAD ANCHORS FOR THE FACE PLATE SHALL BE NELSON H-4F SHEAR CONNECTOR, KSN WELDING SYSTEMS DIVISION SHEAR CONNECTOR, OR EQUAL.

SUPPORT BOLT

9. SUPPORT BOLTS ARE REQUIRED WHEN THE LENGTH OF THE CATCH BASIN OPENING IS 7 FT. OR GREATER, AND SHALL BE EVENLY SPACED ACROSS THE OPENING. SPACING SHALL NOT BE LESS THAN 3 FT. 6 INCHES ON CENTER, NOR GREATER THAN 5 FT. ON CENTER.

STIRRUP

10. THE MATERIAL SHALL BE CAST STEEL.

PROTECTION BAR

11. ALL BARS SHALL BE ¾ INCH GALVANIZED, HOT-ROLLED STEEL PER A.S.T.M. DESIGNATION A-36. BAR LENGTHS SHALL NOT EXCEED 21 FT., AND SHALL BE CUT TO FIT IN THE FIELD. WHEN "W" IS OVER 21 FT., THE PROTECTION BAR SHALL CONSIST OF TWO OR MORE SECTIONS DEPENDING ON THE LENGTH OF THE BASIN. THE LOCATION OF SPECIAL SUPPORT BARS AND ADDITIONAL BRASS SOCKET SET SCREW SHALL BE DETERMINED BY THE ENGINEER IN THE FIELD.

12. A SPECIAL CONNECTOR BETWEEN THE PROTECTION BARS SHALL CONSIST OF A 5 INCH LENGTH OF STANDARD ¾ INCH PIPE WITH STANDARD COUPLINGS FULLY THREADED ONTO EACH END, DRILLED AND TAPPED FOR A SOCKET SET SCREW AS DETAILED FOR THE DOWNSTREAM END ANCHOR.

13. NUMBER OF PROTECTION BARS AND LOCATION(S) ARE AS FOLLOWS:

CURB BATTER	MAXIMUM CURB FACE													"S" DIMENSION
	0"-6"	7"	8"	9"	10"	11"	12"	13"	14"	15"	16"	17"	18"	
0:12	0	0	3.5"	3.5"	3.5"	4.5"	4.5"	5.5"	3.5"	3.5"	4.5"	4.5"	4.5"	
1:12	0	0	3.5"	3.5"	3.5"	4.5"	4.5"	5.5"	3.5"	3.5"	4.5"	4.5"	5.5"	
2:12	0	0	3.5"	3.5"	4.5"	4.5"	5.5"	3.5"	3.5"	4.5"	4.5"	5.5"	5.5"	
3:12	0	0	3.5"	3.5"	4.5"	4.5"	5.5"	3.5"	4.5"	4.5"	5.5"	5.5"	4.5"	
4:12	0	3.5"	3.5"	4.5"	4.5"	5.5"	3.5"	3.5"	4.5"	4.5"	5.5"	4.5"	4.5"	
	0	1					2					3		
	NUMBER OF PROTECTION BARS													

FOR OTHER CURB FACE OR BATTER, SEE PROJECT PLANS.

REV. APPR. BY DATE

REV. APPR. BY DATE

CITY OF Oxnard

Department of Public Works

DETAIL OF CATCH BASIN OPENING

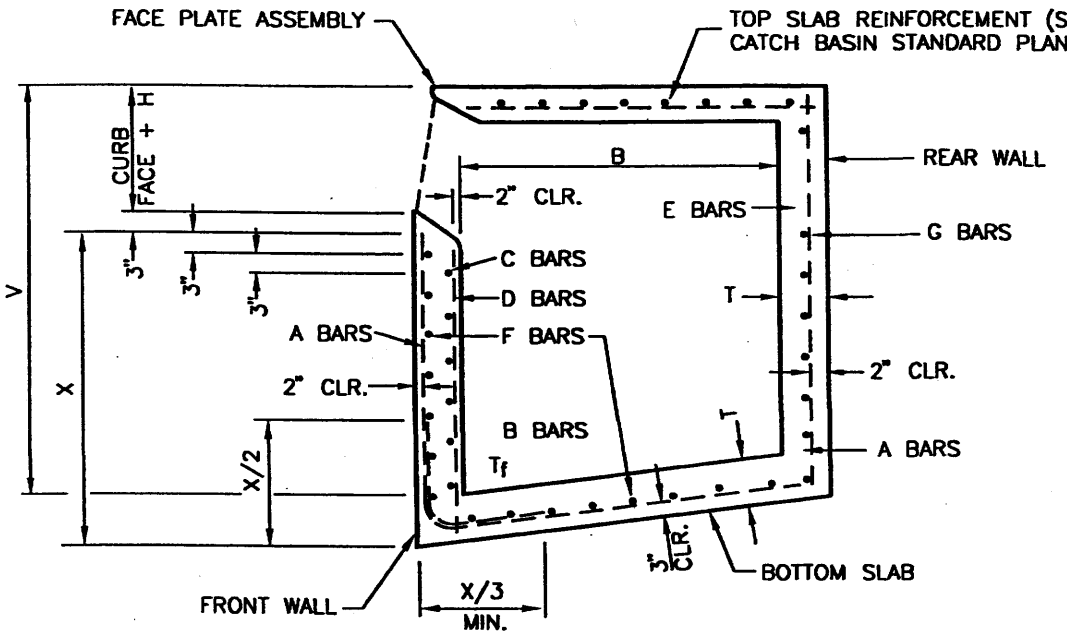
DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 506

SHEET 3 OF 3



TYPICAL REINFORCEMENT DETAILS

CURB OPENING CATCH BASIN REINFORCEMENT									
MAX. W	MAX. V	T	T_f	A & B BARS	C BARS	D BARS	E BARS	F BARS	G BARS
3.5'	8'	6"	6"						
3.5'	12'	8"	8"						
7'	6'	6"	6"						
7'	12'	8"	8"						
14'	4'	6"	6"		#4 @ 12"	#4 @ 18"			
14'	8'	6"	8"		#4 @ 12"	#4 @ 18"			
14'	12'	8"	10"		#4 @ 6"	#4 @ 18"			
28'	4'	6"	6"	#4 @ 24"				#4 @ 18"	
28'	5'	6"	8"	#4 @ 24"				#4 @ 18"	
28'	6'	6"	8"	#4 @ 18"				#4 @ 18"	
28'	7'	8"	8"	#4 @ 17"				#4 @ 18"	
28'	8'	8"	8"	#4 @ 13"				#4 @ 18"	
28'	9'	8"	10"	#4 @ 15"				#4 @ 18"	
28'	10'	8"	10"	#4 @ 12"				#4 @ 18"	
28'	11'	8"	10"	#5 @ 15"			#4 @ 10"	#4 @ 18"	#4 @ 18"
28"	12'	8"	10"	#6 @ 18"			#4 @ 9"	#4 @ 18"	#4 @ 18'
FOR W > 28' OR B > 4' SEE PROJECT PLANS									

REV. | APPR. BY | DATE

REV. | APPR. BY | DATE

CITY OF Oxnard

Department of Public Works

CATCH BASIN REINFORCEMENT

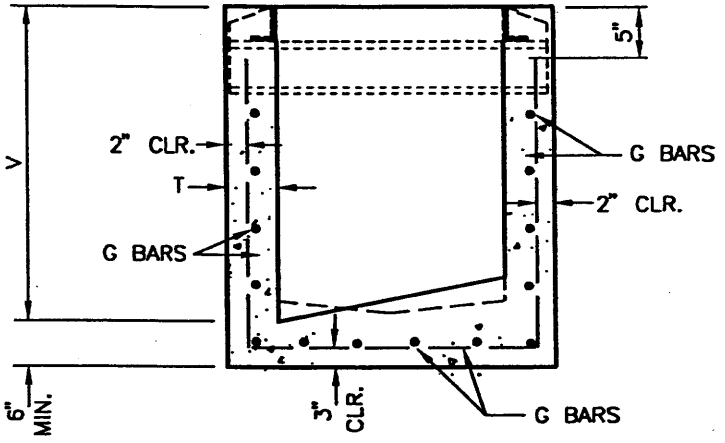
DRAWN: STAFF | CKD.: STAFF CB

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 507

SHEET 1 OF 2



TYPICAL REINFORCEMENT DETAILS

V	T	SIDE AND END WALL STEEL
MAX.		G BARS
4'	6"	#4 @ 10"
8'	8"	#4 @ 6"
12'	10"	#5 @ 6"
FOR V > 12' SEE PROJECT PLANS		

GRATING CATCH BASIN REINFORCEMENT

NOTES:

1. UNLESS OTHERWISE SPECIFIED, REINFORCEMENT FOR CURB OPENING AND GRATING CATCH BASINS SHALL TERMINATE 2" FROM FACE OF CONCRETE.

REV. | APPR. BY | DATE

REV. | APPR. BY | DATE

CITY OF Oxnard

Department of Public Works

CATCH BASIN REINFORCEMENT

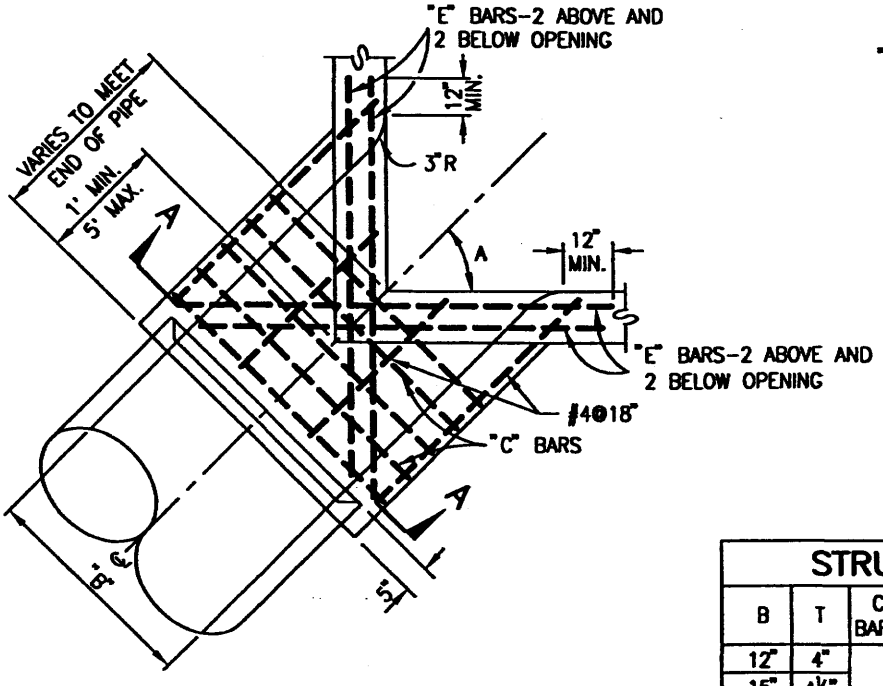
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

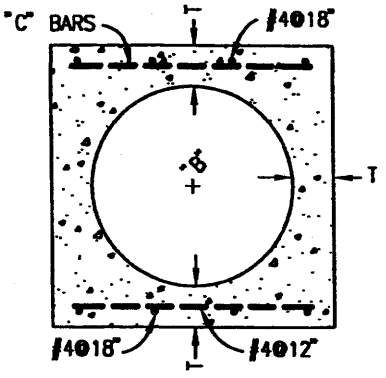
STANDARD PLAN 2002

PLATE 507

SHEET 2 OF 2

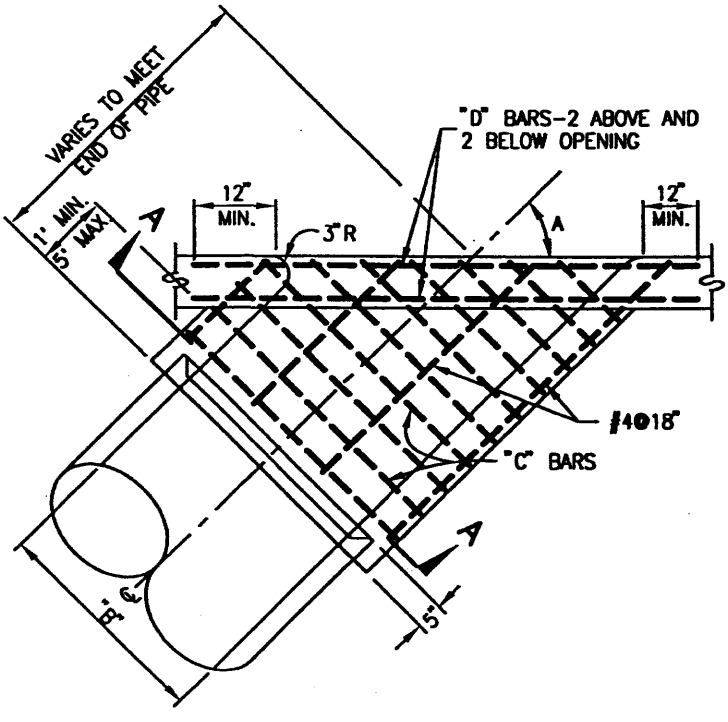


PLAN
CORNER CONNECTION



SECTION A-A

STRUCTURAL DATA							
B	T	C BARS	D&E BARS	B	T	C BARS	D&E BARS
12"	4"	#4 @ 6"	#5	42"	7½"	#5 @ 6"	#6
15"	4¼"			45"	7¾"		
18"	4½"			48"	8"		
21"	5"			51"	8½"		
24"	5¼"			54"	9"		
27"	5½"			57"	9¼"		
30"	6"			60"	9½"		
33"	6¼"			63"	10"		
36"	6½"			66"	10¼"		
39"	7"			69"	10¾"		
				72"	11"		
FOR "B" GREATER THAN 72", SEE PROJECT PLAN							



PLAN
SIDE CONNECTION

NOTES:

1. REINFORCING STEEL SHALL BE 1½" CLEAR FROM FACE OF CONCRETE UNLESS OTHERWISE SHOWN.
2. REINFORCING STEEL FOR INSIDE FACE OF CATCH BASIN WALL SHALL BE CUT AT CENTER OF OPENING AND BENT INTO WALLS OF MONOLITHIC CONNECTION. REINFORCING STEEL FOR OUTSIDE FACE OF CATCH BASIN WALL SHALL BE CUT 2" CLEAR OF OPENING.
3. CONNECTION SHALL BE POURED MONOLITHIC WITH CATCH BASIN. THE ROUNDED EDGE OF OUTLET SHALL BE CONSTRUCTED BY POURING CONCRETE AGAINST A CURVED FORM WITH A RADIUS OF 3".
4. FLOOR OF STRUCTURE SHALL BE STEEL-TROWELED TO SPRING LINE.
5. CONNECTIONS SHALL BE CONSTRUCTED WHEN:
   (A) PIPE INLET OR OUTLET IS THROUGH CORNER OF CATCH BASIN.
   (B) ANGLE A, FOR PIPES UP TO 30" IN DIA., IS LESS THAN 70° OR GREATER THAN 110°.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

MONOLITHIC CATCH BASIN CONNECTION

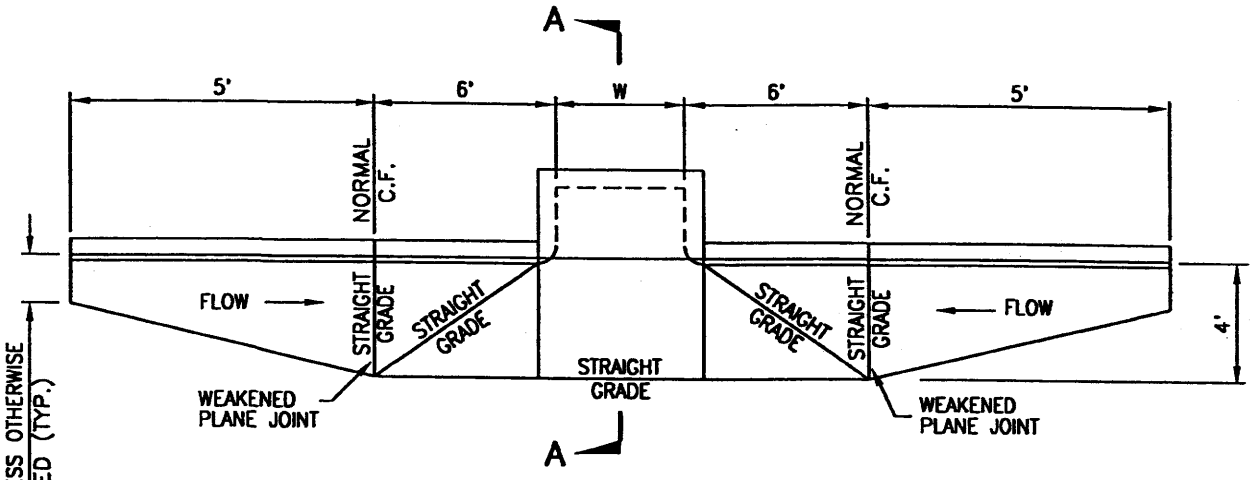
DRAWN: STAFF | CKD.: STAFF LB

APPR. Granville M. Bowman

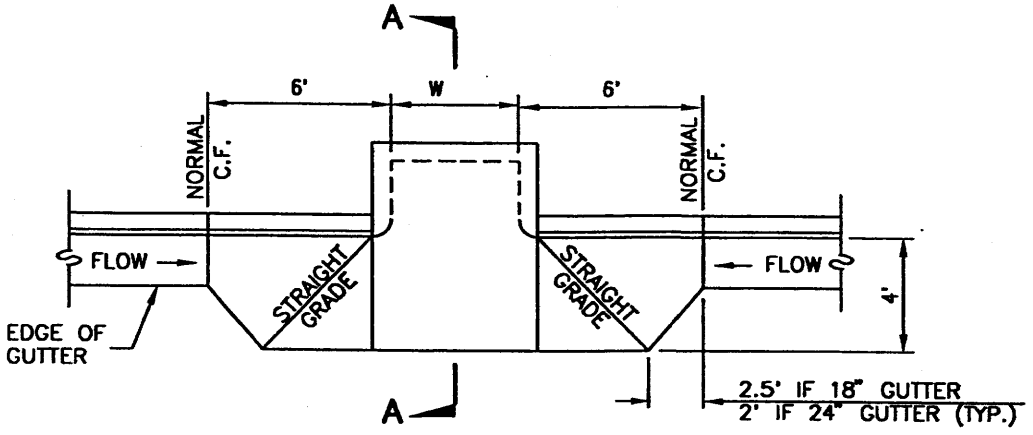
STANDARD PLAN 2002

PLATE 508

SHEET 1 OF 1

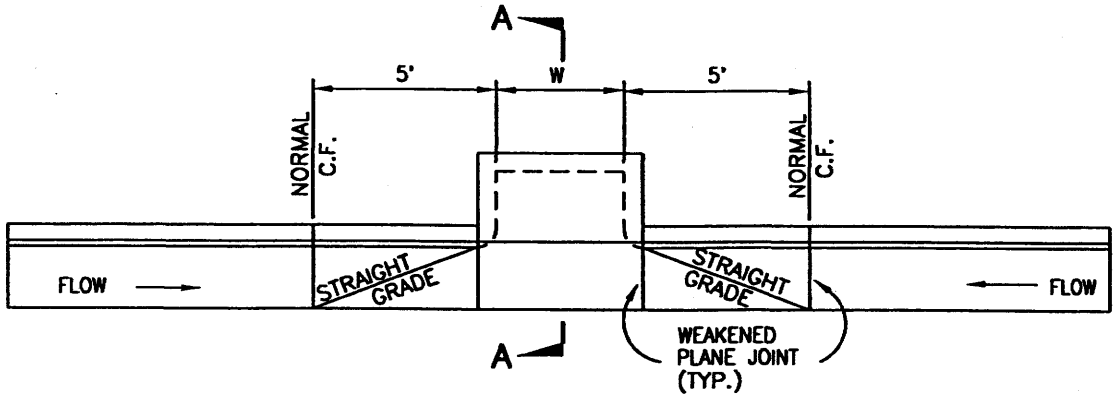


PLAN – CASE A



PLAN – CASE B

SEE NOTE 3



PLAN – CASE C

SEE NOTE 4

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard

Department of Public Works

LOCAL DEPRESSION FOR SIDE OPENING CATCH BASIN

DRAWN: STAFF CKD.: STAFF CB

APPR. Granville M. Bowman

STANDARD PLAN 2002

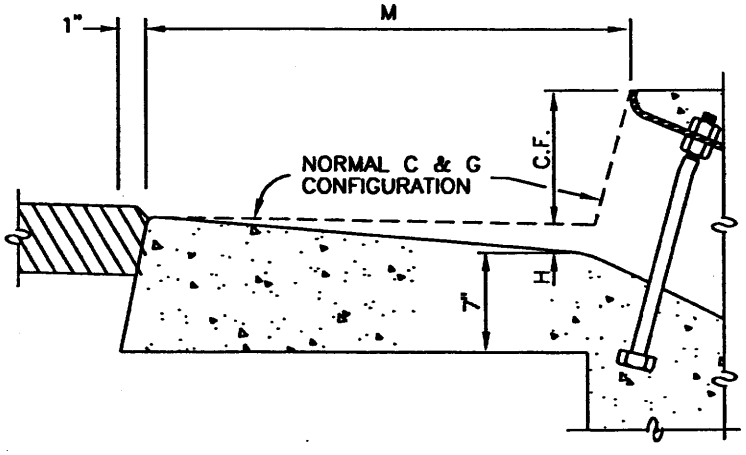
PLATE 509

SHEET 1 OF 2

NOTES:

1. H = 2" FOR CASES A & B, H=1" FOR CASE C UNLESS SPECIFIED OTHERWISE
2. F'c = 3000 PSI AT 28 DAYS. "C" GRADATION
3. CASE B WILL BE USED ONLY WHEN THE AGENCY HAS APPROVED THE USE FOR SPECIAL CIRCUMSTANCES.
4. USE CASE C IF FLOW FROM EACH DIRECTION IS LESS THAN 1CFS

M = 4' FOR CASES A & B
= GUTTER WIDTH FOR CASE C



SECTION A–A

REV. APPR. BY DATE

REV. APPR. BY DATE

CITY OF Oxnard

Department of Public Works

DRAWN: STAFF CKD.: STAFF

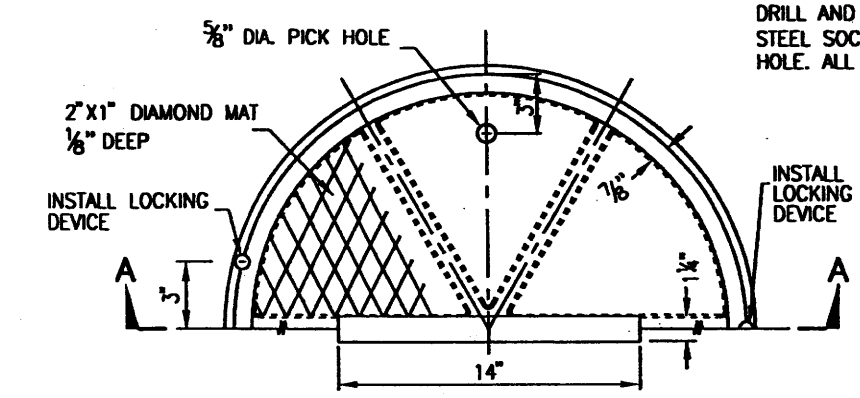
APPR. Granville M. Bowman

LOCAL DEPRESSION FOR SIDE OPENING CATCH BASIN

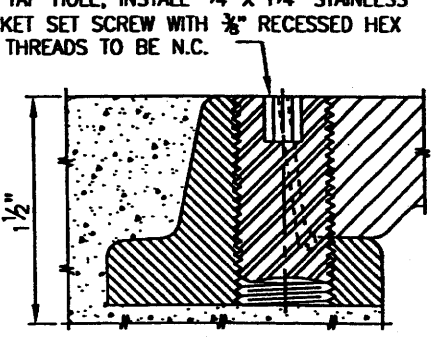
STANDARD PLAN 2002

PLATE 509

SHEET 2 OF 2

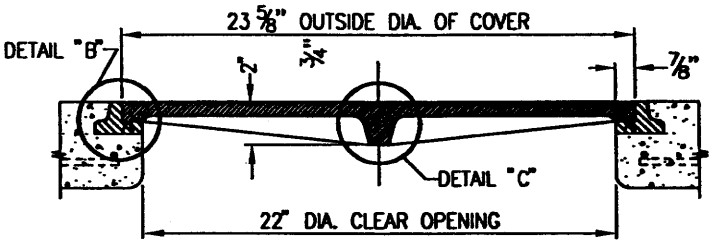


PLAN

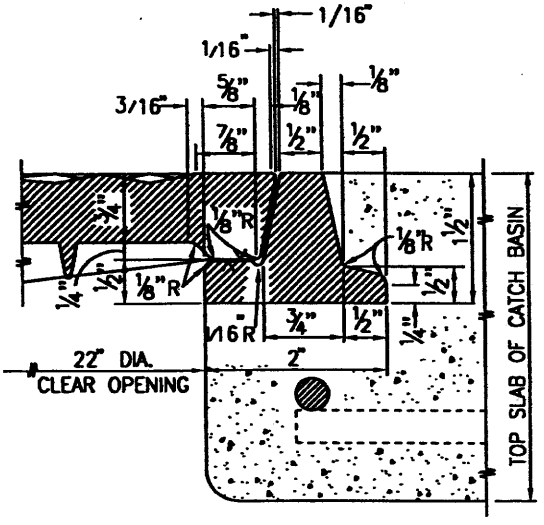


LOCKING DEVICE

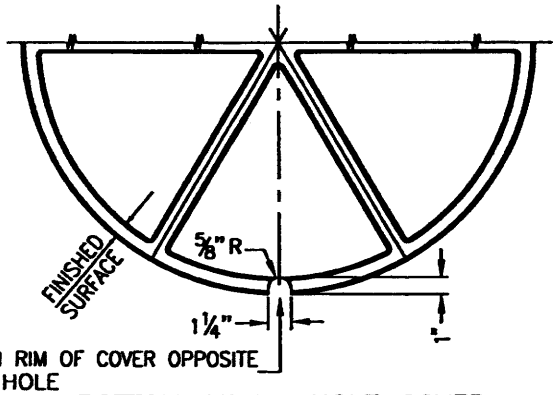
AGENCY DESIGNATED INSCRIPTION. ALL LETTERS 1" HIGH. NO OTHER INSCRIPTION TO APPEAR ON EXPOSED SURFACES.



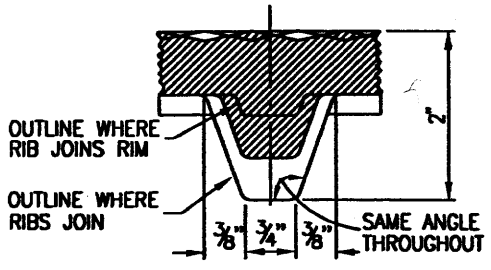
SECTION A–A



DETAIL "B"



BOTTOM OF MANHOLE COVER



DETAIL "C"

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 INDENTIFYING 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 30 LBS.. WEIGHT OF COVER SHALL BE 85 LBS. ACTUAL WEIGHTS SHALL BE WITHIN A RANGE OF 95% TO 110%.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard

Department of Public Works

CATCH BASIN MANHOLE FRAME AND COVER

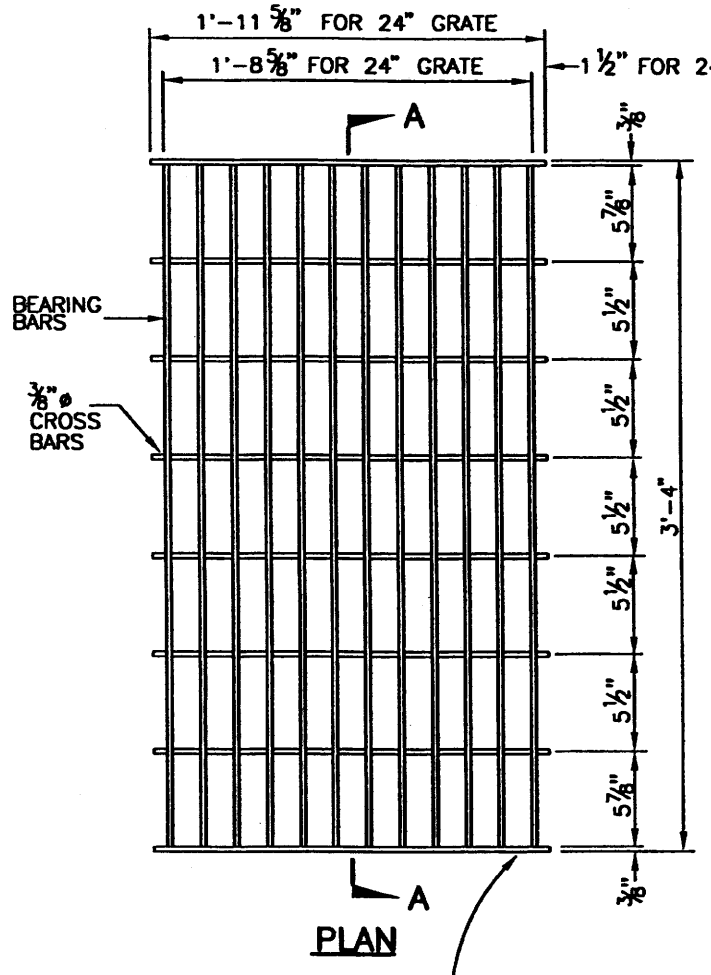
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 510

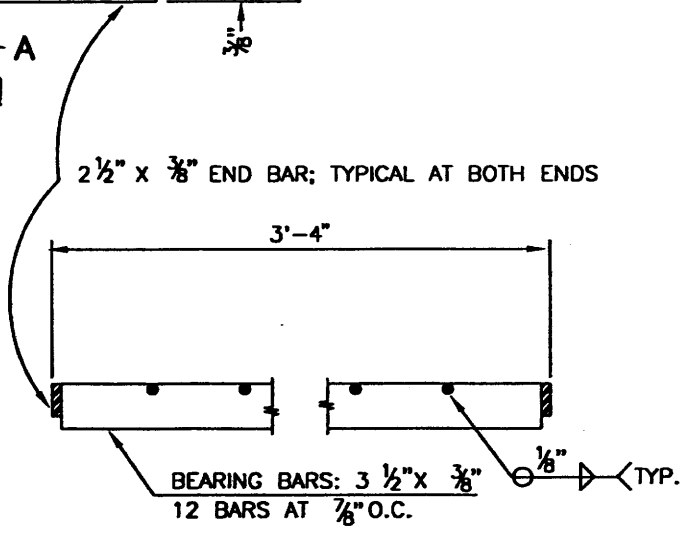
SHEET 1 OF 1



PLAN

NOTES:

1. WEIGHT OF 24" GRATE = 192 LBS.
2. 3/8" ø CROSS BARS MAY BE FILLET WELDED, RESISTANCE WELDED, OR ELECTRO-FORGED TO BEARING BARS.
3. ALL PARTS ARE TO BE GALVANIZED AFTER FABRICATION.
4. ALL DIMENSIONS ARE FINISHED DIMENSIONS, AND INCLUDE GALVANIZING.
5. ALL THREADS SHALL BE NATIONAL COARSE.
6. CENTER SUPPORT ASSEMBLY REQUIRED WHEN MORE THAN ONE GRATE IS CALLED FOR.



SECTION A–A

ATTENTION: PREFER CURB OPENING C.B., NO C.B. WITH GRATES IS PERMITTED WITHOUT PRIOR APPROVAL.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

BICYCLE PROOF GRATE DETAILS

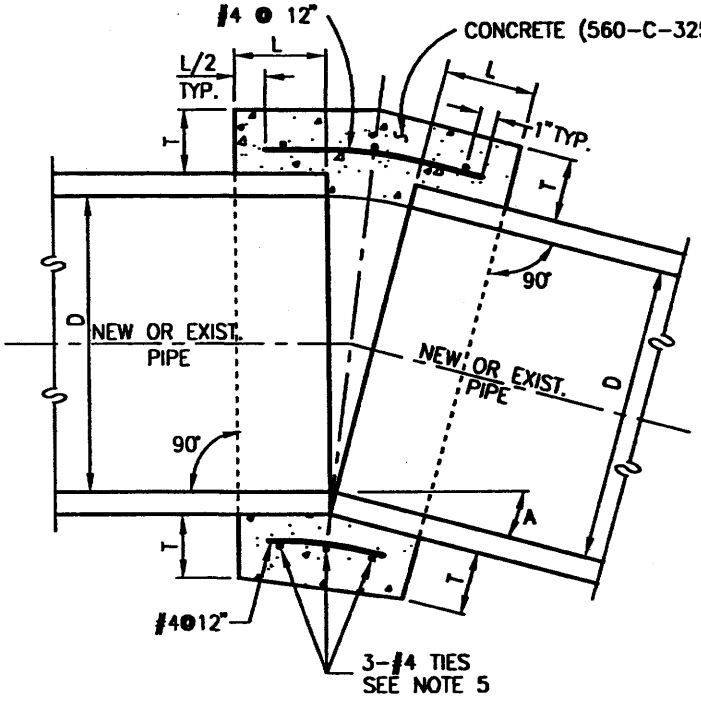
DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 511

SHEET 1 OF 1



D	L	T
12"	12"	4"
18"	12"	5"
24"	12"	6"
30"	18"	7"
36"	18"	9"
42"	18"	9"
48"	18"	10"
57"	18"	10"
60"	21"	11"
66"	21"	11"
72"	24"	12"

REV. APPR. BY DATE

REV. APPR. BY DATE

NOTES:

1. A CONCRETE COLLAR IS REQUIRED WHEN THE CHANGE IN GRADE OR ALIGNMENT EXCEEDS 10 PERCENT.
2. WHERE REINFORCING IS REQUIRED THE DIAMETER OF THE CIRCULAR TIES SHALL BE D + (2 x WALL THICKNESS) + T.
3. FOR PIPE LARGER THAN 72", A SPECIAL COLLAR DETAIL IS REQUIRED.
4. FOR PIPE SIZE NOT LISTED, USE THE NEXT SIZE LARGER.
5. REINFORCING SHALL BE USED WHERE THE PIPE DIA. IS GREATER THAN 21" AND ON ALL ALL PIPES WHERE THE SPACES BETWEEN THE EXTREME OUTER ENDS IS 3" OR LARGER.
6. PIPE MAY BE CORRUGATED METAL PIPE, CONCRETE PIPE, OR REINFORCED CONCRETE PIPE.
7. NOT TO BE USED FOR A SIZE CHANGE.

CITY OF Oxnard

Department of Public Works

CONCRETE COLLAR

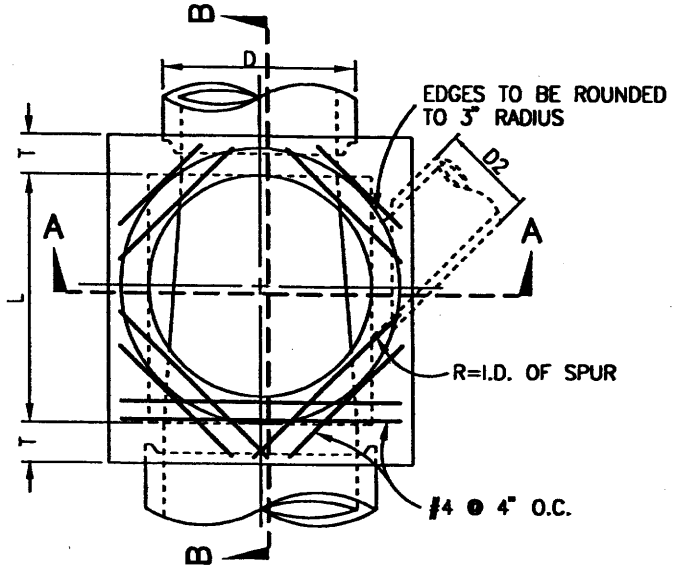
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

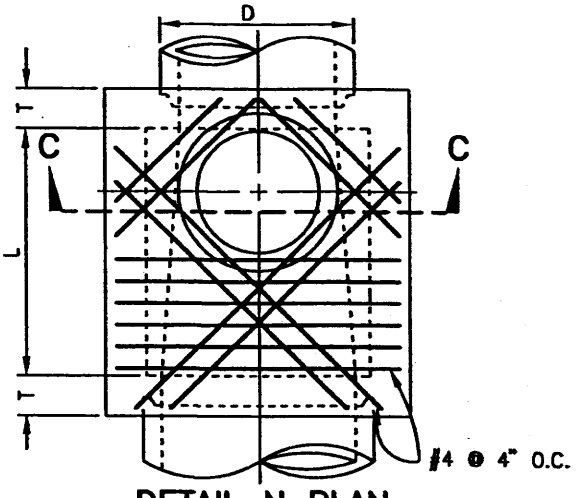
STANDARD PLAN 2002

PLATE 512

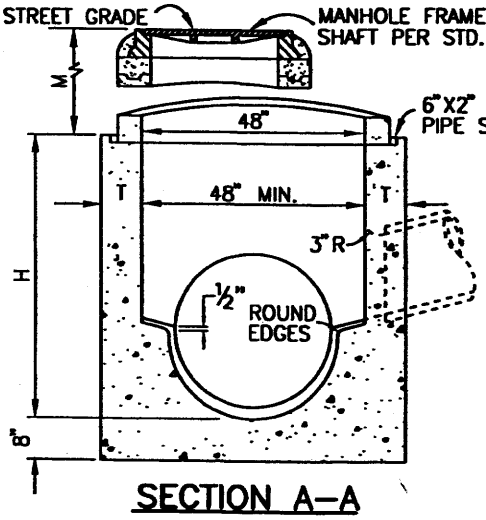
SHEET 1 OF 1



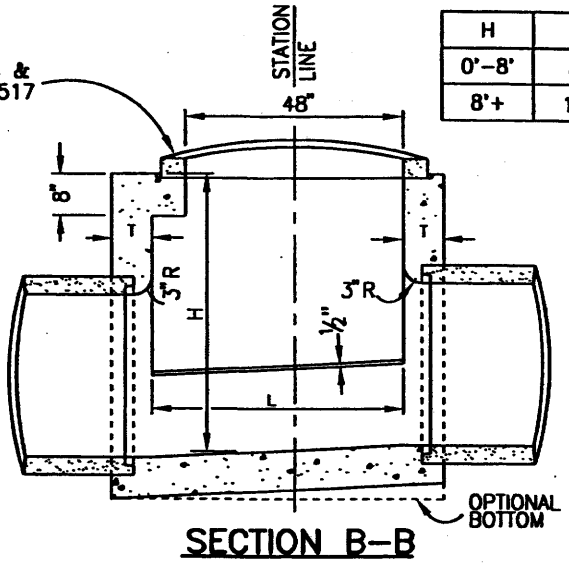
PLAN
(SHAFT NOT SHOWN)



DETAIL N PLAN
(SHAFT NOT SHOWN)
SEE NOTE 3

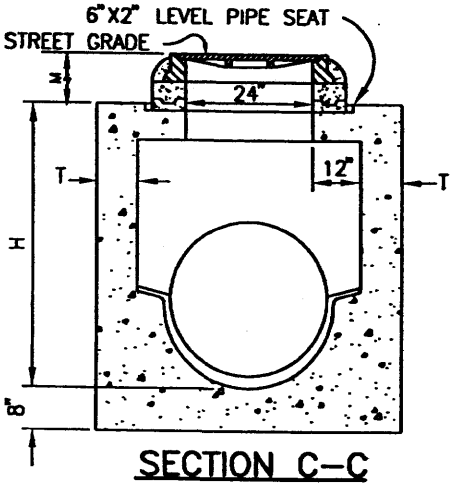


SECTION A–A



H	T
0'–8'	8"
8'+	10"

SECTION B–B



SECTION C–C

NOTES:

1. HEIGHT H (IN SEC. A–A, B–B, AND C–C) SHALL NOT BE LESS THAN 4'–0", BUT MAY BE INCREASED PROVIDED THAT THE VALUE OF M IS NOT LESS THAN THE MINIMUM SPECIFIED, AND THE REDUCER IS USED. FOR H (IN SEC. C–C) SEE NOTE 4.
2. LENGTH L SHALL BE 4 FEET UNLESS OTHERWISE SHOWN ON THE PLAN. L MAY BE INCREASED OR THE LOCATION OF THE MANHOLE SHIFTED TO MEET THE PIPE ENDS.
3. MANHOLE SHAFT SHALL BE CONSTRUCTED PER SEC. C–C AND DETAIL N WHEN DEPTH M, FROM FINISHED GRADE TO TOP OF BOX, IS LESS THAN 36".
4. DEPTH M MAY BE REDUCED TO AN ABSOLUTE MINIMUM OF 6" WHEN LARGER VALUES OF M WOULD REDUCE H (IN SEC. C–C) TO 3'–6" OR LESS.
5. CRADLE OF MANHOLE SHALL BE POURED IN ONE CONTINUOUS OPERATION EXCEPT THAT A CONSTRUCTION JOINT WITH A LONGITUDINAL KEYWAY MAY BE PLACED AT THE SPRING LINE.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

MANHOLE NO. 1
(MAIN LINE 42" OR SMALLER)

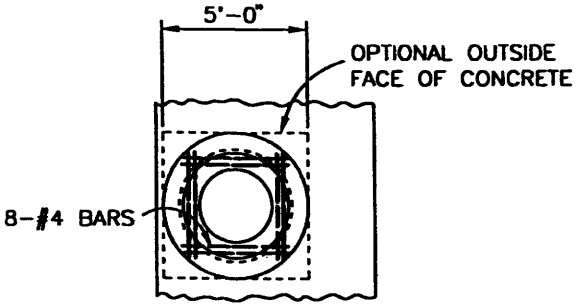
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

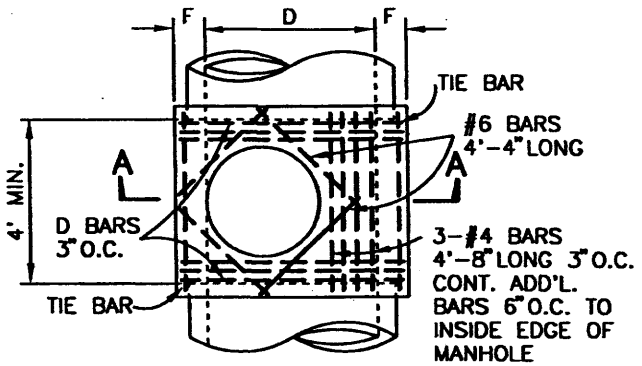
STANDARD PLAN 2002

PLATE 513

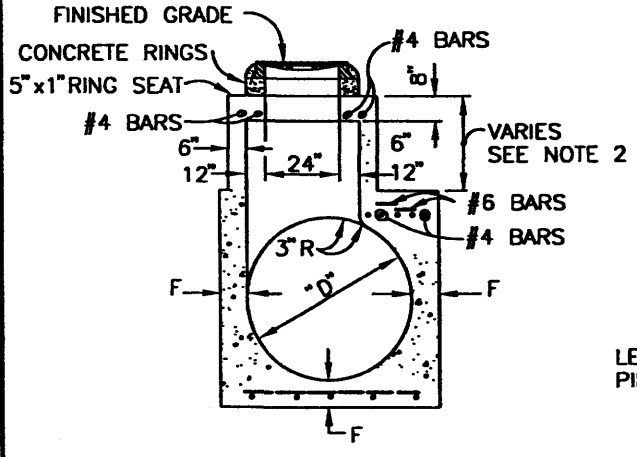
SHEET 1 OF 1



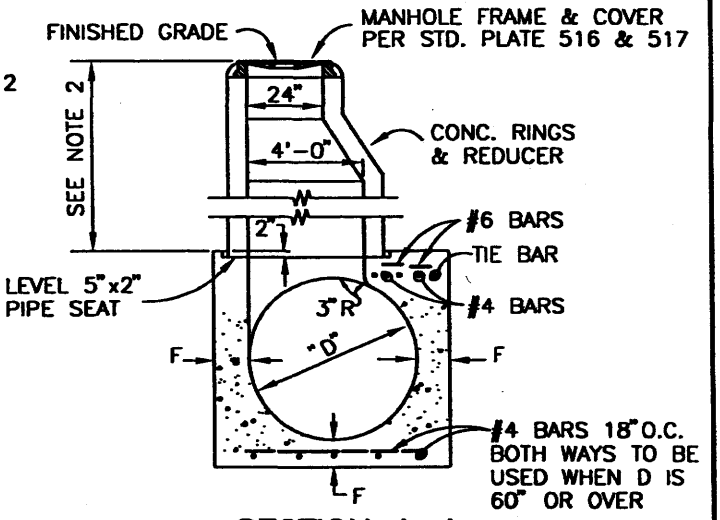
PLAN
(RINGS AND COVER NOT SHOWN)



PLAN
(SHAFT NOT SHOWN)



DETAIL M
(SEE NOTE 2)



SECTION A-A

NOTES:

1. D BARS SHALL BE #5 FOR D=48" TO 84" INCLUSIVE AND #6 FOR D=90" OR OVER. TIE BARS SHALL BE #3 BARS.
2. DETAIL M: WHEN DEPTH OF MANHOLE FROM FINISHED GRADE TO TOP OF BOX IS LESS THAN 36" CONSTRUCT MONOLITHIC SHAFT AS PER DETAIL M. SHAFT FOR ANY DEPTH OF MANHOLE MAYBE CONSTRUCTED AS PER DETAIL M.
3. REINFORCING STEEL TO BE 2" CLEAR FROM FACE OF CONCRETE UNLESS OTHERWISE SPECIFIED.
4. RINGS, REDUCER AND PIPE FOR ACCESS SHAFT SHALL BE SEATED IN MORTAR AND NEATLY POINTED OR WIPED INSIDE THE SHAFT.
5. CRADLE OF MANHOLE SHALL BE POURED IN ONE CONTINUOUS OPERATION, EXCEPT THAT A CONSTRUCTION JOINT WITH A LONGITUDINAL KEYWAY MAYBE PLACED AT THE SPRING LINE.

TABLE OF VALUES FOR 'F'	
D	F
48"	8"
51" & 54"	9"
57", 60", 63", 66"	10"
69" & 72"	11"
78", 84", 90", 96"	14"
102", 108", 114"	16"
120", 126", 132", 138", 144"	18"

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

MANHOLE No. 2
(MAIN LINE 45" OR LARGER)

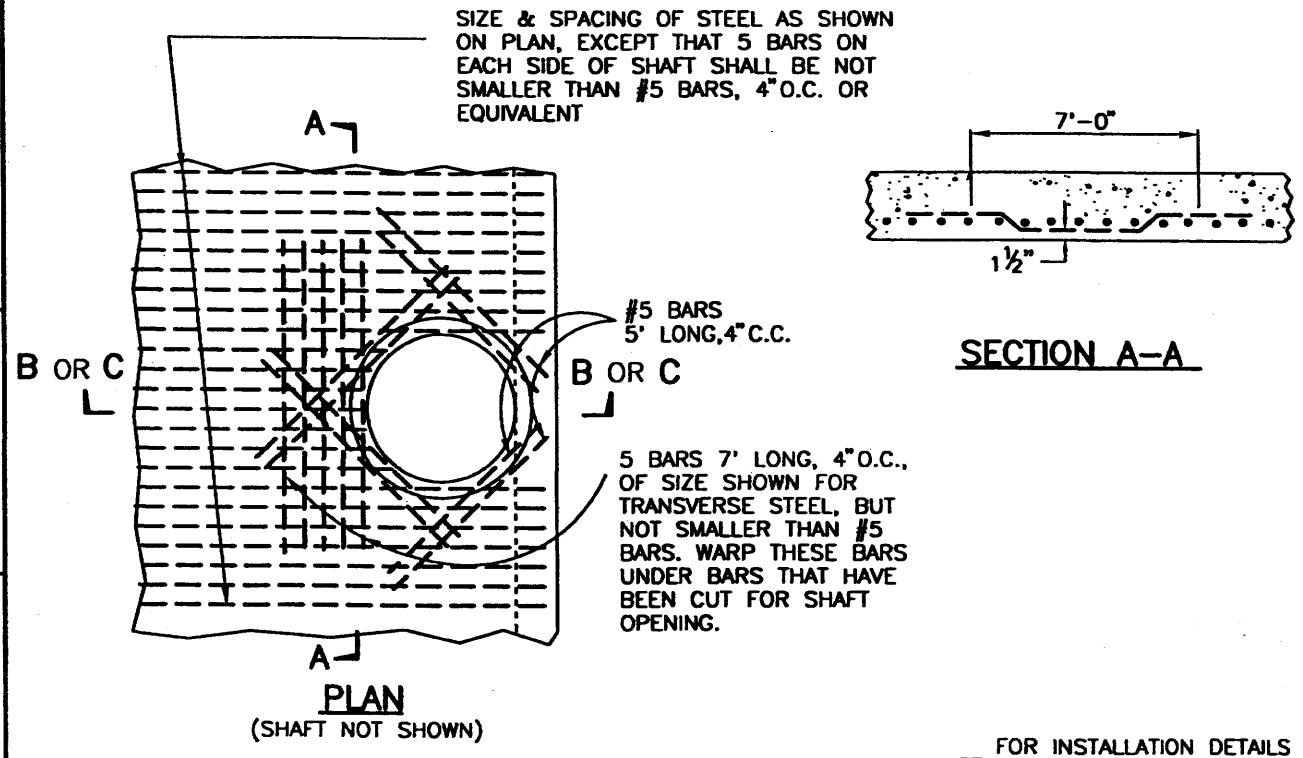
DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

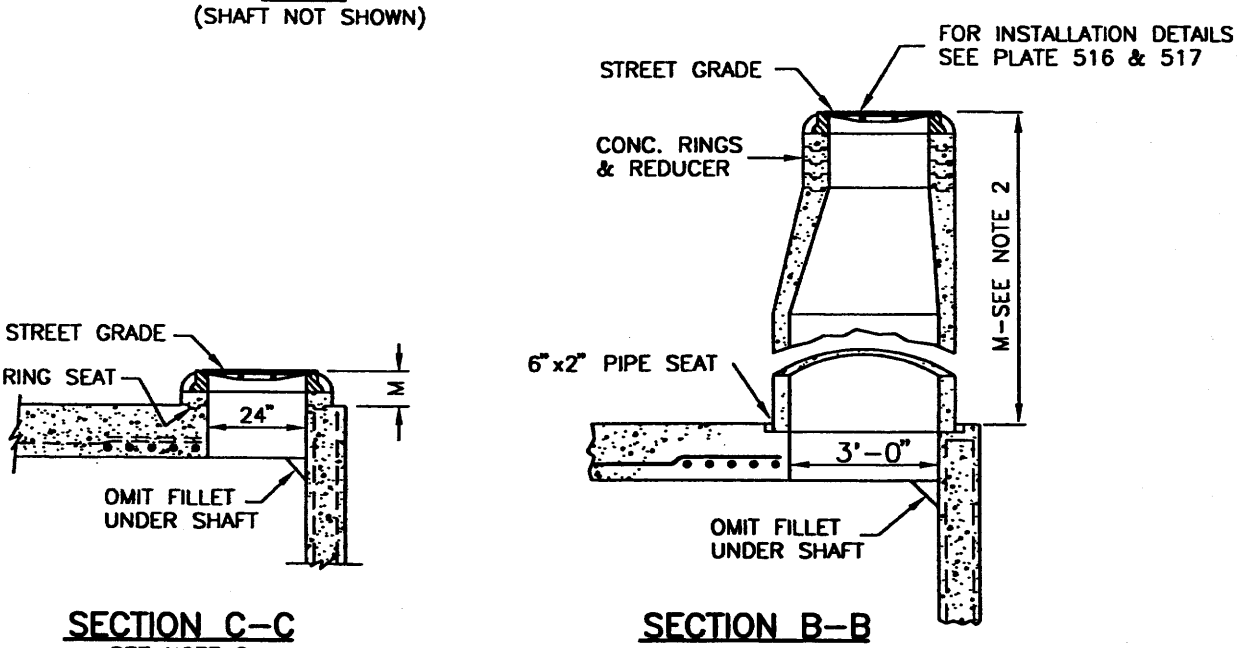
PLATE 514

SHEET 1 OF 1



PLAN
(SHAFT NOT SHOWN)

SECTION A-A



SECTION C-C
SEE NOTE 2

SECTION B-B

MANHOLE FOR
BOX SECTION STORM DRAIN

NOTES:

1. FOR DETAILS OF ACCESS SHAFT SEE PLATE No. 516 & 517.
2. DEPTH M: WHEN DEPTH M FROM STREET GRADE TO TOP OF THE BOX IS LESS THAN 2'-10½" FOR PAVED STREETS OR 3'-6" FOR UNPAVED STREETS, CONSTRUCT SHAFT PER SECTION C-C.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

MANHOLE No. 3
(IN CONCRETE BOX STORM DRAIN)

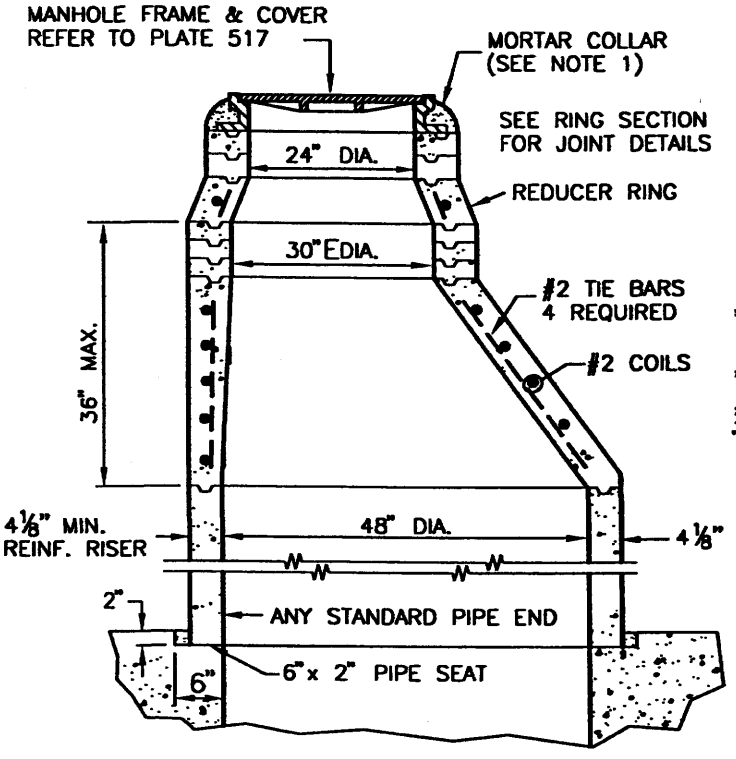
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

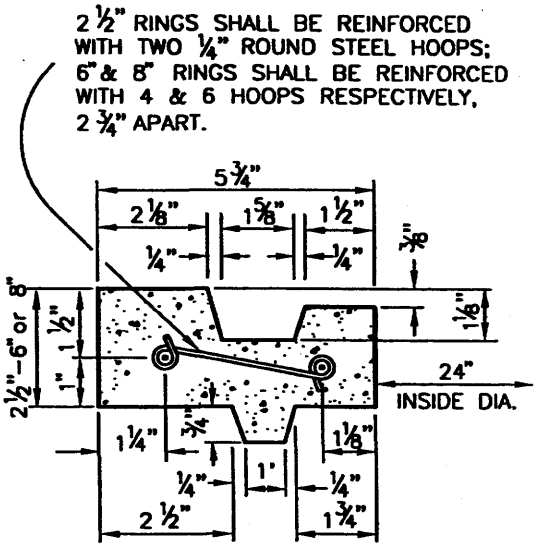
STANDARD PLAN 2002

PLATE 515

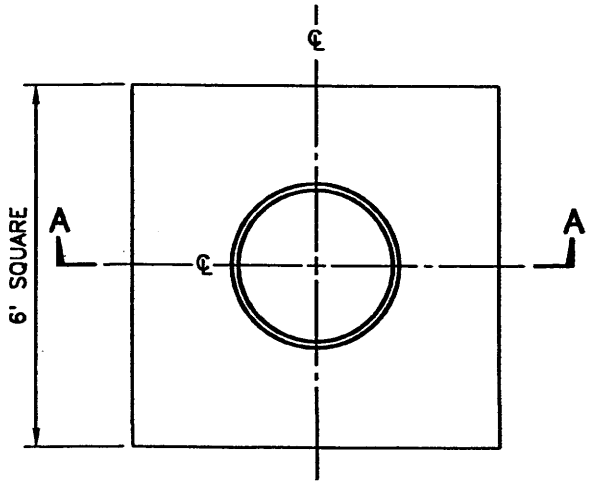
SHEET 1 OF 1



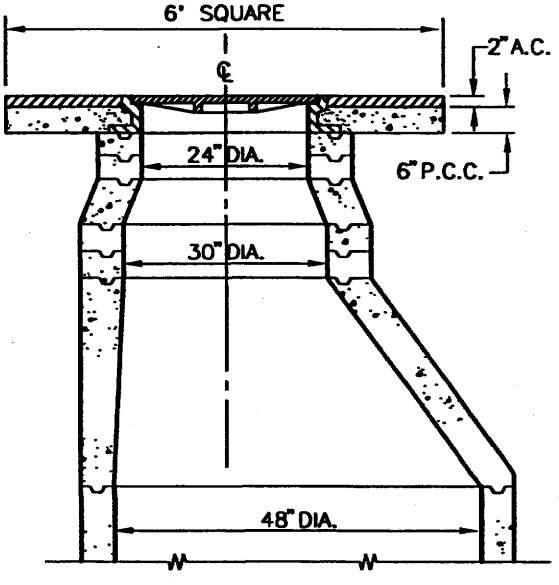
VERTICAL SECTION
OF REINFORCED CONCRETE
ECCENTRIC MANHOLE SHAFT



CROSS SECTION
OF REINFORCED CONCRETE RING



PLAN VIEW



SECTION A–A

NOTES:

1. MORTAR COLLAR AROUND COVER FRAME SHALL BE OMITTED IN PAVED STREETS.
2. ALL JOINTS SHALL BE FILLED WITH MORTAR AND NEATLY POINTED OR WIPED ON INSIDE OF SHAFT.

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CONCRETE RINGS, REDUCER FOR MANHOLE SHAFT

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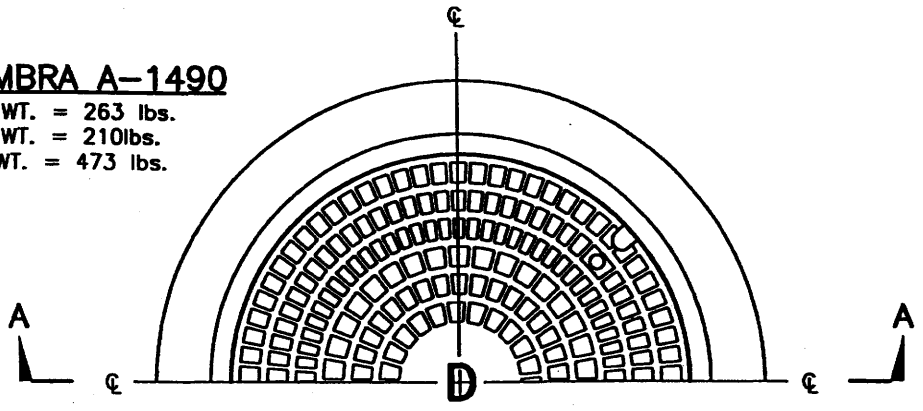
STANDARD PLAN 2002

PLATE 516

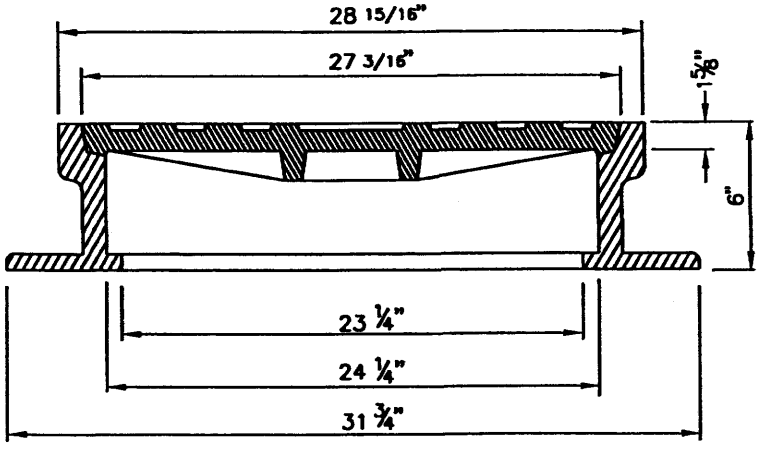
SHEET 1 OF 1

ALHAMBRA A-1490

COVER WT. = 263 lbs.
FRAME WT. = 210lbs.
TOTAL WT. = 473 lbs.



PLAN



SECTION

NOTES:

1. MANHOLE FRAMES AND COVERS SHALL BE ALHAMBRA A-1490, (OR APPROVED EQUAL) WITH ASPHALTUM PAINT.
2. FOUNDRY MARK SHALL BE SHOWN ON THE FRAME (INSIDE OR OUTSIDE) AND ON THE BOTTOM OF THE COVER.
3. COVERS SHALL BEAR THE LETTER "D" FOR STORM DRAINS AND "S" FOR SEWERS. THE LETTERS SHALL BE APPROXIMATELY 2 1/2" HIGH WITH 1/2" LINE WIDTH AND PLACED IN THE CENTER OF THE COVER. COVERS SHALL ALSO BEAR THE AGENCY'S IDENTIFICATION IN ACCORDANCE WITH INSTRUCTIONS FURNISHED BY THE AGENCY. ALL LETTERS SHALL BE FLUSH WITH THE FINISHED SURFACE OF THE COVER.
4. COVERS FOR MANHOLES LOCATED IN EASEMENTS, PARKWAYS, AND ALL OTHER PLACES EXCEPT PAVED STREETS OR ALLEYS SHALL BE PROVIDED WITH ALLEN SOCKET SET SCREW LOCKING DEVICES. THE CONTRACTOR SHALL DRILL AND TAP TWO HOLES TO A DEPTH OF 1 INCH AT 90 DEGREES TO PICK HOLE AND INSTALL 3/4 BY 3/4 INCH ALLEN SOCKET SET SCREWS.
5. THE WEIGHT OF THE COVER SHALL NOT VARY MORE THAN FIVE PERCENT FROM THAT SHOWN.

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MANHOLE FRAME AND COVER

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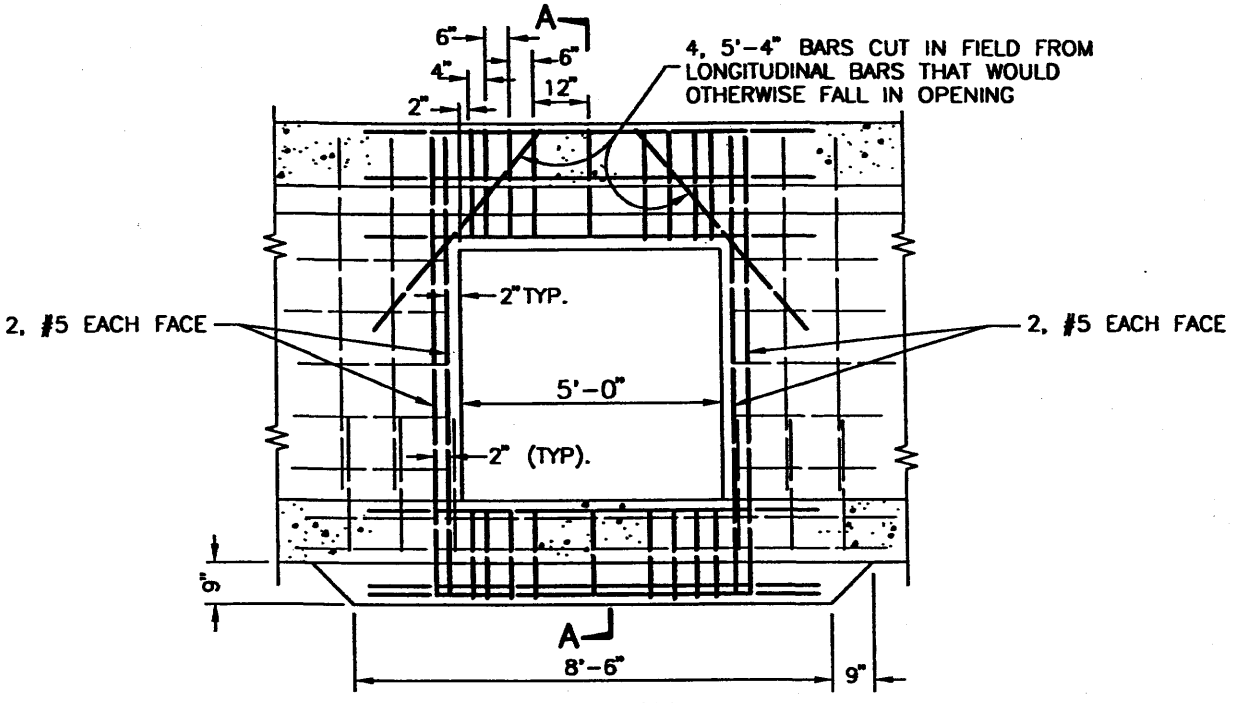
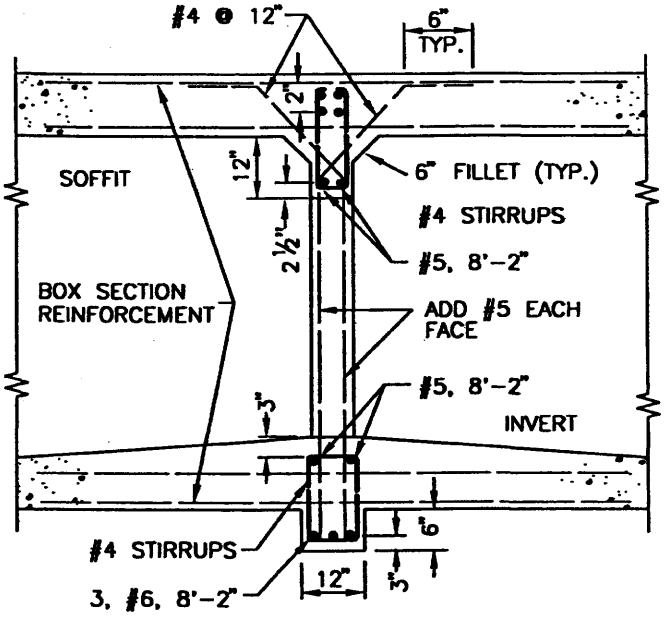
PLATE 517

SHEET 1 OF 1



ELEVATION



SECTION A-A

NOTES:

1. THIS STRUCTURE TO BE USED WHERE:
   a. DEPTH OF COVER DOES NOT EXCEED 10'.
   b. CLEAR SPAN OF ONE BARREL DOES NOT EXCEED 12'
2. LONGITUDINAL BARS TO BE CUT IN FIELD 2" FROM OPENING.
3. ROUND ALL EDGES TO 2" RADIUS.
4. NO TRANSVERSE CONSTRUCTION JOINT TO BE PLACED WITHIN 5' OF WINDOW.

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WINDOW DETAILS FOR MULTIPLE BOX SECTION

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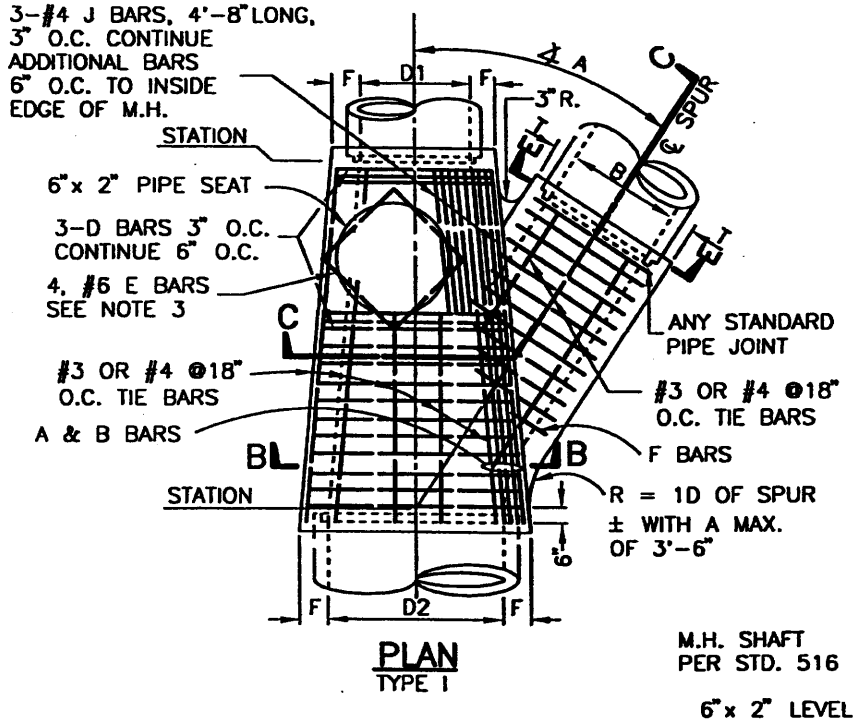
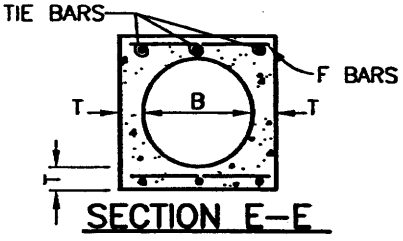
STANDARD PLAN 2002

PLATE 520

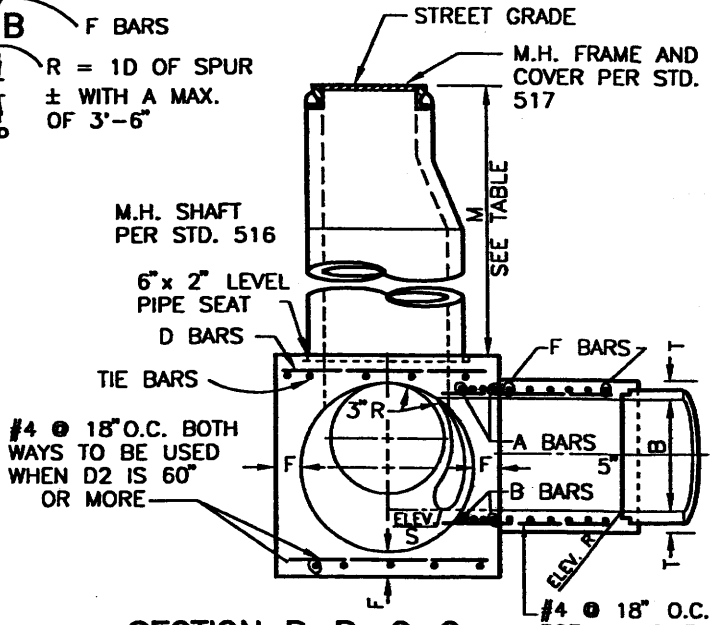
SHEET 1 OF 1



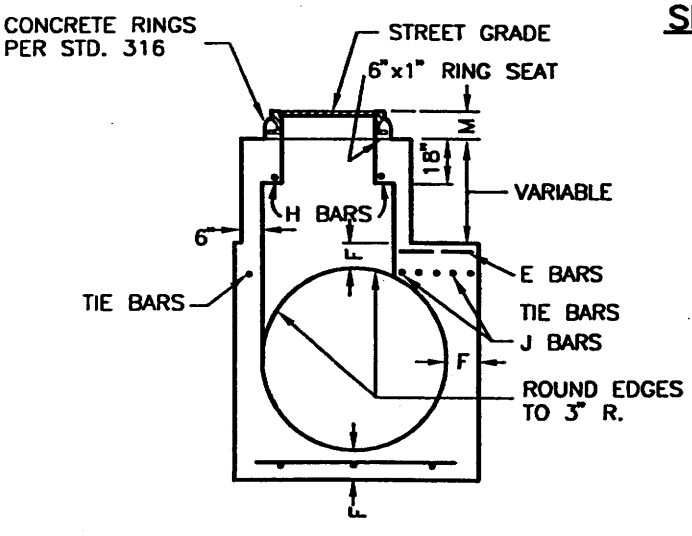
PLAN
TYPE 1



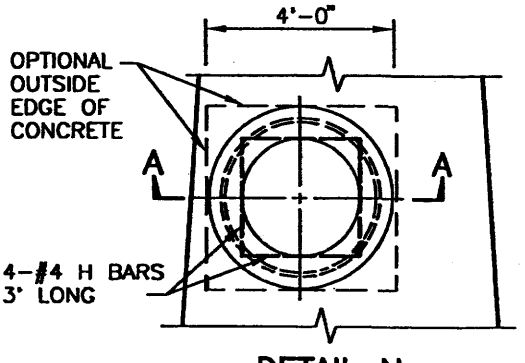
SECTION E-E



SECTION B-B, C-C



SECTION A-A



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

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JUNCTION STRUCTURE No. 1

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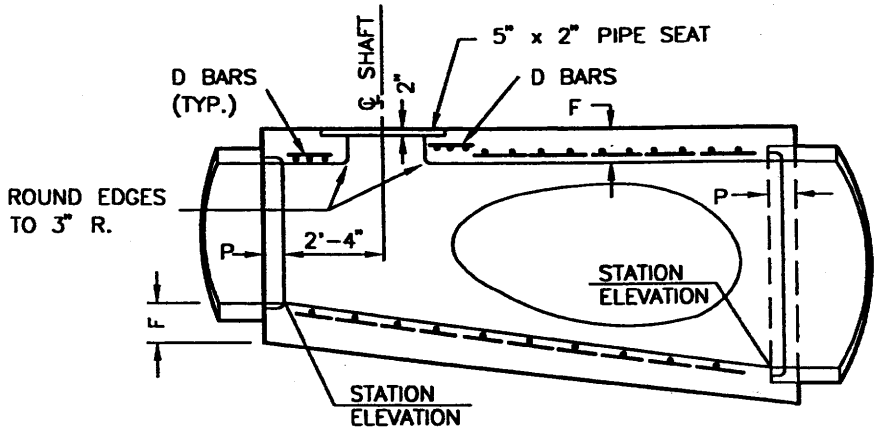
STANDARD PLAN 2002

PLATE 521

SHEET 1 OF 3



LONGITUDIAL SECTION

TABLE OF VALUES FOR M (SEE NOTE 2)				
SECTION	PAVED STREET		UNPAVED STREET	
	MAX.	MIN.	MAX.	MIN.
B–B C–C		2'–10 ½"		3'–6"
A–A	11"	8 ½	16"	15"

TABLE OF BAR SIZES		
D2 OR B	A & B	D OR F
12" – 39"	#5 @ 3"	#4 @ 6"
42" – 84"	#6 @ 3"	#5 @ 6"
90" – 144"	#7 @ 3"	#6 @ 6"

TABLE OF VALUES FOR F	
D2	F
36"	6½"
39"	7"
42"	7½"
45"	7¾"
48"	8"
51"	8½"
54"	9"
57"	9¼"
60"	9½"
63"	10"
66"	10¼"
69"	10¾"
72"	11"
78"	11¾"
84"	12½"
90"	13¼"
96"	14"
102"	15½"
108"	16"
114"	16½"
120"	17"
126"	17"
132"	17½"
138"	17½"
144"	18"

TABLE OF VALUES FOR T	
B	T
12"	4"
15"	4¼"
18"	4½"
21"	5"
24"	5¼"
27"	5½"
30"	6"
33"	6¼"
36"	6½"
39"	7"
42"	7½"
45"	7¾"
48"	8"
51"	8½"
54"	9"
57"	9¼"
60"	9½"
63"	10"
66"	10¼"
69"	10¾"
72"	11"
78"	11¾"
84"	12½"
90"	13¼"
96"	14"
102"	15½"
108"	16"
114"	16½"
120"	17"
126"	17"
132"	17½"
138"	17½"
144"	18"

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JUNCTION STRUCTURE No. 1

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STANDARD PLAN 2002

PLATE 521

SHEET 2 OF 3

NOTES:

1. VALUES FOR A, B, C, D1, D2, 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 2'-10 ½" FOR PAVED STREETS OR 3'-6" FOR UNPAVED STREETS, CONSTRUCT MONOLITHIC SHAFT PER SECTION C-C AND DETAIL N. SHAFT FOR ANY MANHOLE MAY BE CONSTRUCTED PER SECTION C-C. WHEN DIAMETER D1 IS 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 D1 IS 48" OR LESS, IN WHICH CASE PLACE E BARS SYMMETRICALLY AROUND SHAFT AT 45° WITH CENTER LINE.
4. LENGTH OF MANHOLE MAY BE INCREASED TO MEET PIPE ENDS. BUT ANY CHANGE IN LOCATION OF SPUR MUST BE APPROVED BY THE ENGINEER.
5. P SHALL BE 5" FOR D2 = 96" OR LESS AND 8" FOR D2 OVER 96".
6. REINFORCEMENT SHALL CONFORM TO ASTM 615, GRADE 40, AND SHALL TERMINATE 1½" 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 OF F SHOWN ON TABLE.
10. IF LATERALS ENTER ON BOTH SIDES OF MANHOLE, SHAFT SHALL BE LOCATED ON SIDE RECEIVING THE SMALLER LATERAL.
11. THE FOLLOWING CRITERIA SHALL BE USED FOR THIS JUNCTION STRUCTURE:
    A. THIS STANDARD PLAN IS USED WHEN STANDARD PLAN 514 IS INADEQUATE. MAIN LINE = 48" INSIDE DIAMETER OR LARGER.
    B. LATERAL = 12" TO 144" INSIDE DIAMETER: HOWEVER, THE INSIDE DIAMETER SHALL NOT EXCEED THE INSIDE DIAMETER OF THE MAIN LINE.
12. MANHOLE FRAME AND COVER SHALL CONFORM TO STANDARD PLAN 517 UNLESS OTHERWISE SHOWN.
13. MANHOLE SHAFT SHALL CONFORM TO STANDARD PLAN 516 UNLESS OTHERWISE SHOWN.

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JUNCTION STRUCTURE No. 1

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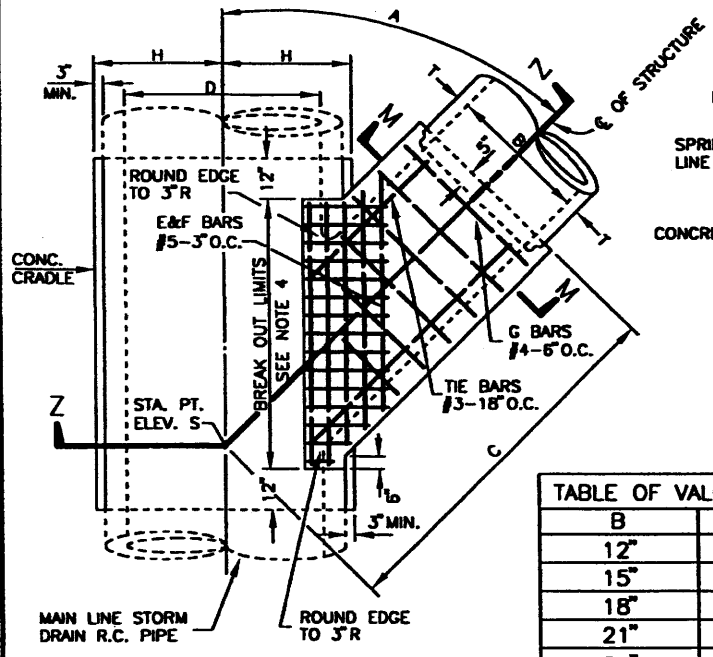
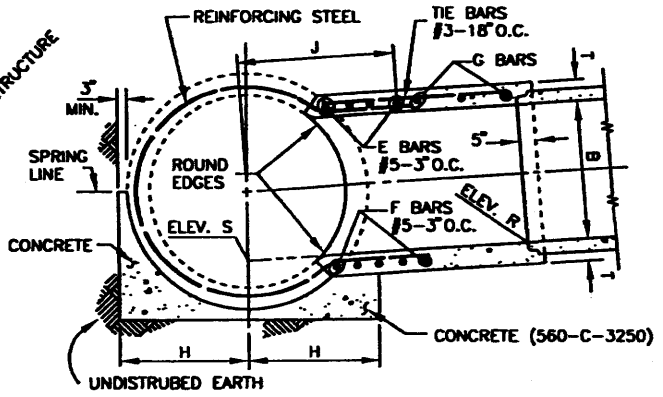
STANDARD PLAN 2002

PLATE 521

SHEET 3 OF 3

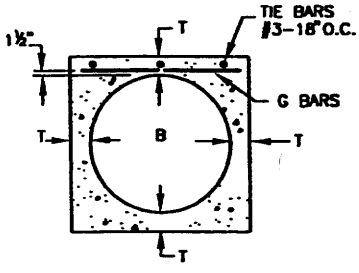


PLAN



SECTION Z-Z

TABLE OF VALUES FOR T	
B	T
12"	5"
15"	5"
18"	5"
21"	5"
24"	5½"
27"	5½"
30"	6"
33"	6½"
36"	6½"
39"	7"



SECTION M-M

NOTES:

1. JUNCTION STRUCTURE No. 2 IS TO BE USED WHEN OUTSIDE DIAMETER OF B IS GREATER THAN ½ THE INSIDE DIAMETER OF D, OR B IS GREATER THAN 24". B SHALL NOT EXCEED ¾D OR 39". NOTE: NO MORE THAN ONE OPENING SHALL BE MADE IN ONE SECTION OF PIPE.
2. VALUES OF A, B, C, AND D ARE SHOWN ON PROJECT DRAWINGS. ELEVATION "R" AND ELEVATION "S" ARE SHOWN WHEN REQUIRED PER NOTE 10.
3. ELEVATION S APPLIES AT INSIDE WALL OF STRUCTURE.
4. THE OPENING SHALL BE RECTANGULAR, CUT NORMAL TO PIPE SURFACE WITHOUT DAMAGING REINFORCING STEEL. IF A JOINT IN THE MAIN LINE PIPE FALLS WITHIN THE LIMITS OF THE CONCRETE CRADLE, PROVIDE A CONCRETE ENCASEMENT ONE FOOT ABOVE THE TOP OF MAIN LINE PIPE TO THE LIMITS OF THE CRADLE.
5. THE TRANSVERSE REINFORCEMENT IN PIPE SHALL BE CUT AT CENTER OF OPENING AND BENT INTO TOP AND BOTTOM SLABS OF SPUR.
6. THE MAIN LINE PIPE SHALL BE CRADLED AND ENCASED IN 560 C 3250 CONCRETE MIX EXTENDING LONGITUDINALLY 12" BEYOND THE LIMITS OF BREAK OUT (SEE NOTE 4), AND TRANSVERSELY A DISTANCE OF H ON EACH SIDE OF THE CENTERLINE OF PIPE H=½ O.D. OF PIPE + 3" MIN. CRADLE MAYBE OMITTED ON SIDE OPPOSITE LATERAL INLET WHEN CONSTRUCTED IN CONNECTION WITH EXISTING STORM DRAIN.
7. REINFORCING STEEL SHALL BE PLACED 1½" CLEAR FROM FACE OF CONCRETE, UNLESS OTHERWISE SHOWN.
8. E AND F BARS SHALL BE CARRIED TO A POINT NOT LESS THAN J DISTANCE FROM CENTERLINE. J=(7D/12)+6".
9. FLOOR OF STRUCTURE SHALL BE STEEL-TROWELED TO SPRING LINE.
10. WHEN ELEVATION "R" AND ELEVATION "S" ARE NOT SHOWN ON PROJECT DRAWINGS, INLET PIPE SHALL ENTER MAIN LINE RADIALLY. WHEN INLET PIPE ENTERS MAIN LINE OTHER THAN RADIALLY, ELEVATION "S" SHALL BE SHOWN PROJECT DRAWINGS AND INLET PIPE SHALL BE LAID ON A STRAIGHT GRADE FROM ELEVATION S TO CATCH BASIN OR GRADE BREAK IN LINE. ELEVATION "R" SHALL BE SHOWN ON PROJECT DRAWINGS ONLY WHEN STUB IS TO BE PROVIDED IN MAIN LINE FOR FUTURE CONSTRUCTION OF INLET PIPE.
11. STATIONS SPECIFIED ON DRAWINGS APPLY AT THE INTERSECTION OF CENTER LINES OF MAIN LINE AND LATERALS, EXCEPT THAT STATIONS FOR CATCH BASIN CONNECTOR PIPE APPLY AT INSIDE WALL OF STRUCTURE.

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JUNCTION STRUCTURE No. 2

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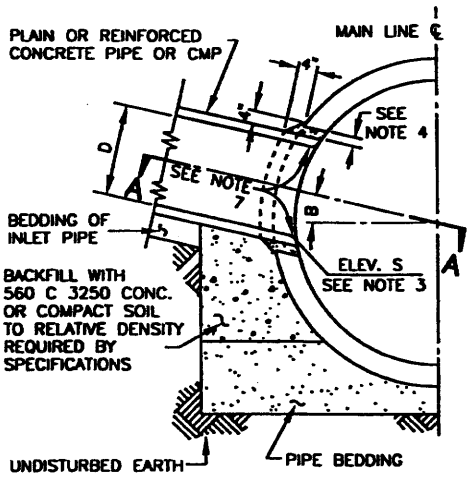
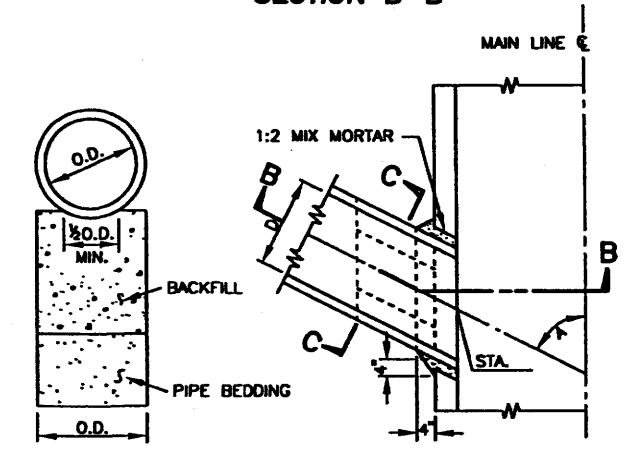
STANDARD PLAN 2002

PLATE 522

SHEET 1 OF 1



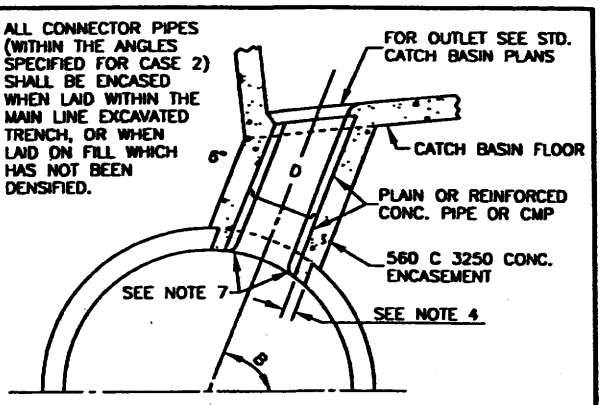
SECTION B–B



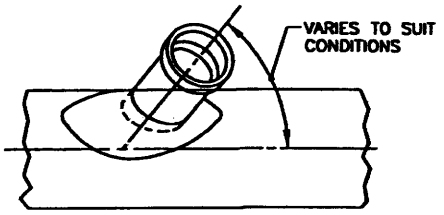
SECTION C–C SECTION A–A

CASE 1

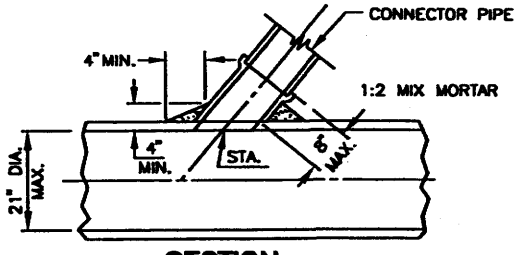
NOTE: ALL CONNECTOR PIPES (WITHIN THE ANGLES SPECIFIED FOR CASE 2) SHALL BE ENCASED WHEN LAID WITHIN THE MAIN LINE EXCAVATED TRENCH, OR WHEN LAID ON FILL WHICH HAS NOT BEEN DENSIFIED.



CASE 2



PLAN



SECTION

CASE 3–SADDLE CONNECTION

NOTES: CASE 1 AND CASE 2

1. ANGLE A SHALL BE BETWEEN 45 DEGREES AND 90 DEGREES AND D SHALL BE 24 INCHES OR LESS. FOR SMALLER VALUES OF A AND LARGER VALUES OF D, USE APPROPRIATE STANDARD STRUCTURE.
2. IN NO CASE SHALL THE OUTSIDE DIAMETER OF THE INLET PIPE EXCEED ONE–HALF THE INSIDE DIAMETER OF THE MAIN STORM DRAIN.
3. CENTER LINE OF INLET SHALL BE ON RADIUS OF MAIN STORM DRAIN EXCEPT WHERE ELEVATION S IS SHOWN ON PROJECT DRAWINGS.
4. THE OPENING INTO MAIN STORM DRAIN SHALL BE THE OUTSIDE DIAMETER OF THE INLET PIPE PLUS ONE INCH MINIMUM OR 3 INCH MAXIMUM.
5. ALL CORRUGATED METAL PIPE AND FITTINGS SHALL BE GALVANIZED.
6. IF ANGLE B IS 45 DEGREES OR LESS, USE CASE 1. IF ANGLE B IS GREATER THAN 45 DEGREES, USE CASE 2.
7. BURN OR CHIP END OF CONNECTOR PIPE FLUSH WITH INNER SURFACE OF MAIN LINE PIPE. ROUND EDGE OF CONCRETE PIPE OR REINFORCED CONCRETE PIPE.
8. STATION SPECIFIED ON DRAWINGS APPLIES AT THE INTERSECTION OF INSIDE WALL OF MAIN STORM DRAIN AND CENTER LINE OF INLET PIPE.

NOTES: CASE 3

1. CONNECTIONS TO PIPES 21 INCHES OR LESS IN DIAMETER WITHOUT JUNCTION STRUCTURES OR PRECAST Y BRANCHES SHALL BE MADE WITH SADDLES.
2. TRIM OR CUT SADDLE TO FIT SNUGLY OVER THE OUTSIDE OF THE MAIN PIPE, AND SO ITS AXIS WILL BE ON THE LINE AND GRADE OF THE CONNECTING PIPE.
3. THE OPENING INTO THE PIPE SHALL BE CUT AND TRIMMED TO FIT THE SADDLE SO THAT NO PART WILL PROJECT WITHIN THE BORE OF THE SADDLE PIPE.
4. THE CONNECTING PIPE SHALL BE SUPPORTED AS SHOWN IN CASES 1 AND 2.

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JUNCTION STRUCTURE No. 3

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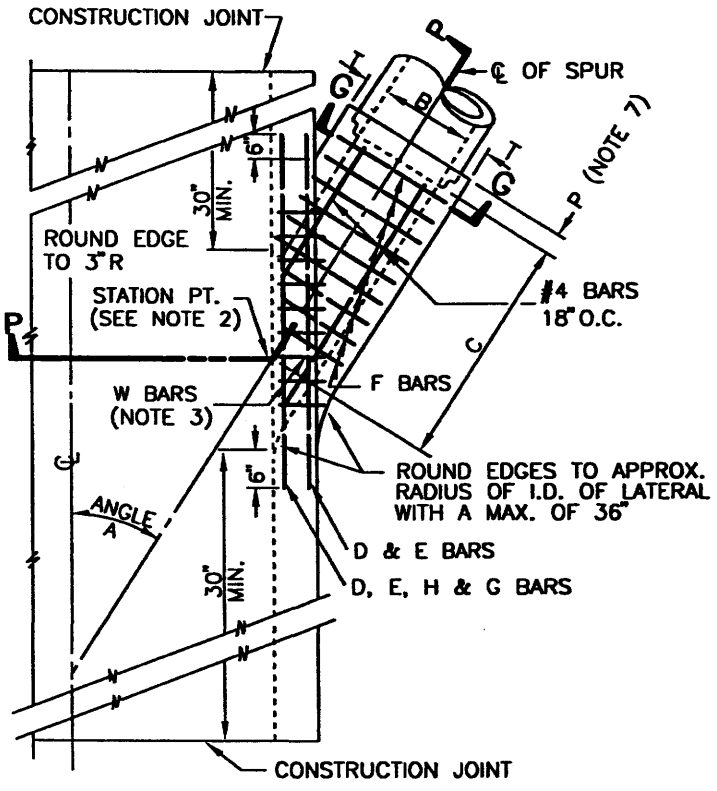
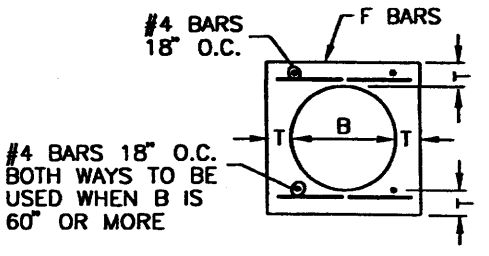
STANDARD PLAN 2002

PLATE 523

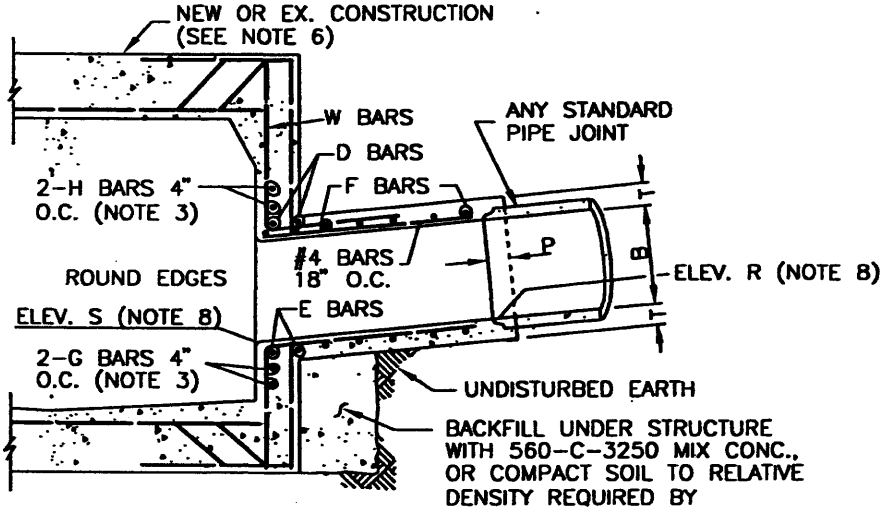
SHEET 1 OF 1



PLAN



SECTION G–G



SECTION P–P

TABLE

FOR DIMENSIONS & BAR SIZES

B (INCHES)	T (INCHES)	D,E,H,& G BARS	F BARS
12	5	#5	#4 @ 6" O.C.
15	5		
18	5		
21	5		
24	5¼		
27	5½		
30	6		
33	6¼		
36	6½		
39	7		
42	7½	#6	#5 @ 6" O.C.
45	7¾		
48	8		
51	8½		
54	9		
57	9¼		
60	9½		
63	10		
66	10¼		
69	10¾		
72	11		
78	11¾		
84	12½		
90	13¼	#7	#5 @ 6" O.C
96	14		
102	15½		
108	16		
114	16½		
120	17		
126	17		
132	17½		
138	17½		
144	18		

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REV. APPR. BY DATE

CITY OF Oxnard

JUNCTION STRUCTURE No. 4

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STANDARD PLAN 2002

PLATE 524

SHEET 1 OF 2

NOTES:

1. VALUES FOR A, B AND C SHALL BE SHOWN ON THE PROJECT PLANS. ELEVATION R AND ELEVATION S SHALL BE SHOWN WHEN REQUIRED PER NOTE 8.

2. STATIONS SPECIFIED ON THE PROJECT PLANS APPLY AT THE INTERSECTION OF CENTER LINES OF MAIN LINE AND LATERALS, EXCEPT THAT STATIONS FOR CATCH BASIN CONNECTOR PIPES APPLY AT INSIDE WALL OF STRUCTURE.

3. REINFORCING STEEL SHALL CONFORM TO ASTM A 615, GRADE 40 AND SHALL TERMINATE 1½" CLEAR OF CONCRETE SURFACE UNLESS OTHERWISE SHOWN.

   A. W BARS ARE OF SIZE AND SPACING SPECIFIED FOR WALL STEEL ON PROJECT PLANS, AND SHALL BE CUT IN CENTER OF OPENING AND BENT INTO TOP AND BOTTOM OF JUNCTION STRUCTURE.
   B. OMIT H BARS WHEN SOFFIT OF SPUR IS 12" OR LESS BELOW SOFFIT OF MAIN LINE AND OMIT G BARS WHEN INVERT OF SPUR IS 12" OR LESS ABOVE FLOOR OF MAIN LINE.

4. JUNCTION STRUCTURE SHALL BE POURED MONOLITHICALLY WITH MAIN LINE, MANHOLE OR TRANSITION STRUCTURE.

5. FLOOR OF STRUCTURE SHALL BE STEEL-TROWELED TO THE SPRING LINE.

6. WHEN CONNECTING TO EXISTING R.C.B., BREAKOUT LIMITS AND DETAILS SHALL BE SHOWN ON THE PROJECT PLANS.

7. EMBEDMENT, P, SHALL BE 5" FOR B = 96" OR LESS 8" FOR B OVER 96".

8. IF ELEVATION R AND ELEVATION S ARE NOT SHOWN ON THE PROJECT PLANS THEN THE INLET OPENING SHALL FALL 6" BELOW THE SOFFIT OF THE MAIN LINE WITH INLET PIPE LAID ON A STRAIGHT GRADE FROM MAIN LINE TO CATCH BASIN OR TO GRADE BREAK IN INLET LINE. ELEVATION S SHALL BE SHOWN ON THE PROJECT PLANS IF THE INLET OPENING FALLS MORE THAN 6" BELOW THE SOFFIT OF THE MAIN LINE WITH THE INLET PIPE LAID ON A STRAIGHT GRADE AS STATED ABOVE. ELEVATION R SHALL BE SHOWN ON THE PROJECT PLANS ONLY WHEN A STUB IS TO BE PROVIDED FOR A FUTURE CONNECTION.

9. LATERALS OR CONNECTOR PIPES 24" OR LESS IN DIAMETER SHALL BE NO MORE THAN 5' ABOVE THE INVERT. LATERALS OR CONNECTOR PIPES 27" OR LARGER IN DIAMETER SHALL BE NO MORE THAN 18" ABOVE THE INVERT, WITH THE EXCEPTION THAT CATCH BASIN CONNECTOR PIPES LESS THAN 50' IN LENGTH SHALL NOT BE MORE THAN 5' ABOVE THE INVERT.

10. THE NEED FOR AN EDGE BEAM AND OR ADDITIONAL REINFORCEMENT SHALL BE INVESTIGATED BY THE ENGINEER FOR ANY ONE OF THE FOLLOWING CONDITIONS:

    A. ANGLE A IS LESS THAN 30°.
    B. TOP OF INLET PIPE IS LESS THAN 6" BELOW THE SOFFIT.
    C. FLOW LINE OF INLET PIPE IS SESS THAN 7" ABOVE THE FLOOR OF THE R.C.B. AT THE INSIDE FACE.

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JUNCTION STRUCTURE No. 4

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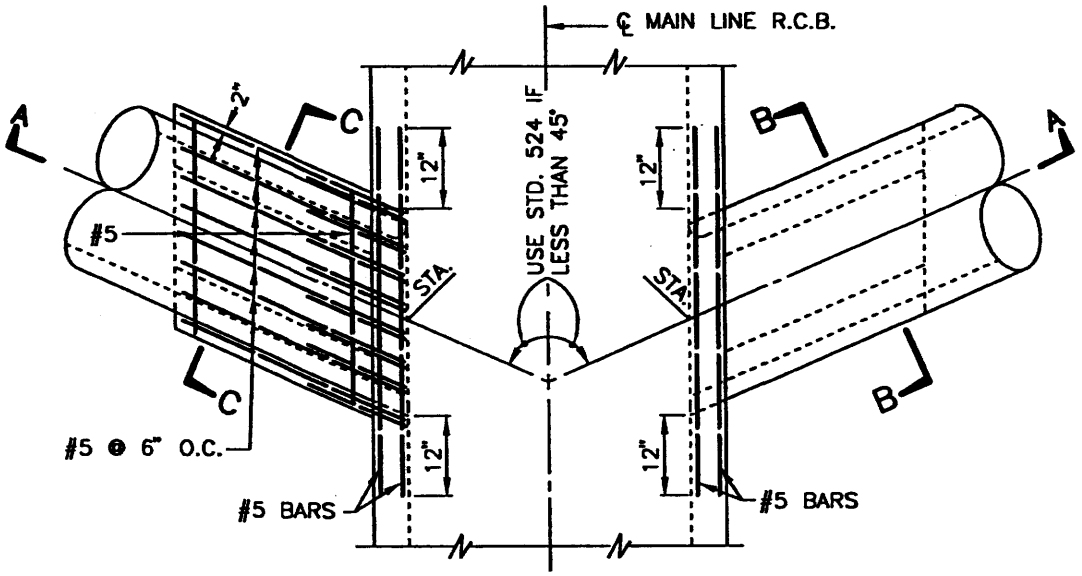
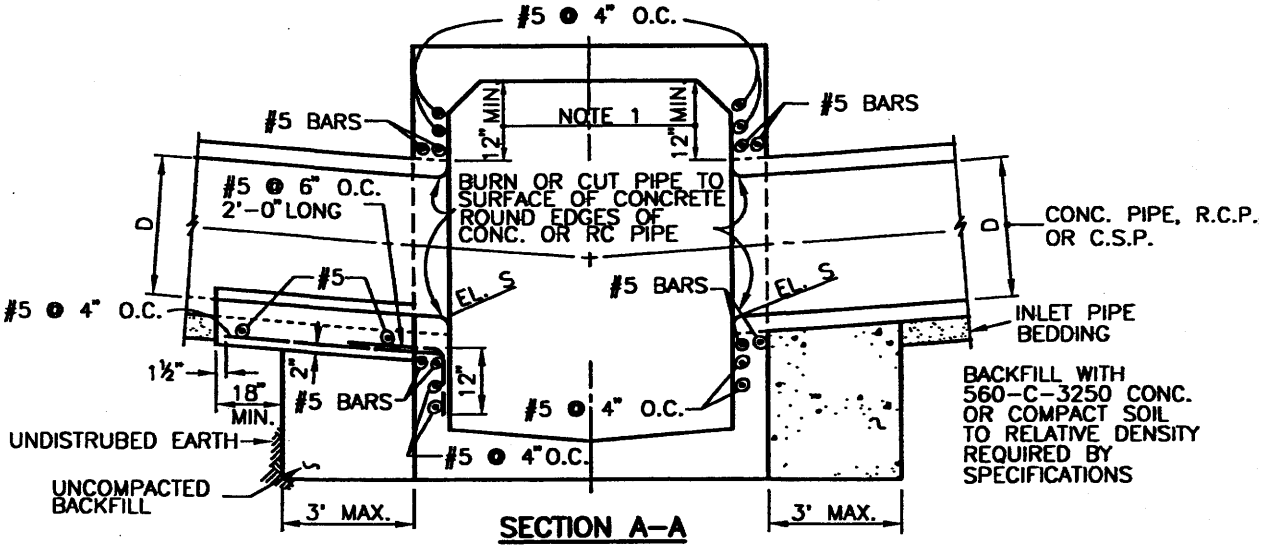
STANDARD PLAN 2002

PLATE 524

SHEET 2 OF 2



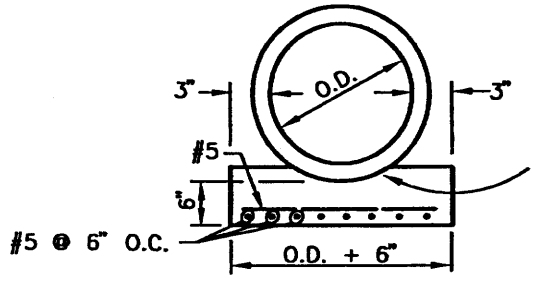
PLAN



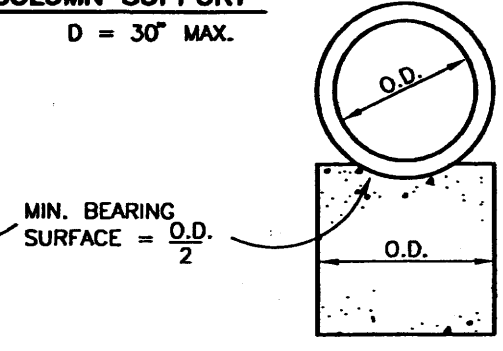
SECTION A–A

CASE 1
BEAM SUPPORT
D = 30" MAX.

CASE 2
COLUMN SUPPORT
D = 30" MAX.



SECTION C–C



SECTION B–B

REV.	APPR. BY	DATE
A		5-1-95

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JUNCTION STRUCTURE No. 5

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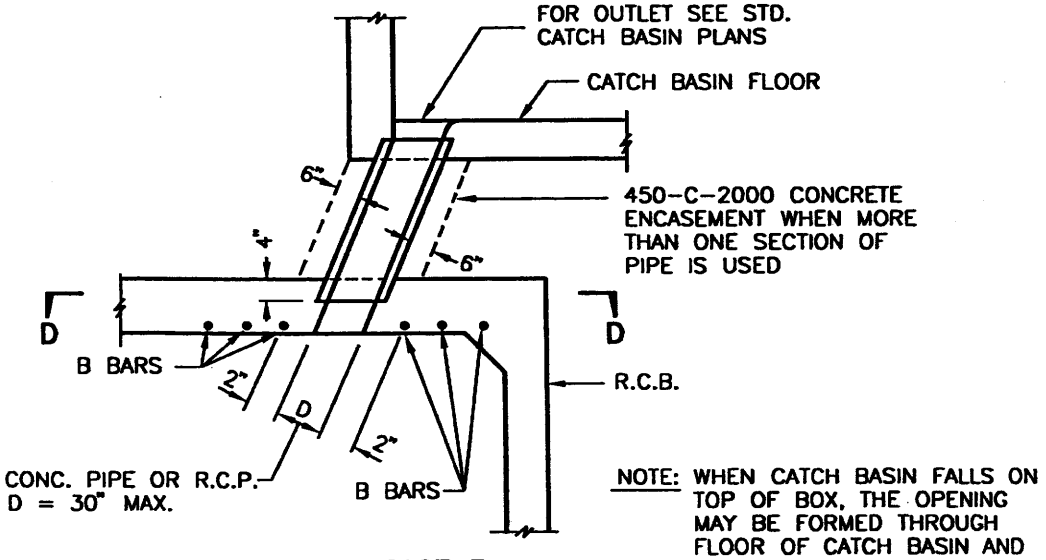
STANDARD PLAN 2002

PLATE 525

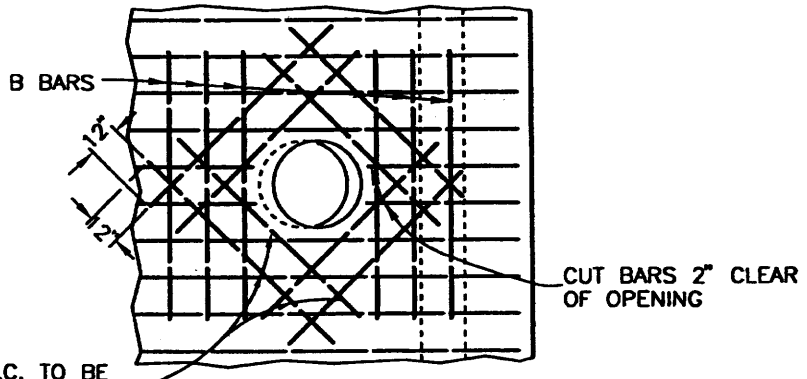
SHEET 1 OF 2

B BARS – #6 @ 4" O.C., LENGTH = D + 36"
PLACED UNDER CUT BARS AND
ON TOP OF UNCUT BARS. OMIT
BARS THAT FALL OVER SIDEWALLS.



NOTE: WHEN CATCH BASIN FALLS ON TOP OF BOX, THE OPENING MAY BE FORMED THROUGH FLOOR OF CATCH BASIN AND TOP SLAB OF BOX.

CASE 3
TOP SLAB ENTRANCE



SECTION D–D

NOTES:

1. USE JUNCTION STRUCTURE PER STD. 524 INSTEAD OF THIS JUNCTION STRUCTURE UNDER ANY ONE OF THE FOLLOWING CONDITIONS:
   A. DIAMETER OF THE INLET PIPE EXCEEDS 30".
   B. TOP OF PIPE IS LESS THAN 12" BELOW SOFFIT OF BOX.
   C. FLOW LINE OF PIPE IS LESS THAN 13" ABOVE FLOOR OF THE BOX AT INSIDE FACE.
   D. ANGLE A IS LESS THAN 45°.
2. ALL CORRUGATED METAL PIPE AND FITTINGS SHALL BE GALVANIZED.
3. ELEVATION S SHALL BE SPECIFIED ON PROJECT PLANS ONLY WHERE TOP OF PIPE IS MORE THAN 12" BELOW SOFFIT OF BOX.
4. LATERALS OR CONNECTOR PIPES 24" OR LESS IN DIAMETER SHALL BE NOT MORE THAN 5' ABOVE THE INVERT. LATERALS OR CONNECTOR PIPES 27" OR LARGER IN DIAMETER SHALL BE NOT MORE THAN 18" ABOVE THE INVERT, WITH THE EXCEPTION THAT CATCH BASIN CONNECTOR PIPES LESS THAN 50' IN LENGTH SHALL BE NOT MORE THAN 5' ABOVE THE INVERT.

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JUNCTION STRUCTURE No. 5

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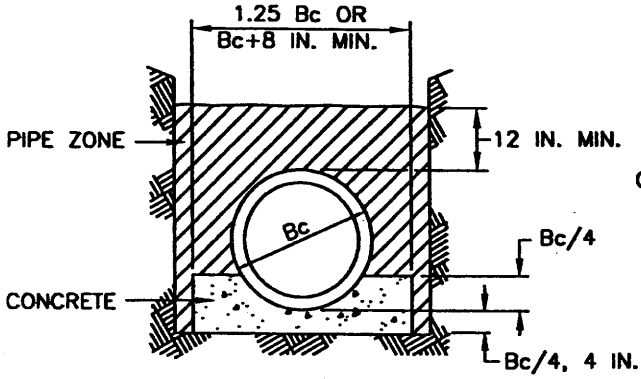
STANDARD PLAN 2002

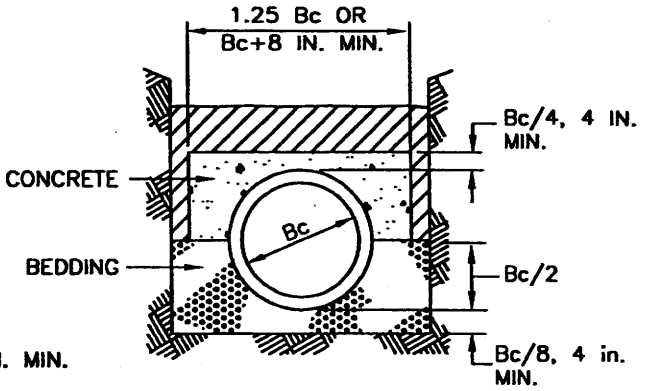
PLATE 525

SHEET 2 OF 2



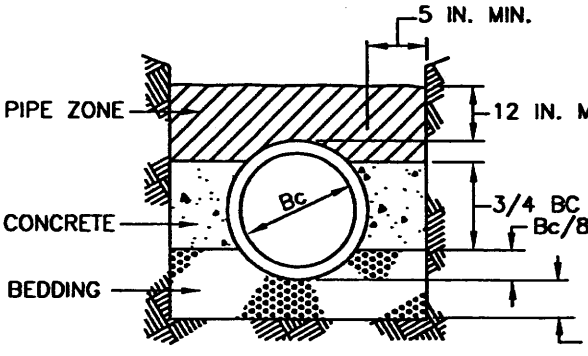
LOAD FACTORS: 2.2 NATIVE BACKFILL MATERIAL LIGHTLY TAMPED
2.8 ASTM D448=67 CRUSHED STONE
3.4 REINFORCED CONCRETE, P=0.4%

FIG. 1 CLASS A–I



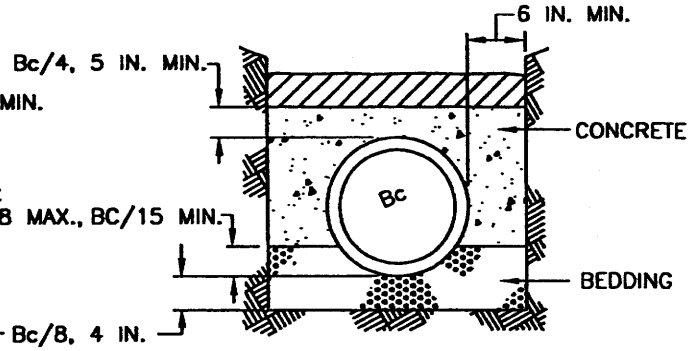
LOAD FACTORS: 2.8 PLAIN CONCRETE
3.4 REINFORCED CONCRETE, P=0.4%

FIG. 2 CLASS A–II



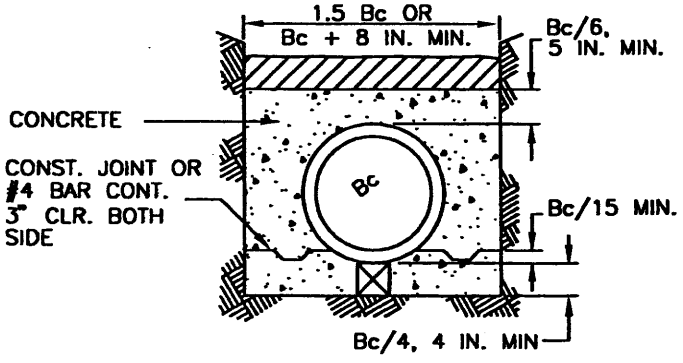
LOAD FACTORS 2.7

FIG. 3 CLASS A–III



LOAD FACTORS 3.2

FIG. 4 CLASS A–IV



LOAD FACTORS 4.5

FIG. 5 CLASS A–V

LOAD FACTOR: 2.2, 2.7, 2.8, 3.4 & 4.5

CLASS A: CONCRETE CRADLE, ARCH & ENCASEMENT

BEDDING: 560 C 3000 CONCRETE

AFTER INITIAL SET OF THE CONCRETE, BACKFILL MATERIAL SHOULD BE PLACED TO ONE FOOT OVER THE CONDUIT. THE BACKFILL ABOVE THIS POINT SHOULD NOT BE PLACED NOR SHEETING REMOVED UNTIL AT LEAST 48 HOURS AFTER PLACEMENT OF THE BEDDING OR ENCASEMENT. SUCH BACKFILL MAY BE PLACED AND SHEETING PULLED AFTER 24 HOURS IF THE EARLY STRENGTH OF THE CONCRETE IS INCREASED IN ACCORDANCE WITH THE ENGINEER'S APPROVAL.

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REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

LOAD FACTOR–CLASS A

DRAWN: STAFF | CKD.: STAFF

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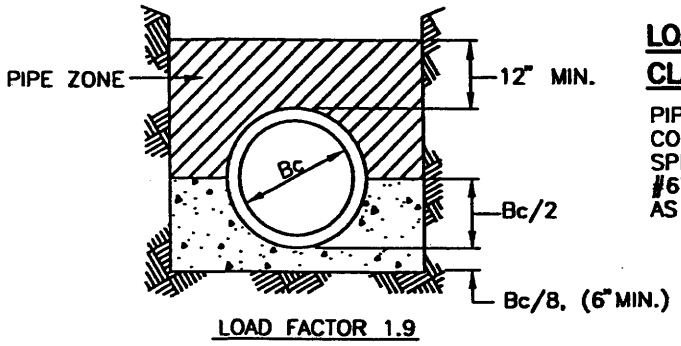
STANDARD PLAN 2002

PLATE 528

SHEET 1 OF 2

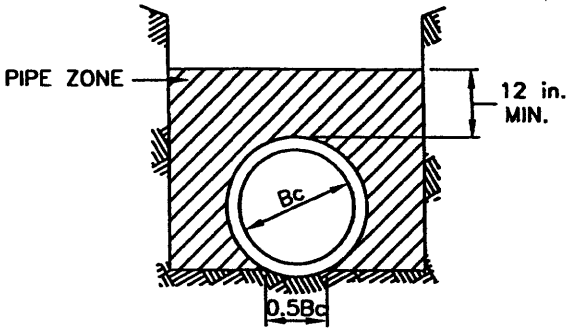


LOAD FACTOR 1.9

FIG. 6 CLASS B

LOAD FACTOR: 1.9
CLASS B FIGURE 6:

PIPE IS BEDDED IN ANGULAR BEDDING MATERIAL, CONFORMING TO ASTM D448 "STANDARD SPECIFICATION FOR COARSE AGGREGATE" SIZE #67 OR OTHER SUITABLE MATERIALS AND METHODS, AS APPROVED BY THE ENGINEER.

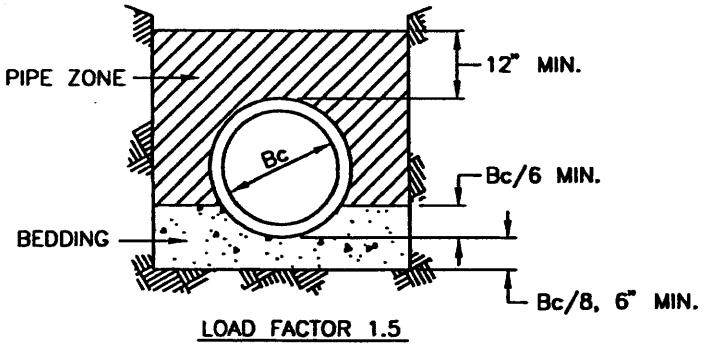


LOAD FACTOR 1.5
SHAPED BOTTOM

FIG. 7 CLASS C

LOAD FACTOR: 1.5
CLASS C FIGURE 7 OR 8:

PIPE IS BEDDED IN GRANULAR MATERIAL PLACED ON A FLAT TRENCH BOTTOM OR ON A SUITABLE UNDISTURBED NATIVE MATERIAL WHICH HAS BEEN HAND SHAPED TO FIT THE PIPE BARREL FOR A WIDTH OF ONE-HALF THE OUTSIDE DIAMETER OF THE PIPE. BEDDING MATERIAL MAY BE CRUSHED STONE, ROUNDED GRAVEL, SHELLS, PEA GRAVEL, SAND OR OTHER LOCALLY AVAILABLE AND COMMONLY USED NON-COHESIVE MATERIALS.



LOAD FACTOR 1.5

FIG. 8 CLASS C

NOTES:

1. ALWAYS PROVIDE UNIFORM AND CONTINUOUS SUPPORT OF PIPE BARREL FOR ALL CLASSES OF BEDDING.
2. BEDDING MATERIALS SHALL MEET SSPWC (GREEN BOOK) SPECIFICATIONS.
3. LOAD FACTOR 1.1 CLASS D IS NOT ALLOWED.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard

Department of Public Works

LOAD FACTORS–CLASS B, C & D

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STANDARD PLAN 2002

PLATE 528

SHEET 2 OF 2

PIPE I.D.	MAX. TRENCH WIDTH	RC STORM DRAIN ASTM C-76 & BEDDING FACTOR										
		CL. II = 1000D		CL. III = 1350D			CL. IV = 2000D			CL. V = 3000D		
		1.9	3.0	1.5	1.9	3.0	1.5	1.9	3.0	1.5	1.9	3.0
18"	34"	9	30+	NL	20	30+	14	30+	30+	30+	30+	30+
	40"	6	16	NL	12	30+	8	30	30+	18	30+	30+
	46"	5	10	NL	8	18	6	16	30+	12	30+	30+
	52"	5	9	NL	7	14	6	12	30	10	26	30+
	58"	5	9	NL	7	12	6	12	20	10	18	30+
	64"	5	9	NL	7	12	6	12	18	10	18	30+
	70"+	5	9	NL	7	12	6	12	18	10	18	28
24"	41"	9	30	NL	18	30+	14	30+	30+	30+	30+	30+
	47"	7	16	NL	12	30+	9	30	30+	20	30+	30+
	53"	5	12	NL	9	20	7	18	30+	14	30+	30+
	59"	5	10	NL	7	16	6	14	30+	12	30+	30+
	65"	5	9	NL	7	12	6	12	26	10	22	30+
	71"	5	9	NL	7	12	6	12	20	10	18	30+
	77"	5	9	NL	7	12	6	12	18	10	18	30+
	83"+	5	9	NL	7	12	6	12	18	10	18	28
30"	49"	9	24	6	18	30+	*12	30+	30+	30+	30+	30+
	55"	7	16	NL	12	30+	*9	28	30+	20	30+	30+
	61"	6	14	NL	10	22	*8	20	30+	16	30+	30+
	67"	5	10	NL	8	18	*7	16	30+	12	30+	30+
	73"	5	9	NL	7	14	*6	14	28	10	26	30+
	79"	5	9	NL	7	12	*6	12	22	10	20	30+
	85"	5	9	NL	7	12	*6	12	20	10	18	30+
	91"	5	9	NL	7	12	*6	12	18	10	18	30+
	97"+	5	9	NL	7	12	*6	12	18	10	18	28
36"	56"	9	22	6	16	30+	*12	30+	30+	28	30+	30+
	62"	8	16	4	12	30	*10	26	30+	20	30+	30+
	68"	6	14	4	10	22	*8	20	30+	16	30+	30+
	74"	6	12	4	9	18	*7	16	30+	14	30+	30+
	80"	6	10	4	8	16	*7	14	30	12	28	30+
	86"	6	9	4	8	14	*7	12	26	10	24	30+
	92"	6	9	4	8	12	*7	12	22	10	20	30+
	98"	6	9	4	8	12	*7	12	20	10	18	30+
	104"	6	9	4	8	12	*7	12	18	10	18	30+
	110"+	6	9	4	8	12	*7	12	18	10	18	28
42"	63"	9	22	6	16	30+	*12	30+	30+	26	30+	30+
	69"	8	16	5	14	30	*10	26	30+	20	30+	30+
	81"	6	12	4	10	20	*8	18	30+	14	30+	30+
	87"	6	10	4	9	16	*7	16	30+	12	30	30+
	99"	6	9	4	8	14	*7	12	24	10	22	30+
	105"	6	9	4	8	12	*7	12	20	10	20	30+
	123"+	6	9	4	8	12	*7	12	18	10	18	28
48"	71"	9	20	6	16	30+	*12	30+	30+	24	30+	30+
	77"	8	16	5	14	28	*10	26	30+	20	30+	30+
	83"	7	14	5	12	24	*9	20	30+	16	30+	30+
	89"	6	12	5	10	20	*8	18	30+	14	30+	30+
	101"	6	10	5	9	16	*7	14	28	12	26	30+
	107"	6	10	5	9	14	*7	12	26	10	24	30+
	119"	6	10	5	9	12	*7	12	20	10	18	30+
	137"+	6	10	5	9	12	*7	12	18	10	18	28
54"	78"	9	20	6	16	30+	*12	30	30+	24	30+	30+
	84"	8	16	5	14	28	*10	24	30+	20	30+	30+
	96"	7	14	5	10	20	*8	18	30+	16	30+	30+
	102"	7	12	5	10	18	*8	16	30+	14	30	30+
	108"	7	10	5	9	16	*8	14	30	12	28	30+
	114"	7	10	5	9	14	*8	14	26	12	24	30+
	126"	7	10	5	9	12	*8	12	22	10	20	30+
	132"	7	10	5	9	12	*8	12	20	10	18	30+
	150"+	7	10	5	9	12	*8	12	18	10	18	28
MIN. COVER		3	2	3	2	2	3	2	1	2	1	1

NOTES: 1. Numbers preceded by an asterisk (*) indicate minimum cover may be reduced 1 ft.
2. Numbers in tables indicate maximum allowable cover on pipe in feet. Standard highway loading is included.
3. NL = No load allowed on pipe in this category.

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REV. | APPR. BY | DATE

CITY OF Oxnard

REINFORCED CONCRETE PIPE CHART

STANDARD PLAN 2002

DRAWN: STAFF | CKD.: STAFF

Department of Public Works

APPR. Granville M. Bowman

PLATE 529

SHEET 1 OF 2

PIPE I.D.	MAX. TRENCH WIDTH	RC STORM DRAIN ASTM C-76 & BEDDING FACTOR										
		CL.II = 1000D		CL. III = 1350D			CL. IV = 2000D			CL. V = 3000D		
		1.9	3.0	1.5	1.9	3.0	1.5	1.9	3.0	1.5	1.9	3.0
60"	85"	9	20	6	16	30+	*12	28	*30+	22	*30+	*30+
	91"	8	16	5	14	26	*10	24	*30+	20	*30+	*30+
	97"	8	14	5	12	24	*9	22	*30+	18	*30+	*30+
	103"	7	14	5	10	20	*9	18	*30+	16	*30+	*30+
	109"	7	12	5	10	18	*8	16	*30+	14	*30	*30+
	121"	7	10	5	9	16	*8	14	*28	12	*26	*30+
	127"	7	10	5	9	14	*8	14	*24	12	*22	*30+
	133"	7	10	5	9	14	*8	12	*22	12	*22	*30+
	145"	7	10	5	9	12	*8	12	*20	12	*18	*30+
	163"+	7	10	5	9	12	*8	12	*18	12	*18	*28
66"	93"	9	18	6	14	30	*12	28	*30+	22	*30+	*30+
	99"	8	16	5	14	26	*10	24	*30+	20	*30+	*30+
	105"	8	14	5	12	24	*10	22	*30+	18	*30+	*30+
	111"	7	14	5	12	20	*9	18	*30+	16	*30+	*30+
	123"	7	12	5	9	18	*8	16	*30	14	*28	*30+
	129"	7	10	5	9	16	*8	14	*28	12	*26	*30+
	135"	7	10	5	9	14	*8	14	*26	12	*24	*30+
	147"	7	10	5	9	14	*8	12	*22	12	*20	*30+
	159"	7	10	5	9	14	*8	12	*20	12	*18	*30+
	177"+	7	10	5	9	14	*8	12	*18	12	*18	*28
72"	100"	9	18	6	14	30	*12	26	*30+	22	*30+	*30+
	106"	9	16	5	14	26	*10	24	*30+	18	*30+	*30+
	112"	8	16	5	12	24	*10	22	*30+	18	*30+	*30+
	118"	7	14	5	12	20	*9	20	*30+	16	*30+	*30+
	124"	7	12	5	10	20	*8	18	*30+	14	*30	*30+
	136"	7	12	5	10	16	*8	16	*28	12	*26	*30+
	148"	7	10	5	10	14	*8	14	*24	12	*22	*30+
	160"	7	10	5	10	14	*8	14	*22	12	*20	*30+
	178"	7	10	5	10	14	*8	14	*18	12	*18	*30
	190"	7	10	5	10	14	*8	14	*18	12	*18	*28
78"	107"	9	18	6	14	*28	*12	26	*30+	NA	NA	NA
	113"	9	16	6	14	*26	*10	24	*30+	NA	NA	NA
	125"	7	14	5	12	*22	*9	20	*30+	NA	NA	NA
	131"	7	14	5	10	*20	*9	18	*30+	NA	NA	NA
	137"	7	12	5	10	*18	*8	16	*30	NA	NA	NA
	143"	7	12	5	10	*16	*8	16	*28	NA	NA	NA
	155"	7	12	5	10	*14	*8	14	*26	NA	NA	NA
	161"	7	12	5	10	*14	*8	14	*24	NA	NA	NA
	173"	7	12	5	10	*14	*8	14	*20	NA	NA	NA
	185"	7	12	5	10	*14	*8	14	*18	NA	NA	NA
84"	114"	9	18	6	14	*28	*12	*26	*30+	NA	NA	NA
	120"	9	16	6	14	*26	*10	*22	*30+	NA	NA	NA
	126"	8	16	5	12	*22	*10	*20	*30+	NA	NA	NA
	138"	7	14	5	10	*20	*9	*18	*30+	NA	NA	NA
	144"	7	12	5	10	*18	*9	*16	*30	NA	NA	NA
	156"	7	12	5	10	*16	*9	*14	*28	NA	NA	NA
	162"	7	12	5	10	*16	*9	*14	*26	NA	NA	NA
	168"	7	12	5	10	*14	*9	*14	*24	NA	NA	NA
	180"	7	12	5	10	*14	*9	*14	*22	NA	NA	NA
	186"+	7	12	5	10	*14	*9	*14	*20	NA	NA	NA
90"	122"	9	18	6	14	*28	NA	NA	NA	NA	NA	NA
	128"	9	16	6	14	*24	NA	NA	NA	NA	NA	NA
	146"	7	14	5	12	*20	NA	NA	NA	NA	NA	NA
	158"	7	12	5	10	18	NA	NA	NA	NA	NA	NA
	170"	7	12	5	10	16	NA	NA	NA	NA	NA	NA
	176"	7	12	5	10	14	NA	NA	NA	NA	NA	NA
MIN. COVER		3	2	3	2	2	3	2	1	2	1	1

NOTES: 1. Numbers preceded by an asterisk (*) indicate minium cover may be reduced 1 ft.
2. Numbers in tables indicate maximum allowable cover on pipe in feet. Standard highway loading is included.
3. NA = Pipe size not avalailable in this class.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard

Department of Public Works

REINFORCED CONCRETE PIPE CHART

DRAWN: STAFF CKD.: STAFF LB

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 529

SHEET 2 OF 2

REQUIRED "D" LOAD FOR R.C.P. & BEDDING FACTOR = 1.5

PIPE SIZE (INCH)	DEPTH OF COVER IN FEET												PIPE SIZE (INCH)
	0.5	1.0	1.5	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	
15	CONC. ENC.	3,000	2,500	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	15
18	4,000	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	18
21	3,500	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	21
24	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	24
27	↓	↓	↓	1,750	1,750	1,750	1,750	1,750	↓	↓	↓	↓	27
30	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	30
33	↓	↓	↓	↓	1,500	1,500	1,500	1,500	↓	↓	↓	↓	33
36	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	36
39	3,250	2,750	2,250	1,500	1,350	1,350	1,350	1,350	↓	↓	↓	↓	39
42	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	42
45	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	45
48	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	48
51	3,000	2,500	2,000	↓	↓	↓	↓	↓	↓	↓	↓	↓	51
54	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	54
57	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	57
60	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	60
63	2,750	2,250	1,750	↓	↓	↓	↓	↓	↓	↓	↓	↓	63
66	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	66
69	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	69
72	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	72
75	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	75
78	2,500	2,000	1,500	↓	↓	↓	↓	↓	↓	↓	↓	↓	78
81	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	81
84	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	84
87	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	87
90	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	90
93	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	93
96	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	96

REV. | APPR. BY | DATE

REV. | APPR. BY | DATE

NOTES:

1. LIVE LOAD = 1 H-20, S-16, TRUCK. EARTH LOAD = 110 P.C.F. (MARSTON'S FORMULA). SAFTY FACTOR = 1.25 MIN.
2. THIS IS TO BE USED FOR AVERAGE SOIL CONDITIONS. INCREASE WHERE SOIL ANAYLYSIS INDICATES GREATER EARTH LOADS. WHERE SOILS HAVING LOW COHESIVE VALUES EXIST, USE D-LOADS CALCULATED FOR PROJECTION CONDITION.
3. SEE PLATE 529 FOR PIPE CLASS.

CITY OF Oxnard

Department of Public Works

"D" LOAD TABLE FOR DESIGN OF R.C.P.

DRAWN: STAFF | CKD.: STAFF CB

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 530

SHEET 1 OF 3

REQUIRED "D" LOAD FOR R.C.P. & BEDDING FACTOR = 1.9

PIPE SIZE (INCH)	DEPTH OF COVER IN FEET												PIPE SIZE (INCH)
	0.5	1.0	1.5	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	
15	CONC. ENC.	2,500	2,000	1,500	1,350	1,350	1,350	1,350	1,500	1,500	1,500	1,500	15
18	3,000	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	18
21	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	21
24	2,750	2,250	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	24
27	↓	↓	↓	↓	↓	1,200	1,200	1,200	↓	↓	↓	↓	27
30	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	30
33	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	33
36	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	36
39	2,500	2,000	1,750	↓	1,100	1,100	1,100	1,100	↓	↓	↓	↓	39
42	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	42
45	2,250	1,750	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	45
48	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	48
51	2,000	1,500	1,500	1,350	↓	↓	↓	↓	↓	↓	↓	↓	51
54	↓	↓	1,400	↓	↓	↓	↓	↓	↓	↓	↓	↓	54
57	1,750	1,400	1,350	↓	↓	↓	↓	↓	↓	↓	↓	↓	57
60	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	60
63	1,500	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	63
66	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	66
69	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	69
72	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	72
75	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	75
78	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	78
81	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	81
84	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	84
87	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	87
90	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	90
93	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	93
96	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	96

REV. APPR. BY DATE

REV. APPR. BY DATE

NOTES:

1. LIVE LOAD = 1 H-20, S-16, TRUCK. EARTH LOAD = 110 P.C.F. (MARSTON'S FORMULA). SAFTY FACTOR = 1.25 MIN.
2. THIS IS TO BE USED FOR AVERAGE SOIL CONDITIONS. INCREASE WHERE SOIL ANAYLYSIS INDICATES GREATER EARTH LOADS. WHERE SOILS HAVING LOW COHESIVE VALUES EXIST, USE D-LOADS CALCULATED FOR PROJECTION CONDITION.
3. SEE PLATE 529 FOR PIPE CLASS.

CITY OF Oxnard

Department of Public Works

"D" LOAD TABLE FOR DESIGN OF R.C.P.

DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 530

SHEET 2 OF 3

REQUIRED "D" LOAD FOR R.C.P. & BEDDING FACTOR = 3.0

PIPE SIZE (INCH)	DEPTH OF COVER IN FEET												PIPE SIZE (INCH)
	0.5	1.0	1.5	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	
15	2,500	2,000	1,500	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	15
18	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	18
21	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	21
24	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	24
27	↓	1,750	1,350	↓	↓	↓	↓	↓	↓	↓	↓	↓	27
30	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	30
33	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	33
36	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	36
39	↓	↓	1,200	↓	↓	↓	↓	↓	↓	↓	↓	↓	39
42	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	42
45	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	45
48	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	48
51	2,000	1,500	1,000	↓	↓	↓	↓	↓	↓	↓	↓	↓	51
54	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	54
57	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	57
60	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	60
63	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	63
66	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	66
69	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	69
72	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	72
75	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	75
78	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	78
81	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	81
84	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	84
87	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	87
90	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	90
93	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	93
96	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	96

REV. APPR. BY DATE

REV. APPR. BY DATE

NOTES:

1. LIVE LOAD = 1 H-20, S-16, TRUCK. EARTH LOAD = 110 P.C.F. (MARSTON'S FORMULA). SAFTY FACTOR = 1.25 MIN.
2. THIS IS TO BE USED FOR AVERAGE SOIL CONDITIONS. INCREASE WHERE SOIL ANAYLYSIS INDICATES GREATER EARTH LOADS. WHERE SOILS HAVING LOW COHESIVE VALUES EXIST, USE D-LOADS CALCULATED FOR PROJECTION CONDITION.
3. SEE PLATE 529 FOR PIPE CLASS.

CITY OF Oxnard
Department of Public Works

"D" LOAD TABLE FOR DESIGN OF R.C.P.

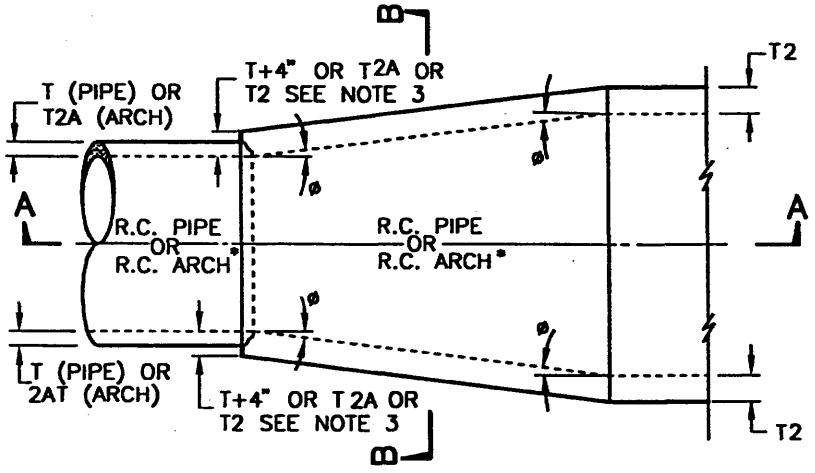
DRAWN: STAFF CKD.: STAFF LB

APPR. Granville M. Bowman

STANDARD PLAN 2002

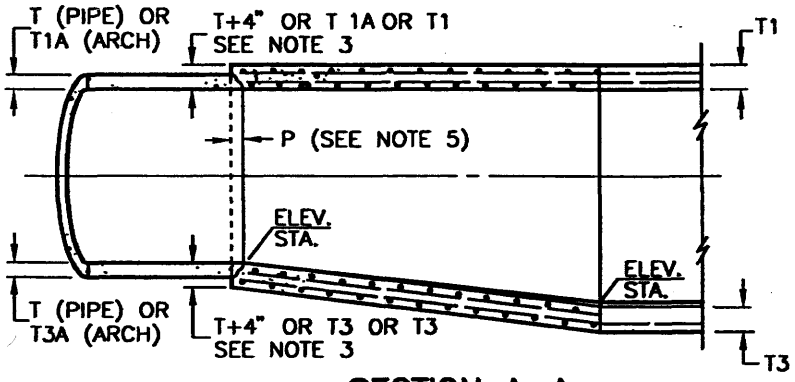
PLATE 530

SHEET 3 OF 3

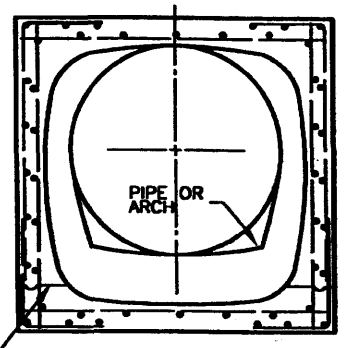


PLAN

* ARCH MAY HAVE A HORSESHOE-SHAPED, CIRCULAR, ELLIPTICAL OR SIMILAR CROSS-SECTION.



SECTION A-A



OPTIONAL CONSTRUCTION JOINT:
BOX OR ARCH TO PIPE - USE CONSTRUCTION JOINT OF BOX OR ARCH.
BOX TO ARCH-USE CONSTRUCTION JOINT OF BOX.

SECTION B-B

NOTES:

1. THE HORIZONTAL ANGLE OF DIVERGENCE OR CONVERGENCE, ø, SHALL NOT TO EXCEED 5 DEGREES 45 MINUTES.
2. REINFORCING STEEL BAR SIZES, SPACING, PATTERN AND COVER OVER THE STEEL SHALL BE AS FOLLOWS:
   BOX TO PIPE AND BOX TO ARCH-THAT OF BOX SECTION.
   ARCH TO PIPE-THAT OF ARCH SECTION.
   ARCH TO ARCH-THAT OF ARCH SECTION HAVING THE THICKER WALLS.
   THE BAR LENGTHS SHALL VARY UNIFORMLY THROUGHOUT THE TRANSITION.
3. THE CONCRETE THICKNESS SHALL BE AS FOLLOWS:
   BOX TO PIPE AND ARCH TO PIPE-THAT OF ARCH OR BOX SECTION UNLESS THE WALL THICKNESS OF THE PIPE PLUS 4 INCHES IS GREATER, IN WHICH CASE THE CONCRETE THICKNESS SHALL VARY UNIFORMLY FROM THAT OF THE ARCH OR BOX SECTION TO THAT OF THE PIPE WALL PLUS 4 INCHES.
   BOX TO ARCH AND ARCH TO ARCH-THAT OF THE ADJOINING BOX OR ARCH SECTION AT EACH END OF THE TRANSITION AND SHALL VARY UNIFORMLY BETWEEN THE TWO ENDS.
4. THE INTERIOR SURFACE SHALL BE SMOOTH AND VARY UNIFORMLY BETWEEN THE TWO ADJOINING SECTIONS.
5. AT PIPE JUNCTURE, EMDEDMENT P SHALL BE 5 INCHES FOR PIPE SIZES OF 96 INCHES OR LESS, AND 8 INCHES FOR PIPE SIZES OVER 96 INCHES.
6. f'c=4000 PSI AT 28 DAYS .
7. KEYED CONSTRUCTION JOINTS OF THE SAME DIMENSIONS AS THOSE OF THE BOX OR ARCH SECTION MAY BE CARRIED THROUGH THE TRANSITION STRUCTURE AT THE CONTRACTOR'S OPTION. SEE SECTION B-B HEREON.
8. THE TRANSITION STRUCTURE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE GENERAL STRUCTURAL NOTES APPLYING TO BOX OR ARCH STRUCTURES SHOWN ON THE PROJECT DRAWGINGS.
9. ALL STEEL, EXCEPT LONGITUDINAL STEEL SHALL BE GRADE 60 BILLET STEEL CONFORMING TO ASTM A 615 AND SHALL TERMINATE 1½" CLEAR OF CONCRETE SURFACE UNLESS OTHERWISE SHOWN.

REV. APPR. BY DATE

REV. APPR. BY DATE

CITY OF Oxnard
Department of Public Works

TRANSITION STRUCTURE No. 1
PIPE TO BOX

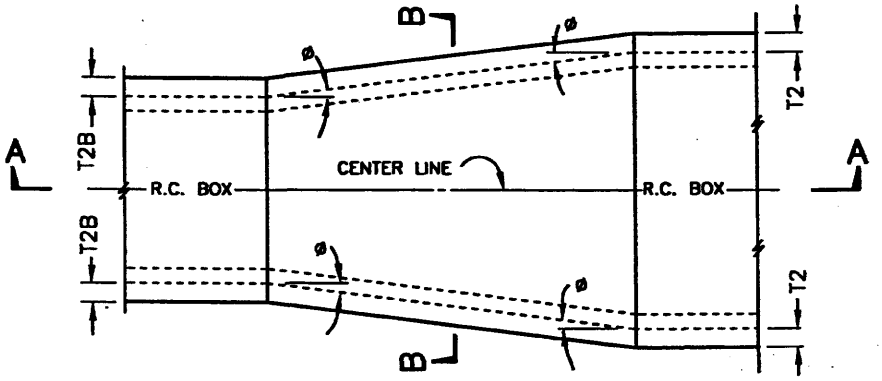
DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

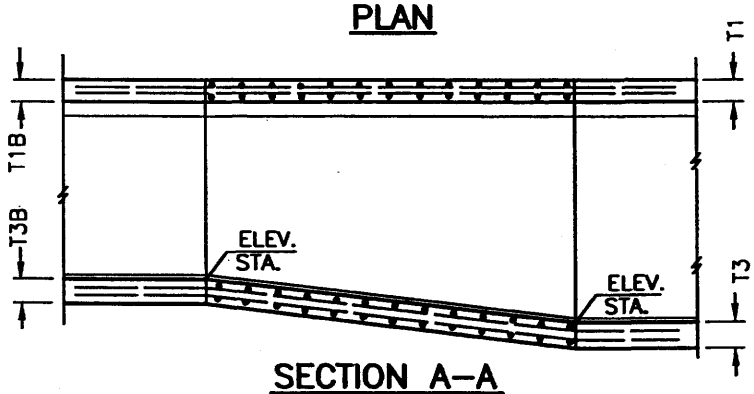
STANDARD PLAN 2002

PLATE 531

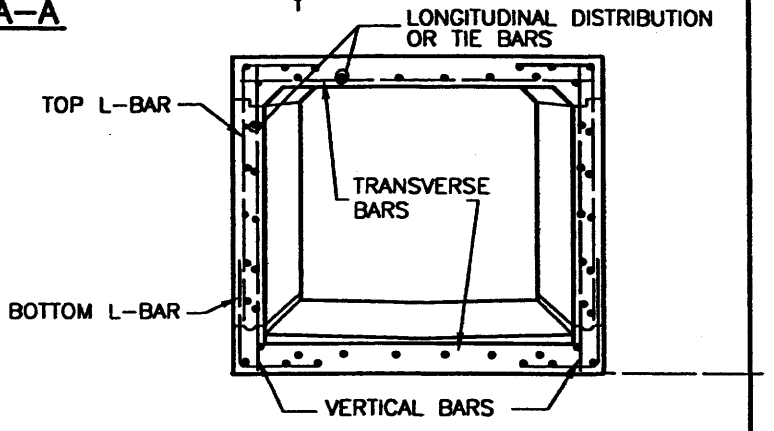
SHEET 1 OF 1



PLAN



SECTION A–A



SECTION B–B

NOTES:

1. THE HORIZONTAL ANGLE OF DIVERGENCE OR CONVERGENCE, ø, SHALL NOT EXCEED 5 DEGREES 45 MINUTES.
2. THE REINFORCING STEEL BAR SIZE, SPACING, AND COVER OVER THE STEEL OF STRAIGHT TRANSVERSE BARS IN TOP OR BOTTOM SLABS, OF L–BARS IN TOP OR BOTTOM CORNERS, OF STRAIGHT VERTICAL BARS IN SIDE WALLS AND OF LONGITUDIAL DISTRIBUTION AND TIE BARS IN TOP OR BOTTOM SLABS OR SIDE WALLS SHALL BE THOSE OF WHICHEVER ADJOINING BOX SECTION PROVIDES THE GREATER STEEL AREA FOR EACH TYPE OF BAR. THE BAR LENGTHS SHALL VARY UNIFORMLY THROUGHOUT THE TRANSTION.
3. THE THICKNESS OF THE WALLS AND SLABS SHALL BE THOSE OF THE ADJOINING BOX SECTION AT EACH END OF THE TRANSITION AND SHALL VARY UNIFORMLY BETWEEN THE TWO ENDS.
4. f'c=4000 PSI AT 28 DAYS.
5. THE TRANSITION STRUCTURE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE GENERAL STRUCTURE NOTES APPLYING TO BOX STRUCTURES, SHOWN ON THE PROJECT DRAWINGS.
6. DETAILS OF CONSTRUCTION JOINTS AND KEYWAYS SHALL BE AS SHOWN ON THE PROJECT DRAWINGS FOR SINGLE BARREL BOX STRUCTURES.
7. ALL STEEL, EXCEPT LONGITUDINAL STEEL SHALL BE GRADE 60 BILLET STEEL CONFORMING TO ASTM A 615 AND SHALL TERMINATE 1½" CLEAR OF CONCRETE SURFACE UNLESS OTHERWISE SHOWN.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

TRANSITION STRUCTURE No. 2
SINGLE BOX TO SINGLE BOX

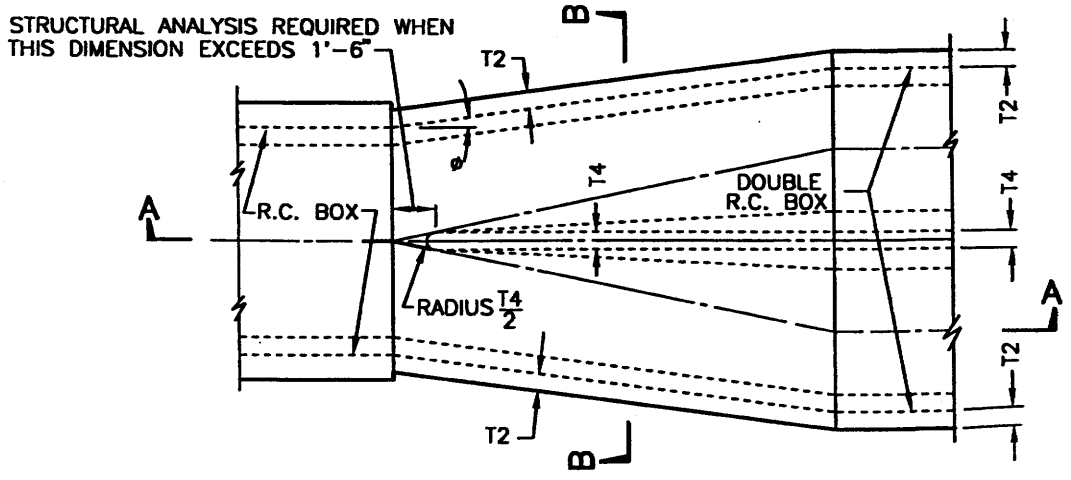
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

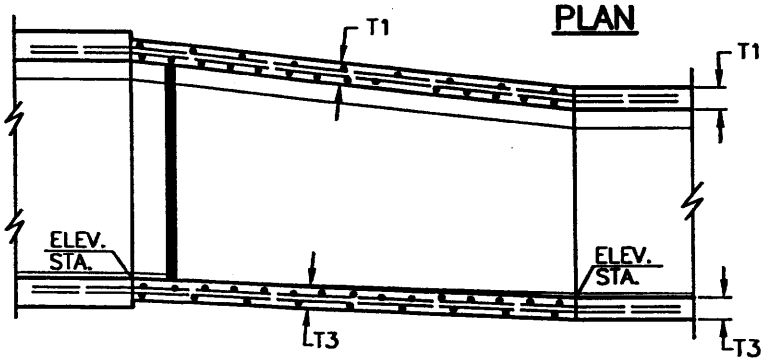
STANDARD PLAN 2002

PLATE 532

SHEET 1 OF 1

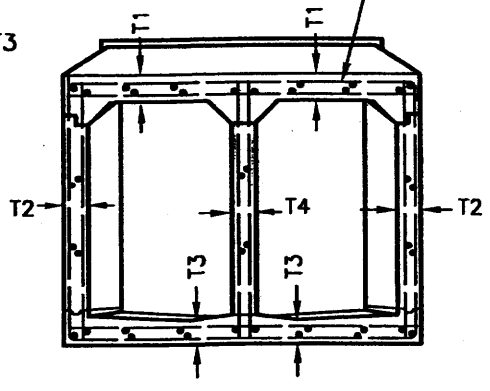


PLAN



SECTION A–A

STEEL PATTERN SHOWN IS PICTORIAL ONLY. SEE PROJECT DRAWINGS FOR ACTUAL LAYOUT.



SECTION B–B

NOTES:

1. THE HORIZONTAL ANGLE OF DIVERGENCE OR CONVERGENCE, ø, SHALL NOT EXCEED 5 DEGREES 45 MINUTES.
2. REINFORCING STEEL BAR SIZE, SPACING AND OUTSIDE COVER SHALL BE THAT OF DOUBLE BOX SECTION. FOR CURVED TRANSITIONS, SPACE BARS ON CENTER LINE AND PLACE TRANSVERSE RADIALLY. THE BAR LENGTHS AND DIMENSIONS SHALL VARY UNIFORMLY THROUGHOUT TRANSTION. LONGITUDINAL BARS SHALL BE CONTINUED THROUGH THE JOINTS WITH THE TRANSTION STRUCTURE.
3. THE CONCRETE THICKNESS SHALL BE THAT OF THE DOUBLE BOX SECTION.
4. PLAN AS SHOWN IS FOR DOUBLE BOX SECTION DOWNSTREAM. WHEN WHEN DOUBLE BOX SECTION IS UPSTREAM, TAPER THE LAST 2 FEET OF CENTER WALL TO END IN 1½ INCH RADIUS.
5. f'c = 4000 AT 28 DAYS .
6. TRANSVERSE JOINT KEYWAYS, AS DETAILED FOR LONGITUDINAL JOINT KEYWAYS AT BASE OF OUTLET WALLS ON THE PROJECT DRAWINGS, SHALL BE PLACED IN BOTHS SLABS AND WALLS AT THE END OF EACH POUR.
7. ALL STEEL, EXCEPT LONGITUDINAL STEEL SHALL BE GRADE 60 BILLET STEEL CONFORMING TO ASTM A 615 AND SHALL TERMINATE 1½" CLEAR OF CONCRETE SURFACE UNLESS OTHERWISE SHOWN.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

TRANSITION STRUCTURE No. 3
SINGLE BOX TO DOUBLE BOX

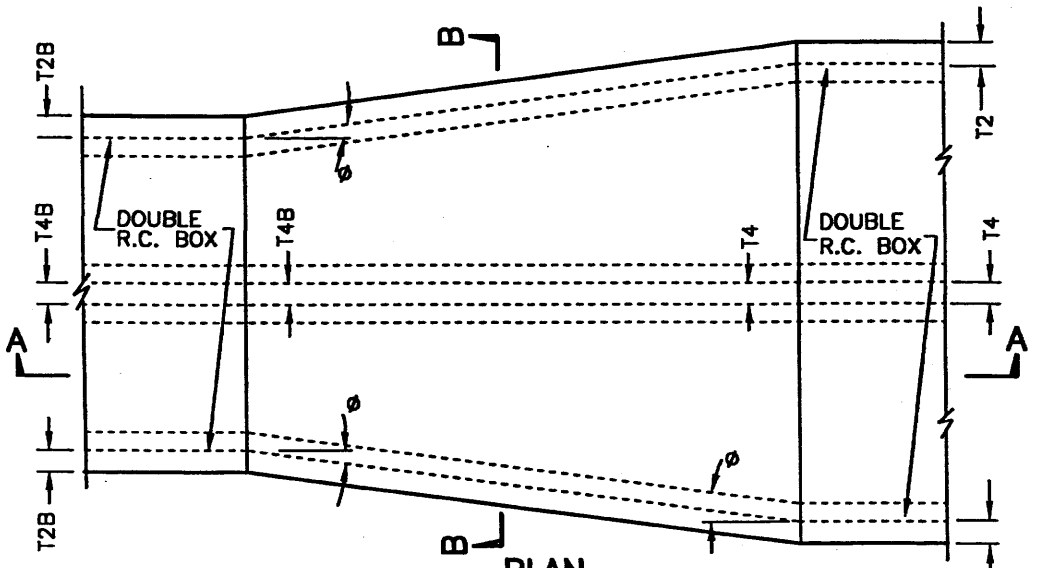
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

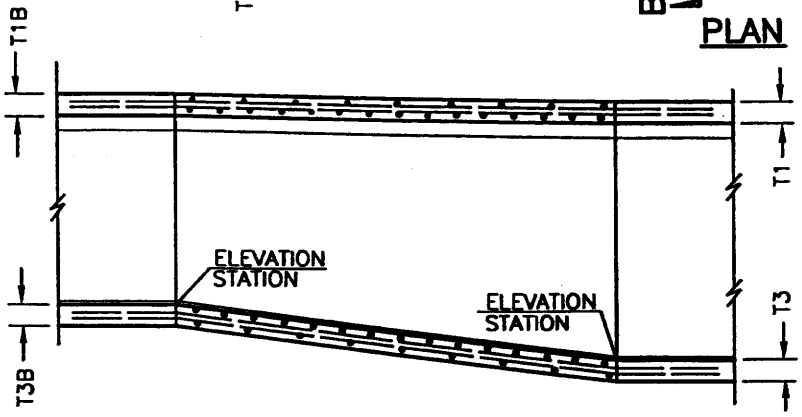
STANDARD PLAN 2002

PLATE 533

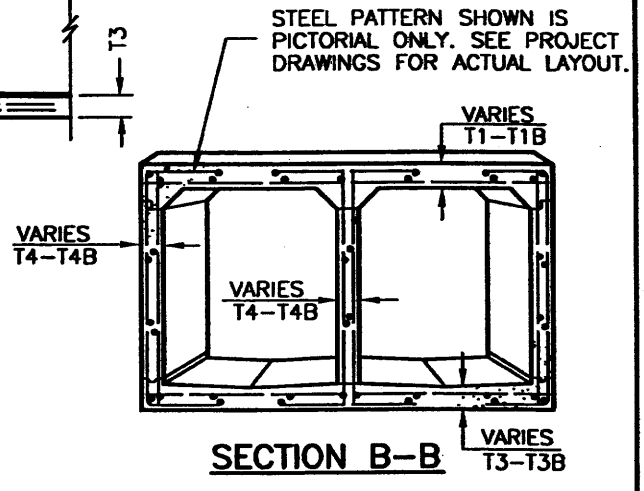
SHEET 1 OF 1



PLAN



SECTION A–A



SECTION B–B

NOTES:

1. HORIZONTAL ANGLE OF DIVERGENCE OR CONVERGENCE, ø, SHALL NOT EXCEED 5 DEGREES 45 MINUTES.
2. REINFORCING STEEL BAR SIZE, SPACING, LENGTHS, AND OUTSIDE COVER SHALL BE THAT OF WHICHEVER ADJOINING BOX SECTION PROVIDES THE BOX SECTION PROVIDES THE GREATER STEEL AREA FOR EACH TYPE OF BAR. LONGITUDINAL BARS SHALL BE CONTINUED THROUGH THE JOINTS WITH THE TRANSTION STRUCTURE.
3. THE THICKNESS OF THE WALLS AND SLABS SHALL BE THOSE OF THE ADJOINTING BOX SECTION AT EACH END OF THE TRANSITION AND SHALL VARY UNIFORMLY BETWEEN THE TWO ENDS.
4. f'c = 4000 PSI AT 28 DAYS .
5. TRANSVERSE JOINT KEYWAYS, AS DETAILED FOR LONGITUDINAL JOINT KEYWAYS AT BASE OF OUTER WALLS ON THE PROJECT DRAWINGS, SHALL BE PLACED IN BOTH SLABS AND WALLS AT THE END OF EACH POUR.
6. THE TRANSITION STRUCTURE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE GENERAL STRUCTURAL NOTES APPLYING TO BOX STRUCTURES SHOWN ON THE PROJECT DRAWINGS.
7. ALL STEEL, EXCEPT LONGITUDINAL STEEL SHALL BE GRADE 60 BILLET STEEL CONFORMING TO ASTM A 615 AND SHALL TERMINATE 1½" CLEAR OF CONCRETE SURFACE UNLESS OTHERWISE SHOWN.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

TRANSITION STRUCTURE No. 4
DOUBLE BOX TO DOUBLE BOX

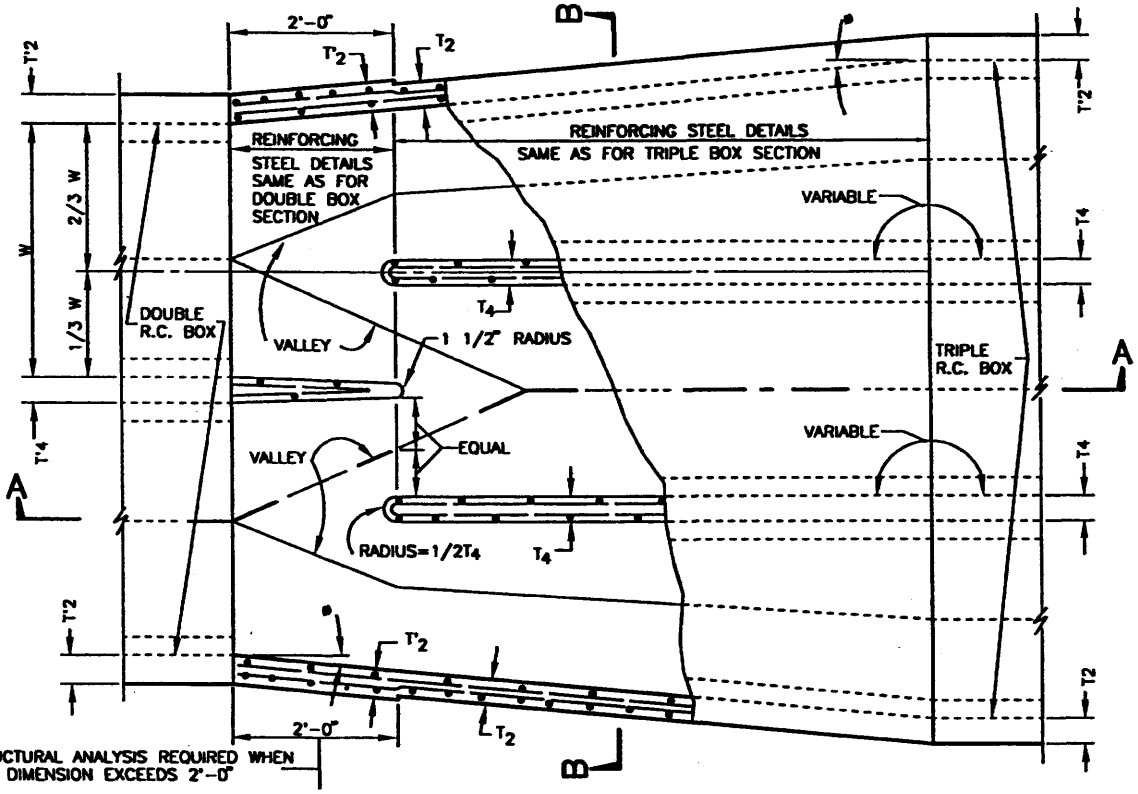
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

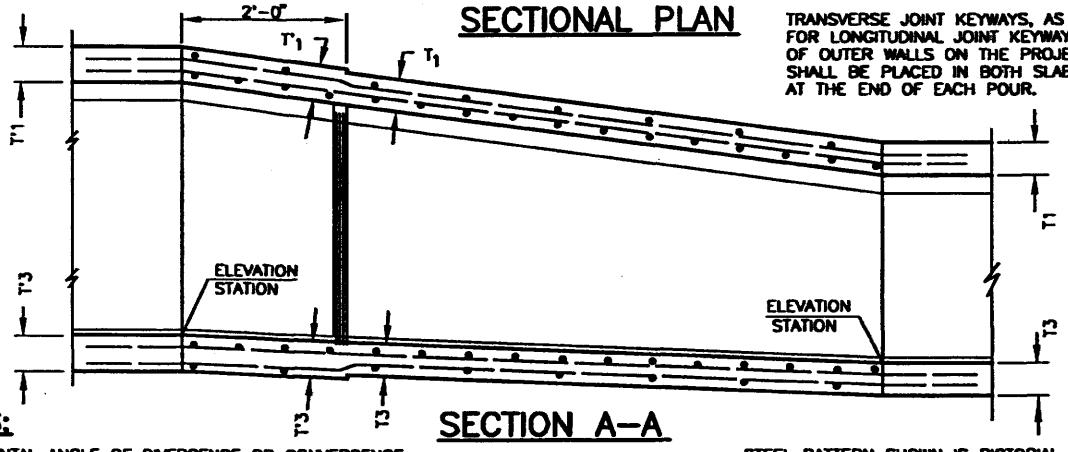
STANDARD PLAN 2002

PLATE 534

SHEET 1 OF 1



SECTIONAL PLAN



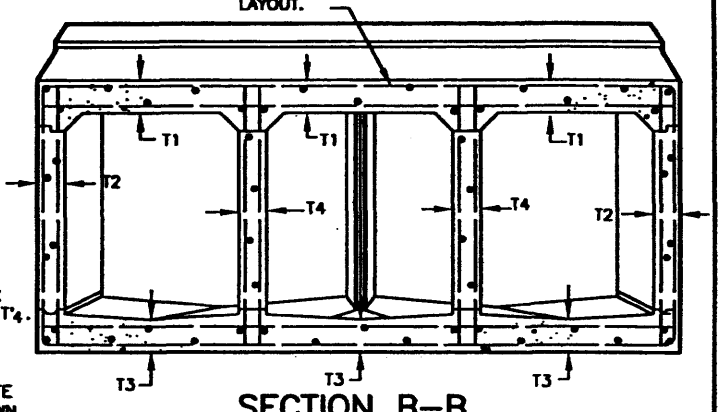
SECTION A–A

TRANSVERSE JOINT KEYWAYS, AS DETAILED FOR LONGITUDINAL JOINT KEYWAYS AT BASE OF OUTER WALLS ON THE PROJECT DRAWINGS, SHALL BE PLACED IN BOTH SLABS AND WALLS AT THE END OF EACH POUR.

NOTES:

1. HORIZONTAL ANGLE OF DIVERGENCE OR CONVERGENCE, ø, SHALL NOT EXCEED 5 DEGREE 45 MINUTES.
2. REINFORCING STEEL BAR SIZE, SPACING, AND OUTSIDE COVER SHALL BE THAT OF THE ADJOINING BOX SECTION WITHIN THE LIMITS INDICATED ON THE DRAWING. FOR CURVED TRANSITIONS SPACE BARS ON CENTER LINE, AND PLACE TRANSVERSE STEEL RADIALLY. BARS LENGTHS AND DIMENSIONS SHALL VARY UNIFORMLY THROUGHOUT TRANSITION. LONGITUDINAL BARS SHALL BE CONTINUED THROUGH THE JOINTS WITH THE TRANSITION STRUCTURE.
3. CONCRETE THICKNESS SHALL BE THAT OF ADJOINING BOX SECTION WITHIN THE LIMITS INDICATED ON THE DRAWING.
4. PLAN AS SHOWN IS FOR TRIPLE BOX SECTION DOWNSTREAM. WHEN TRIPLE BOX SECTION IS UPSTREAM, REVERSE THE RADIUS AT THE ENDS OF DIVISION WALLS AS FOLLOWS:
   a) TAPER THE LAST TWO FEET OF TRIPLE BOX DIVISION WALLS TO END IN 1 1/2 INCH RADIUS.
   b) THE TWO FOOT EXTENSION OF CENTER WALL OF DOUBLE BOX TO BE OF UNIFORM THICKNESS, T'4, ENDING IN RADIUS 1/2 T'4.
5. f'c = 4000 PSI AT 28 DAYS.
6. ALL STEEL, EXCEPT LONGITUDINAL STEEL SHALL BE GRADE 60 BILLET STEEL CONFORMING TO ASTM A615 AND SHALL TERMINATE 1 1/2" CLEAR OF CONCRETE SURFACE UNLESS OTHERWISE SHOWN.

STEEL PATTERN SHOWN IS PICTORIAL ONLY. SEE PROJECT DRAWINGS FOR ACTUAL STEEL LAYOUT.



SECTION B–B

REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

TRANSITION STRUCTURE No. 5
DOUBLE BOX TO TRIPLE BOX

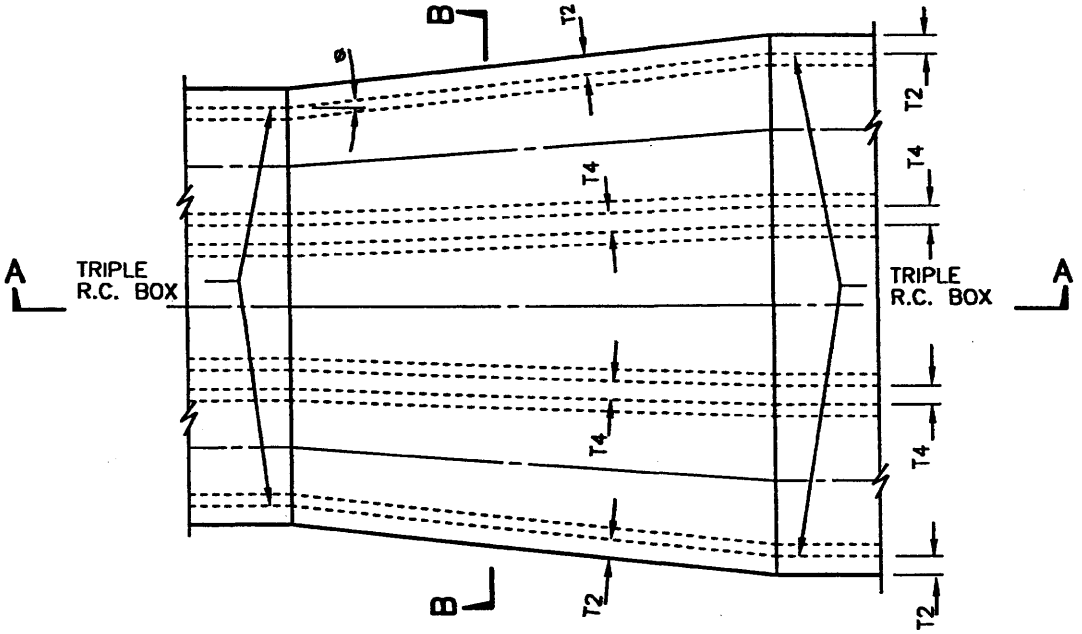
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

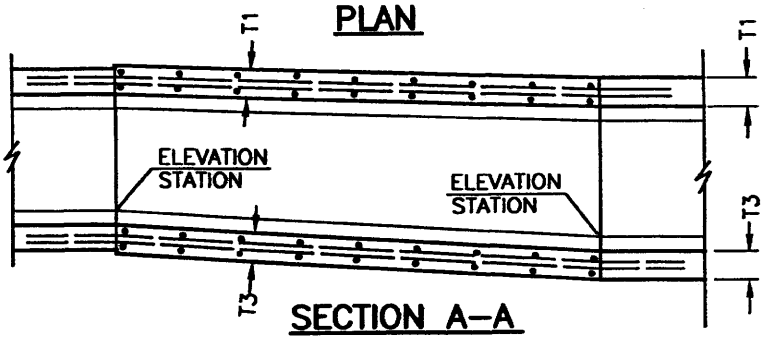
STANDARD PLAN 2002

PLATE 535

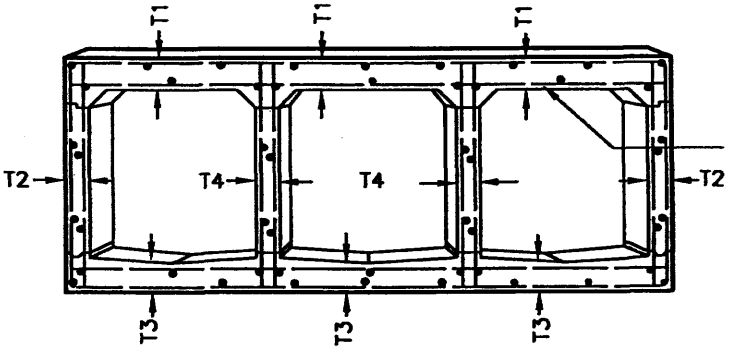
SHEET 1 OF 1



PLAN



SECTION A–A



STEEL PATTERN SHOWN IS PICTORIAL ONLY. SEE PROJECT DRAWINGS FOR ACTUAL LAYOUT.

SECTION B–B

NOTES:

1. THE HORIZONTAL ANGLE OF DIVERGENCE OR CONVERGENCE, ø, SHALL NOT EXCEED 5 DEGREES 45 MINUTES.
2. REINFORCING STEEL BAR SIZE, SPACING, AND OUTSIDE COVER SHALL BE THAT OF THE LARGER SECTION. FOR FOR CURVED TRANSTIONS, SPACE BARS ON CENTER LINE AND PLACE TRANSVERSE STEEL RADIALLY. BAR LENGTHS AND DIMENSTIONS SHALL VARY UNIFORMLY THROUGHOUT TRANSTION. LONGITUDINAL BARS SHALL BE CONTINUED THROUGH THE JOINTS WITH THE TRANSTION STRUCTION.
3. THE CONCRETE THICKNESS SHALL BE THAT OF THE LARGER BOX SECTION.
4. f'c = 4000 PSI AT 28 DAYS.
5. TRANSVERSE JOINT KEYWAYS, AS DETAILED FOR LONGITUDINAL JOINT KEYWAYS AT BASE OF OUTER WALLS ON THE PROJECT DRAWINGS, SHALL BE PLACED IN BOTH SLABS AND WALLS AT THE END OF EACH POUR.
6. ALL STEEL, EXCEPT LONGITUDINAL STEEL SHALL BE GRADE 60 BILLET STEEL CONFORMING TO ASTM A615 AND SHALL TERMINATE 1½" CLEAR OF CONCRETE SURFACE UNLESS OTHERWISE SHOWN.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

TRANSITION STRUCTURE No. 6
TRIPLE BOX TO TRIPLE BOX

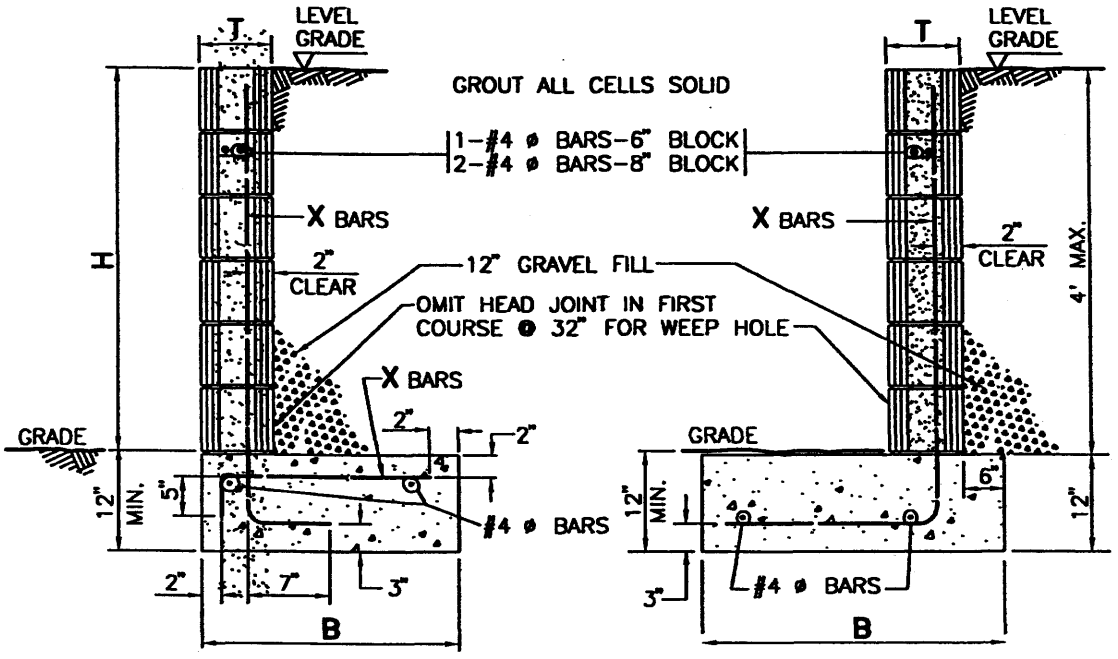
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowmon

STANDARD PLAN 2002

PLATE 536

SHEET 1 OF 1



POUR FOOTING AGAINST UNDISTURBED NATURAL SOIL

H	B	T	'X' BARS
2'-0"	1'-6"	6"	#3 @ 48" O.C.
3'-0"	1'-10"	6"	#3 @ 32" O.C.
4'-0"	2'-6"	8"	#4 @ 48" O.C.

GENERAL NOTES:

1. CONCRETE-2000 P.S.I. MIN. @ 28 DAYS; 480 C 2000, 4" MAXIMUM SLUMP.
2. REINFORCING STEEL-ASTM A15 & A305, MIN. fs=18000 P.S.I.
3. REINFORCING STEEL LAPS-MIN. 1'-6"
4. CONCRETE MANSORY UNITS-ASTM C 90; CONCRETE BLOCK GRADE 'A'
5. GROUT-1 PART CEMENT, 2 TO 3 PARTS SAND, 2 PARTS PEA GRAVEL.
6. SOIL-MAX. 1000 P.S.I. BEARING PRESSURE.
7. BACKFILL-COHESIONLESS SOIL.
8. ALL WORKMANSHIP AND MATERIALS TO CONFORM WITH THE UNIFORM BUILDING CODE.
9. NO SURCHARGE ON WALL. CONSULT A PROFESSIONAL CIVIL OR STRUCTURAL ENGINEER FOR DESIGN OF RETAINING WALLS HAVING
   (a) A HEIGHT GREATER THAN 4 FEET AND/OR
   (b) ANY SURCHARGE (VEHICLE LOADING, ADJACENT FOOTING, ETC.).

REV. APPR. BY DATE

REV. APPR. BY DATE

CITY OF Oxnard

Department of Public Works

RETAINING WALL

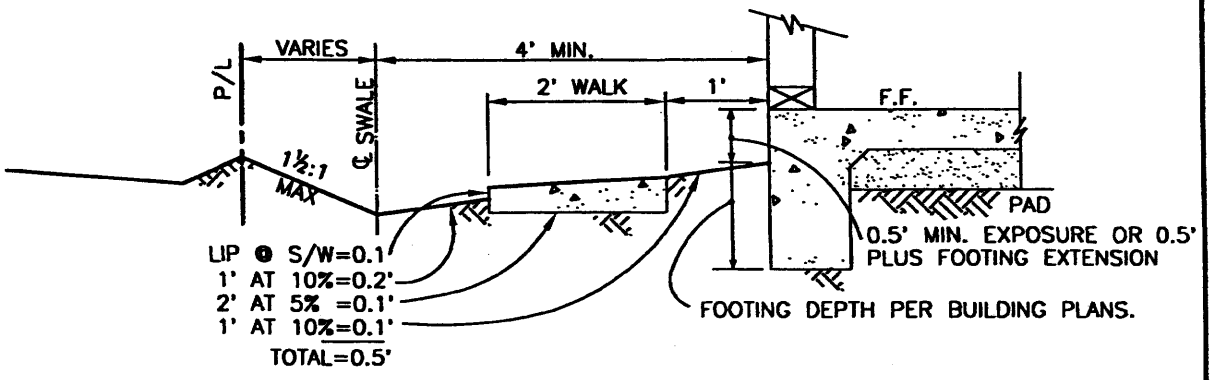
DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Boxman

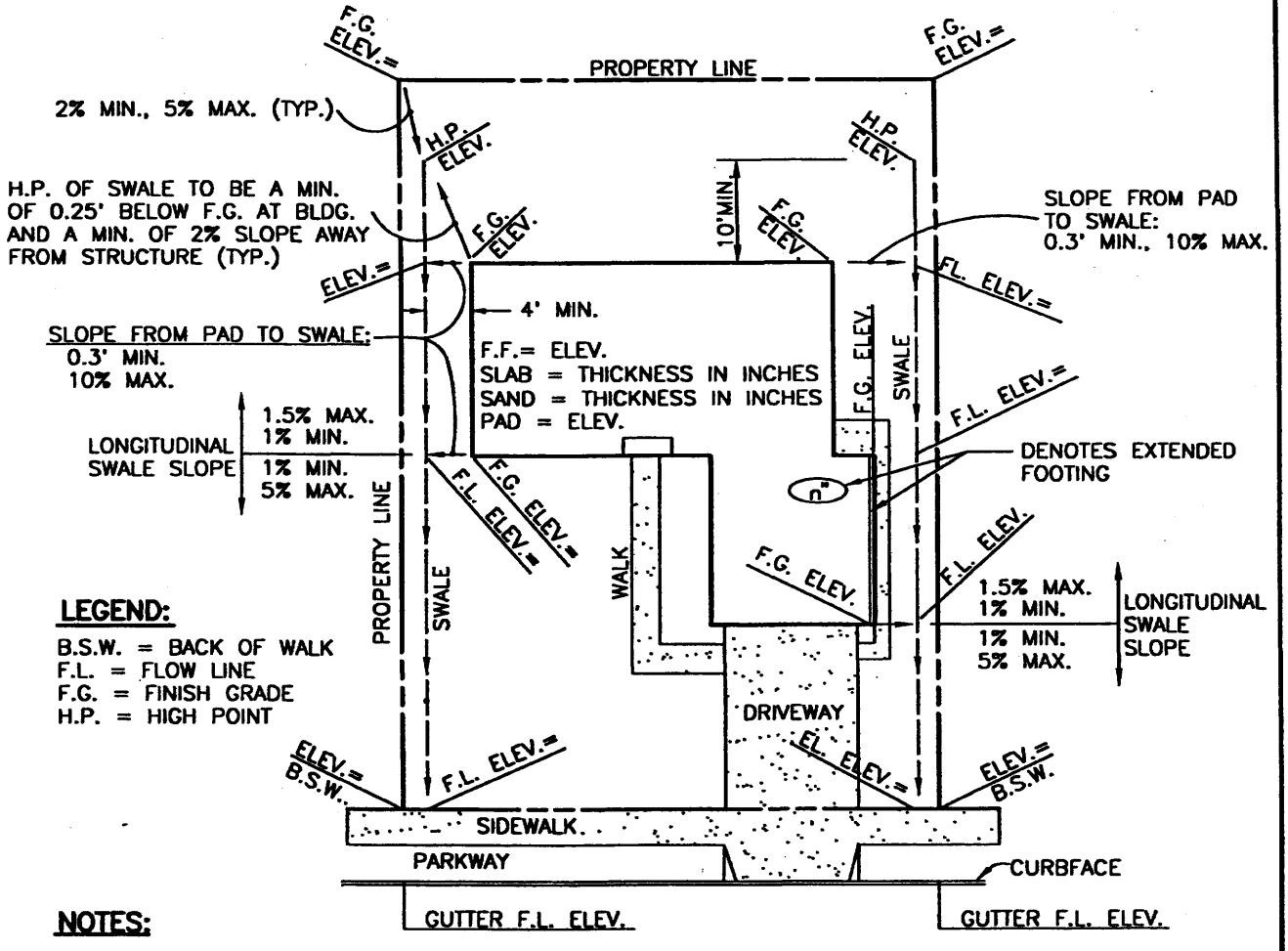
STANDARD PLAN 2002

PLATE 600

SHEET 1 OF 1



TYPICAL SWALE SECTION



LEGEND:

B.S.W. = BACK OF WALK
F.L. = FLOW LINE
F.G. = FINISH GRADE
H.P. = HIGH POINT

NOTES:

1. THE (n") DENOTES AN EXTENDED FOOTING WHERE "n" EQUALS THE EXTENDED FOOTING DEPTH.
2. DEVIATION FROM THIS CRITERIA WILL REQUIRE PRIOR APPROVAL OF THE CITY OF OXNARD.
3. CALL OUT ALL ELEVATIONS AS SHOWN.
4. THIS PLATE PRIMARILY APPLIES TO SINGLE FAMILY RESIDENTIAL DEVELOPMENT. FINISH FLOOR ELEV. SHALL BE 25" ABOVE THE LOWEST ADJACENT STREET GUTTER OR BE PROTECTED FROM A 100 YEAR STORM STORM, WHICHEVER IS GREATER.
5. SIDEWALK DRAINS SHALL NOT BE USED IN RESIDENTIAL CONSTRUCTION.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

STANDARD LOT DRAINAGE

DRAWN: STAFF | CKD.: STAFF

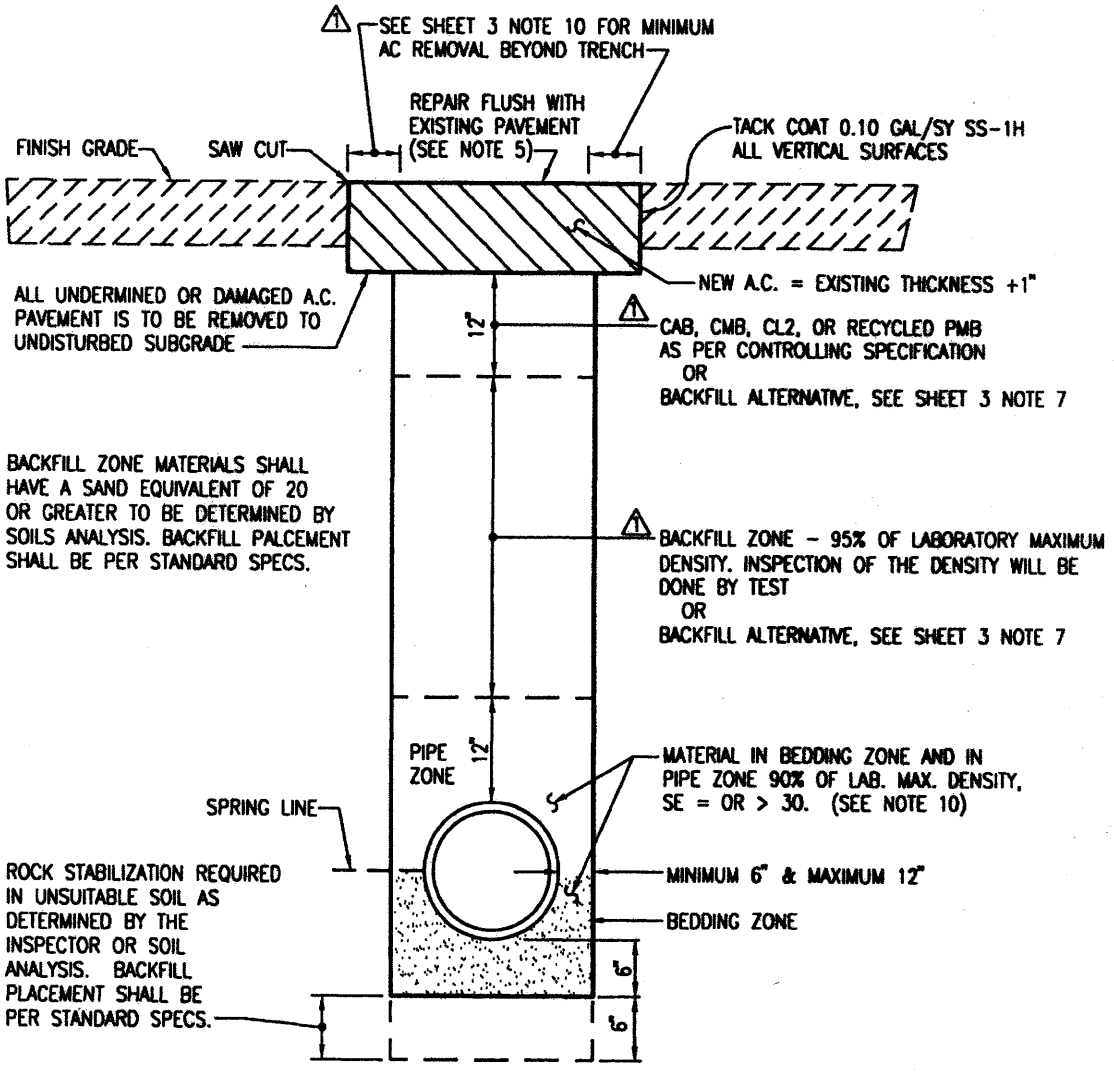
APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 601

SHEET 1 OF 1

DETAIL APPLICABILITY: STREETS OLDER THAN 10 YEARS



REV.	APPR. BY	DATE

REV.	APPR. BY	DATE
⚠	Lou B.	7/31/06

CITY OF ALAMEDA CALIFORNIA

STD. TRENCH BACKFILL REQUIREMENT

STANDARD PLAN 2002

DRAWN: A. ROQUE | CKD.: B.STARR, PE

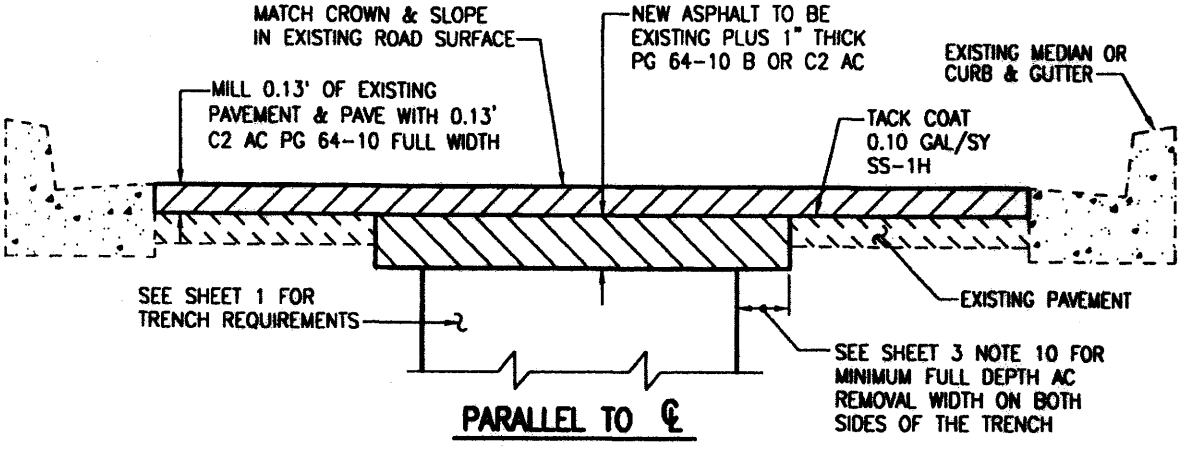
Department of Public Works

APPR. L. Bilderrama, PE, City Engineer

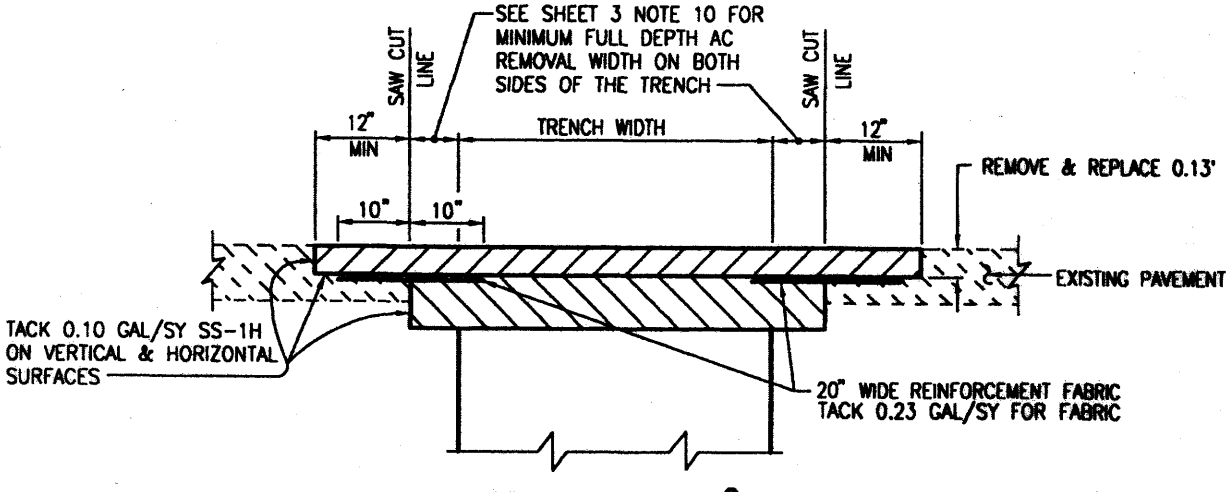
PLATE 602

SHEET 1 OF 3

DETAIL APPLICABILITY: STREETS LESS THAN 10 YEARS



PARALLEL TO ℄



⚠ PERPENDICULAR TO ℄

⚠ SEE NOTES 15 & 16

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE
⚠	Lou B.	7/31/06
⚠	Lou B.	9/28/06

CITY OF OAKLAND CALIFORNIA

STD. TRENCH BACKFILL REQUIREMENT

DRAWN: A. ROQUE | CKD.: B.STARR, PE

Department of Public Works

APPR. L. Balderrama, PE, City Engineer

STANDARD PLAN 2002

PLATE 602

SHEET 2 OF 3

NOTES:

1. JETTING PERMITTED 3' BELOW SUBGRADE IN SUITABLE SOIL (SE = OR >30) WITH NO GROUNDWATER CONDITION.

⚠2. A.C. AND BACKFILL TO BE MECHANICALLY COMPACTED. WHEEL ROLLING NOT PERMITTED.

3. A.C. COLD MIX TO BE ON SITE PRIOR TO BREAKING PAVEMENT.

4. SHORING REQUIRED PER CAL-OSHA

5. ALL TRENCHES PARALLEL TO THE CENTERLINE OF THE STREET SHALL BE PAVED WITH ASPHALT PAVING MACHINE FLUSH WITH THE EXISTING PAVEMENT.

⚠6. BACKFILL SHALL BE IN ACCORDANCE WITH THIS PLATE EXCEPT THAT THE BACKFILL OF TRENCH CUTS OR TRANSVERSE CUTS ON ALL MAJOR ARTERIAL STREETS SHALL BE A ONE SACK CEMENT SLURRY.

⚠7. A 1½-SACK SLURRY BACKFILL MAY BE ALLOWED BY ENGINEER.

8. HYDRO-HAMMER, OR STOMPER, IS PERMITTED SUBJECT TO PRIOR APPROVAL. THEY ARE NOT PERMITTED WITHIN 5' OF EXISTING UTILITIES.

9. IF EDGE OF TRENCH IS 60" OR LESS FROM THE EDGE OF A GUTTER, OR OTHER EXISTING TRENCH REPAIR, THEN REMOVE THE INTERVENING ASPHALT BETWEEN THE GUTTER EDGE OR EXISTING TRENCH REPAIR AND REPAVE IT AS PART OF THE TRENCH RESURFACING.

⚠10.

TRENCH DEPTH	MIN. PAVEMENT REMOVAL BEYOND TRENCH WALL
0 - 5'	12"
5' - 10'	36"
10'+	60"

NOTE: CITY OF OXNARD PUBLIC WORKS INSPECTOR MAY INCREASE BEYOND THESE LIMITS DUE TO SPECIAL SITE CONDITIONS AND CONTRACTORS METHOD OF OPERATION. REMOVAL WIDTHS IDENTIFIED ABOVE ARE MINIMUM REQUIRED FOR ALL TRENCH REPAIRS.

11. BEDDING AND PIPE ZONE FILL SHALL BE PER SSPWC (GREENBOOK) UNLESS OTHERWISE SPECIFIED.

12. REINFORCING FABRIC WILL BE "PAVE PREP", "PAVE TAC" OR EQUAL.

⚠13. FOR TRENCHES PARALLEL TO THE ℄ OF THE STREET THE ENTIRE PAVEMENT WIDTH BETWEEN THE EDGES OF THE PAVEMENT, i.e. CURB TO CURB, SHALL BE REMOVED TO A DEPTH OF 0.13'; THE TRENCH AREA SHALL BE RESTORED AS PER SHEET 1 & 2.

⚠14. FOR TRENCHES PERPENDICULAR TO STREET ℄, THE PAVEMENT SURFACE SHALL BE REMOVED TO A DEPTH OF 0.13' AS DETERMINED BY SHEET 1 & 2. STRIPS OF PAVEMENT REINFORCEMENT FABRIC SHALL BE CENTERED OVER THE EDGES OF THE TRENCH. MINIMUM WIDTH OF REINFORCING FABRIC FABRIC SHALL BE 20".

⚠15. MULTIPLE PERPENDICULAR/TRANVERSE TRENCHES SPACED CLOSER THAN 500 FEET APART SHALL BE MILLED LONGITUDINALLY FROM TRENCH TO TRENCH AND CAPPED WITH A 0.13' C2 AC PG 64-10 FULL WIDTH OF THE STREET AS SHOWN ON PARALLEL TO ℄.

⚠16. POT HOLES SHALL BE CONSIDERED TRENCH CUTS FOR REPAIR PURPOSES.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE
⚠	Lou B.	7/31/06
⚠	Lou B.	9/28/06

CITY OF Oxnard CALIFORNIA

STD. TRENCH BACKFILL REQUIREMENT

STANDARD PLAN 2002

DRAWN: A. ROQUE | CKD.: B.STARR, PE

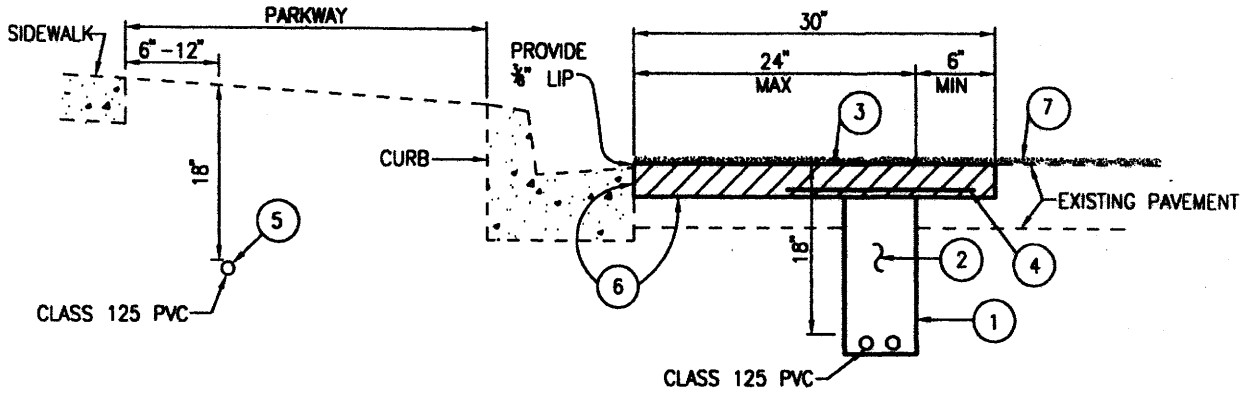
Department of Public Works

APPR. L. Balderrama, PE, City Engineer

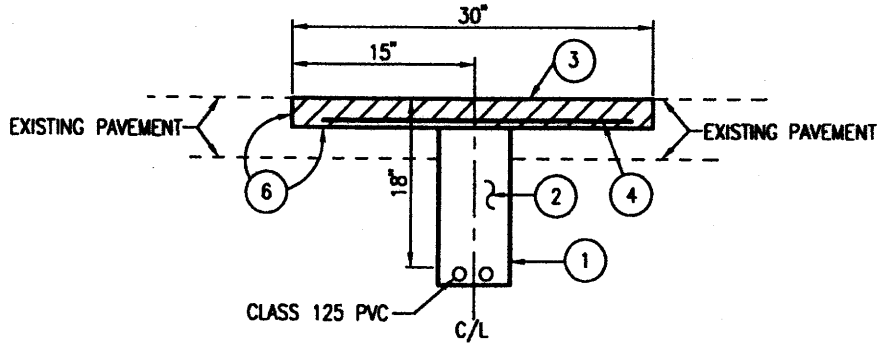
PLATE 602

SHEET 3 OF 3

REPAVING REQUIREMENT FOR ROCKSAW TRENCHES IN CITY STREETS/ALLEYS AND PARKWAYS



PARALLEL TO CURB



TRANSVERSE TO CURB

NOTES:

1. ROCKSAW TRENCH 4"-6" WIDE, MAX. 24" FROM GUTTER FACE, 18" COVER OVER CONDUITS.
2. FILL TRENCH TO TOP WITH 1½ SACK MIX CEMENT/SAND SLURRY.
3. GRIND FROM GUTTER LIP TOWARDS STREET CENTERLINE A MINIMUM OF 30" WIDE AND 2" DEEP ON PARALLEL TRENCHES & 30" WIDE AND 2" DEEP CENTERED ON TRANSVERSE TRENCHES OR AS DIRECTED BY CITY OF OXNARD PUBLIC WORKS INSPECTOR AND PLACE C-2 PG 64-10 ASPHALT COMPACTED WITH A ROLLER TO 95%.
4. PLACE 3.5 OUNCE PETROMAT 18" WIDE CENTER ON TRENCH & TACK WITH 0.23 GAL/SY SS-1H.
5. PARKWAY CONSTRUCTION: PERMITEE TO SUBMIT DETAILS FOR APPROVAL. ALL APRONS RIBBON GUTTERS, RESIDENTIAL HARDSCAPE & RESIDENTIAL SOFTSCAPE SHALL BE RESTORED/REPAIRED/OR REPLACED AS ORIGINALLY FOUND AND AS DIRECTED BY THE CITY OF OXNARD PUBLIC WORKS INSPECTOR.
6. TACK COAT 0.10 GAL/SY SS-1H ALL VERTICAL & HORIZONTAL SURFACES OR UNLESS NOTED OTHERWISE.
7. TYPE II SLURRY SEAL PLACED AT 16#/SY. SLURRY SEAL SHALL EXTEND FROM THE GUTTER LIP TO THE LANE LINE, OR AS DIRECTED BY THE PUBLIC WORKS INSPECTOR.
8. ⚠ MULTIPLE PERPENDICULAR/TRANVERSE TRENCHES SPACED CLOSER THAN 500 FEET APART SHALL BE MILLED LONGITUDINALLY FROM TRENCH TO TRENCH AND CAPPED WITH A 0.13' C2 AC PG 64-10 FULL WIDTH OF THE STREET AS SHOWN ON PARALLEL TO ℄.
9. ⚠ POT HOLES SHALL BE CONSIDERED TRENCH CUTS FOR REPAIR PURPOSES.

ROCKSAW TRENCH CUTS ARE NORMALLY NOT ALLOWED. UTILITIES ARE REQUIRED TO BE BORED, EXCEPT WHEN ALLOWED BY THE CITY ENGINEER OR REPRESENTATIVE.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE
⚠	Lou B.	7/31/06
⚠	Lou B.	9/28/06

CITY OF OXNARD CALIFORNIA

⚠ ROCKSAW TRENCH

DRAWN: A. ROQUE | CKD.: B.STARR, PE

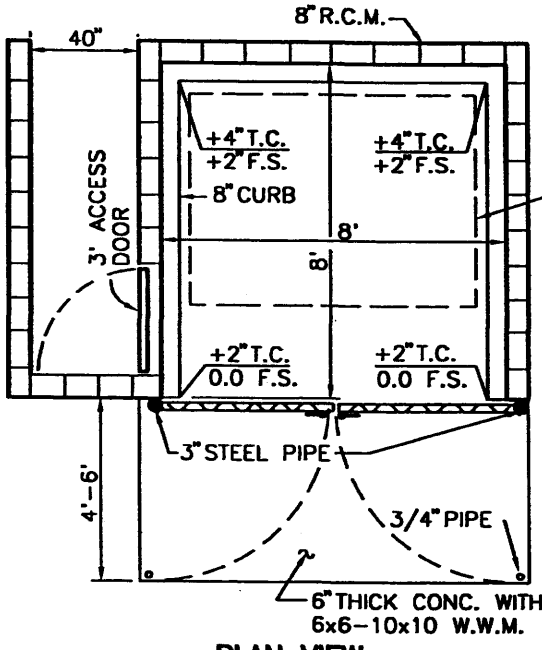
Department of Public Works

APPR. L. Balderrama, PE, City Engineer

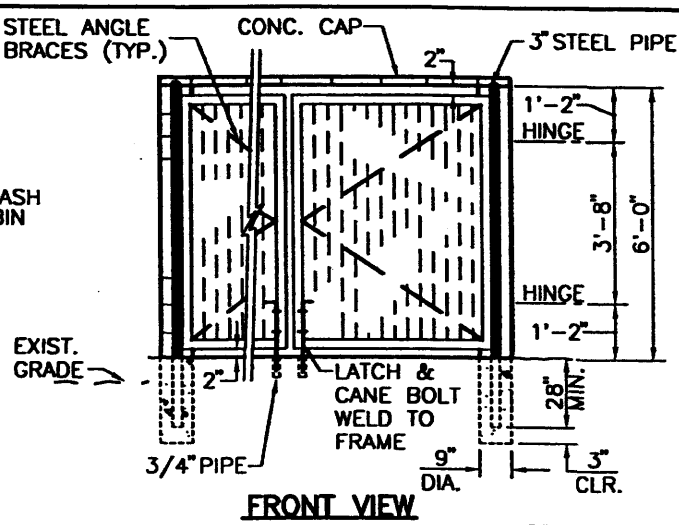
STANDARD PLAN 2002

PLATE 603

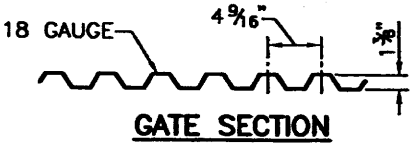
SHEET 1 OF 1



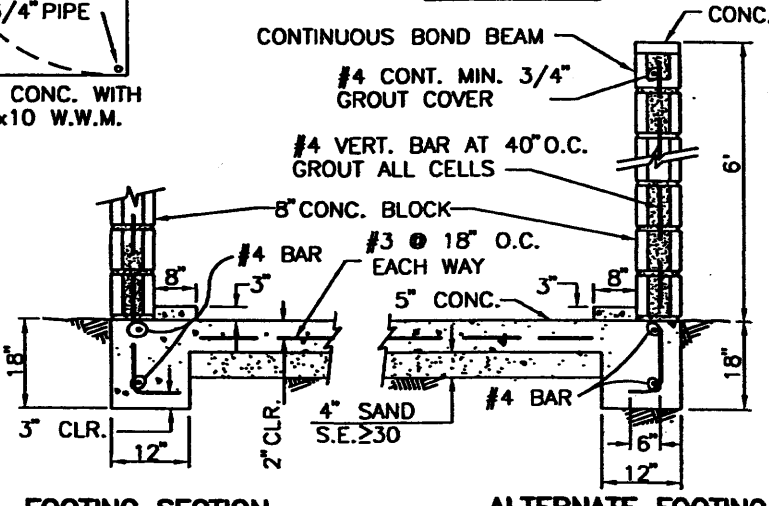
PLAN VIEW
(4 YARD)



FRONT VIEW

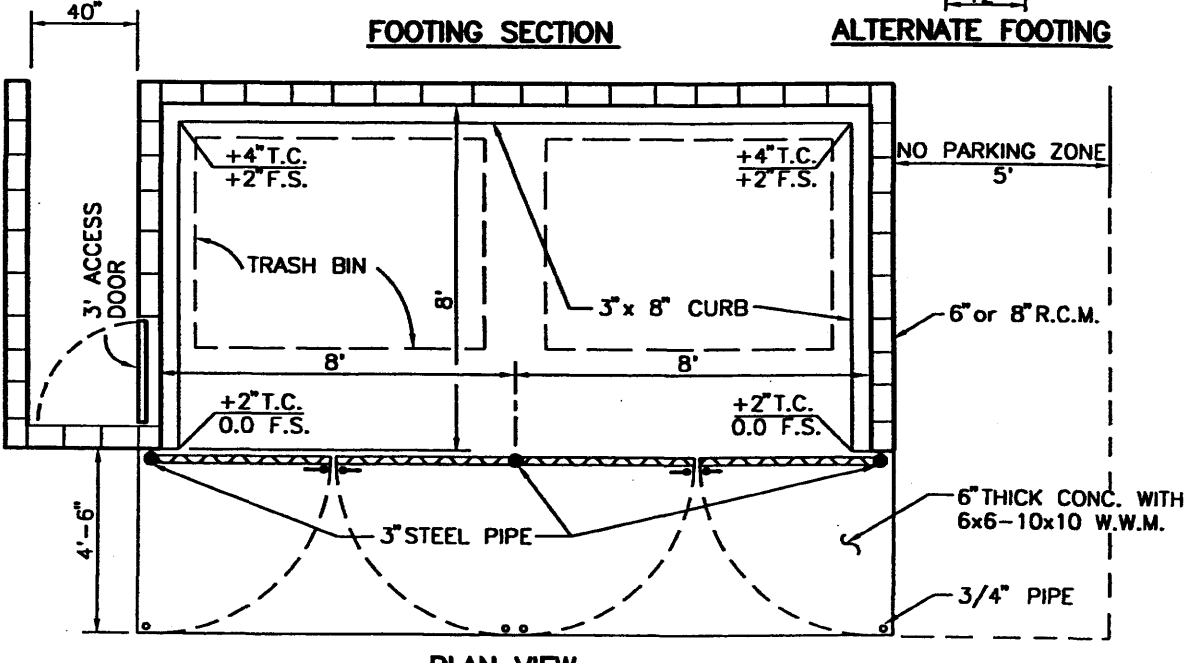


GATE SECTION



FOOTING SECTION

ALTERNATE FOOTING



PLAN VIEW
(DOUBLE 4 YARD)

REV. APPR. BY DATE

REV. APPR. BY DATE

CITY OF Oxnard
Department of Public Works

PARALLEL REFUSE CONTAINER ENCLOSURE WITH SIDE ENTRANCE

DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 604

SHEET 1 OF 2

NOTES:

1. WALLS: SLUMPSTONE BLOCK, REINFORCED AND CAPPED. STRUCTURE TO BE APPROVED PRIOR TO CONSTRUCTION BY BUILDING AND SAFETY DEPARTMENT.
2. GATES: SHALL BE STEEL FRAMED WITH STEEL ANGLE BRACE TYPE METAL 18 GAUGE AND STEEL MINI V-BEAM PANEL AND THE GATE ITSELF, SHALL BE HUNG ON A 3" STEEL PIPE, CONCRETE FILLED THAT IS NOT ATTACHED TO THE ENCLOSURE. SHALL NOT OPEN INTO DRIVING LANES OR PARKING SPACES.
3. SIZE: ENCLOSURE SIZE FOR SINGLE FOUR YARD CONTAINER IS TO BE 8' DEEP AND 8' WIDE AND FOR DOUBLE FOUR YARD IS TO BE 8' DEEP AND 16' WIDE. SIZE OF ENCLOSURE TO BE DETERMINED IN ADVANCE OF CONSTRUCTION BY THE REFUSE SUPERINTENDENT.
4. LOCATION: TO BE DETERMINED IN ADVANCE OF CONSTRUCTION FROM PLANS SUBMITTED TO THE REFUSE SUPERINTENDENT. CONSTRUCTION SHALL BE IN ACCORDANCE WITH CITY OF OXNARD ORDINANCE-SECTION 34-9.4, 15-19, AND 15-26.
5. FLOOR: SHALL BE OF CONCRETE, WITH A MAXIMUM SLOPE OF 2" TO DRAIN ENCLOSURE, AND FLUSH WITH ADJOINING PAVEMENT
6. LATCH: A LATCHING ASSEMBLY IS REQUIRED WITH CANE BOLTS ON BOTH GATES TO HOLD IN OPEN AND CLOSED POSITION WITH 3/4" PIPE TO HOLD THE CANE BOLT.
7. ACCESSABILITY: ENCLOSURE LOCATIONS SHOULD NOT BE BEHIND ANY LOCKED GATES, CHAINS, OR FENCES. IF ENCLOSURE LOCATIONS ARE SITUATED BEHIND LOCKED COMPLEXES, THE CONDITIONS FOR PICKUP WILL BE FORMALIZED IN A WRITTEN AGREEMENT SIGNED BY THE OWNER AND APPROVED BY THE REFUSE SUPERINTENDENT. THIS AGREEMENT MUST BE APPROVED PRIOR TO APPROVAL OF PLANS. CONTACT THE REFUSE PROGRAM FOR DETAILS AT 385-8060.
8. ROOF: A SOLID ROOF WITH 8 FEET OF CLEARANCE IS REQUIRED ON ALL TRASH ENCLOSURES.
9. GREASE INTERCEPTOR: TRASH ENCLOSURES SERVING FOOD PREPARATION FACILITIES, GAS STATIONS AND GROCERY STORES SHALL INCLUDE A TRAFFIC RATED TRENCH DRAIN WITHIN THE ENCLOSURE WHICH DRAINS THROUGH A GREASE INTERCEPTER TO THE SEWER SYSTEM. OTHER USES MAY BE REQUIRED TO INSTALL A TRENCH DRAIN AS DIRECTED BY THE CITY ENGINEER.
10. FIRE SPRINKLER: FIRE SPRINKLER MAY BE REQUIRED BY THE CALIFORNIA BUILDING CODE OR THE THE UNFORM FIRE CODE.
11. PARKING: NO PARKING SPACES ARE ALLOWED WITHIN 5 FEET OF EDGE OF ENCLOSURE.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard

Department of Public Works

PARALLEL REFUSE CONTAINER ENCLOSURE WITH SIDE ENTRANCE

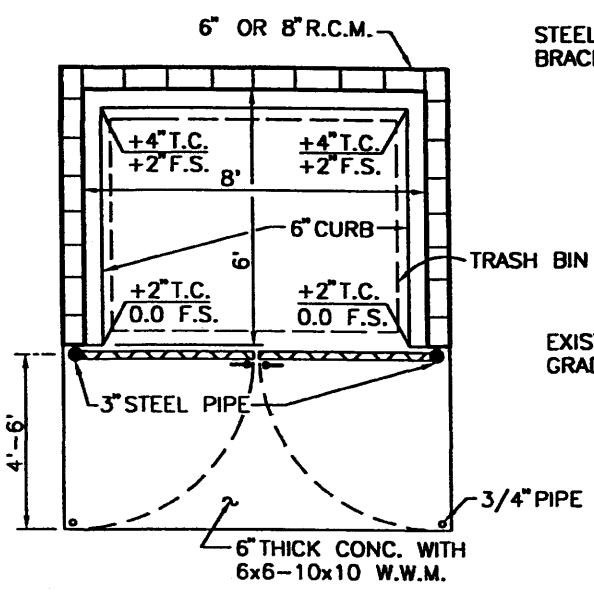
DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

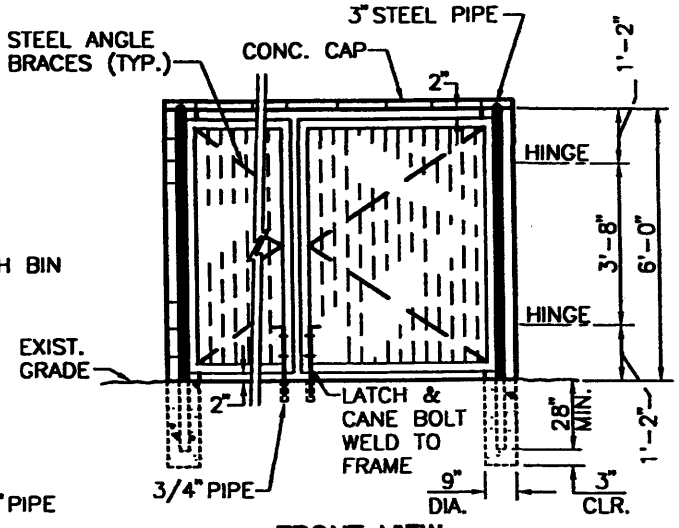
STANDARD PLAN 2002

PLATE 604

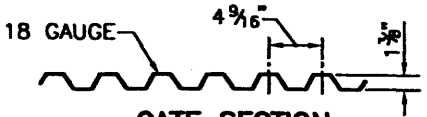
SHEET 2 OF 2



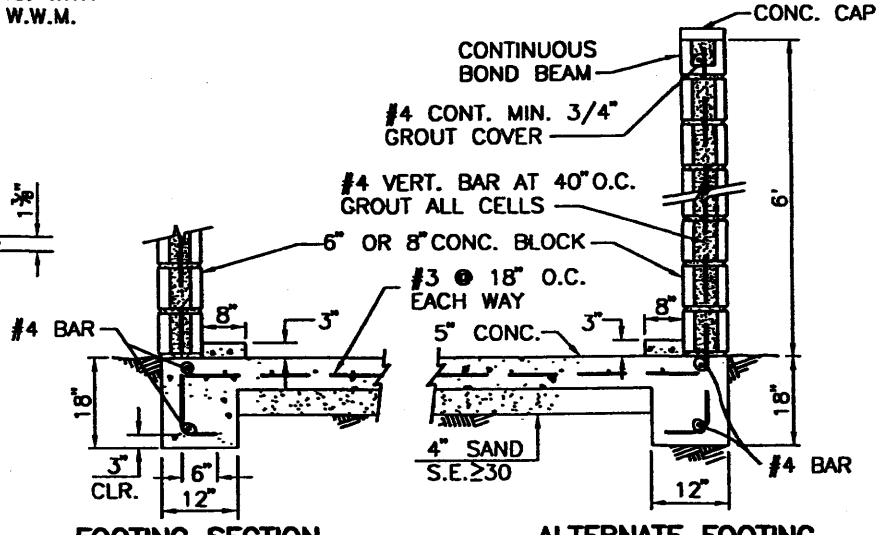
PLAN VIEW
(4 YARD)



FRONT VIEW

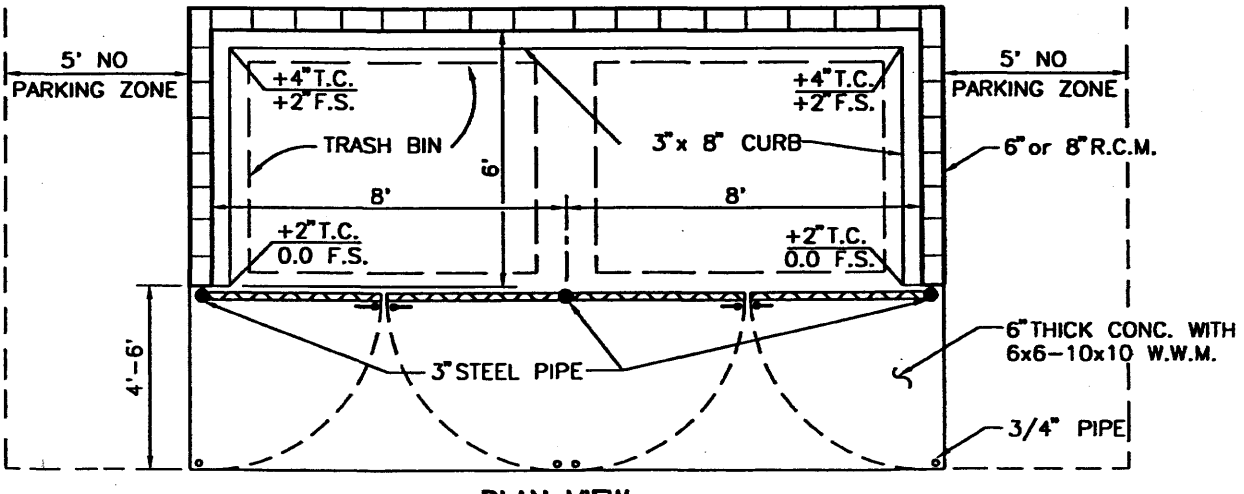


GATE SECTION



FOOTING SECTION

ALTERNATE FOOTING



PLAN VIEW
(DOUBLE 4 YARD)

REV. APPR. BY DATE

REV. APPR. BY DATE

CITY OF Oxnard

Department of Public Works

PARALLEL REFUSE CONTAINER ENCLOSURE WITHOUT SIDE ENTRANCE

DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 605

SHEET 1 OF 2

NOTES

1. WALLS: SLUMPSTONE BLOCK, REINFORCED AND CAPPED. STRUCTURE TO BE APPROVED PRIOR TO CONSTRUCTION BY DEVELOPMENT SERVICES DEPARTMENT.
2. GATES: SHALL BE STEEL FRAMED WITH STEEL ANGLE BRACE TYPE METAL 18 GAUGE AND STEEL MINI V-BEAM PANEL AND THE GATE ITSELF, SHALL BE HUNG ON A 3" STEEL PIPE, CONCRETE FILLED THAT IS NOT ATTACHED TO THE ENCLOSURE.
3. SIZE: ENCLOSURE SIZE FOR SINGLE FOUR YARD CONTAINER IS TO BE 6' DEEP AND 8' WIDE AND FOR DOUBLE FOUR YARD IS TO BE 6' DEEP AND 16' WIDE. SIZE OF ENCLOSURE TO BE DETERMINED IN ADVANCE OF CONSTRUCTION BY THE REFUSE SUPERINTENDENT.
4. LOCATION: TO BE DETERMINED IN ADVANCE OF CONSTRUCTION FROM PLANS SUBMITTED TO THE REFUSE SUPERINTENDENT. CONSTRUCTION SHALL BE IN ACCORDANCE WITH CITY OF OXNARD ORDINANCE-SECTION 34-9.4, 15-19, AND 15-26.
5. FLOOR: SHALL BE OF CONCRETE, WITH A MAXIMUM SLOPE OF 2" TO DRAIN ENCLOSURE, AND FLUSH WITH ADJOINING PAVEMENT
6. LATCH: A LATCHING ASSEMBLY IS REQUIRED WITH CANE BOLTS ON BOTH GATES TO HOLD IN OPEN AND CLOSED POSITION WITH 3/4" PIPE TO HOLD THE CANE BOLT.
7. ACCESSABILITY: ENCLOSURE LOCATIONS SHOULD NOT BE BEHIND ANY LOCKED GATES, CHAINS, OR FENCES. IF ENCLOSURE LOCATIONS ARE SITUATED BEHIND LOCKED COMPLEXES, THE CONDITIONS FOR PICKUP WILL BE FORMALIZED IN A WRITTEN AGREEMENT SIGNED BY THE OWNER AND APPROVED BY THE REFUSE SUPERINTENDENT. THIS AGREEMENT MUST BE APPROVED PRIOR TO APPROVAL OF PLANS. CONTACT THE REFUSE PROGRAM FOR DETAILS AT 385-8060.
8. ROOF: A SOLID ROOF WITH 8' FEET OF CLEARANCE IS REQUIRED ON ALL TRASH ENCLOSURES.
9. GREASE INTERCEPTOR: TRASH ENCLOSURES SERVING FOOD PREPARATION FACILITIES, GAS STATIONS AND GROCERY STORES SHALL INCLUDE A TRAFFIC RATED TRENCH DRAIN WITHIN THE ENCLOSURE WHICH DRAINS THROUGH A GREASE INTERCEPTER TO THE SEWER SYSTEM. OTHER USES MAY BE REQUIRED TO INSTALL A TRENCH DRAIN AS DIRECTED BY THE CITY ENGINEER.
10. FIRE SPRINKLERS: FIRE SPRINKLERS MAY BE REQUIRED BY THE CALIIFORNIA BUILDING CODE OR THE UNIFORM FIRE CODE.
11. PARKING: NO PARKING SPACES ARE ALLOWED WITHIN 5 FEET OF EDGE OF ENCLOSURE.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard

Department of Public Works

REFUSE CONTAINER ENCLOSURE WITHOUT SIDE ENTRANCE

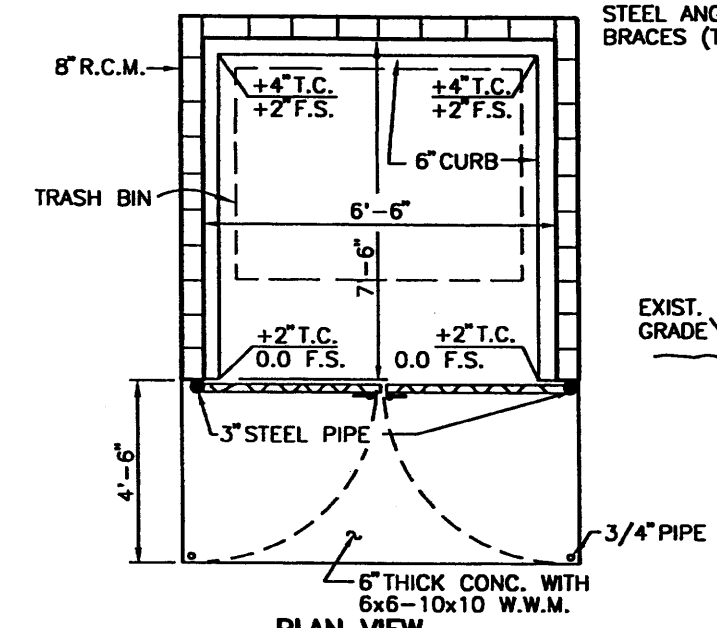
DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

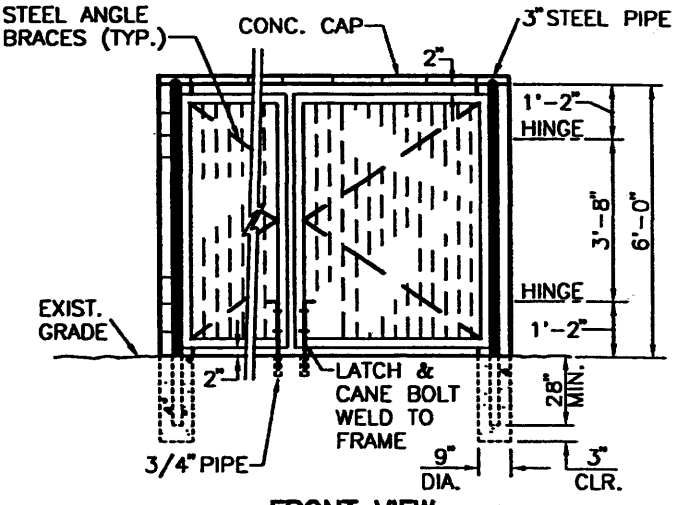
STANDARD PLAN 2002

PLATE 605

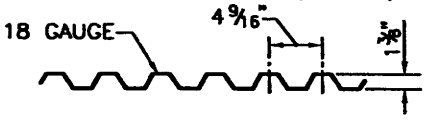
SHEET 2 OF 2



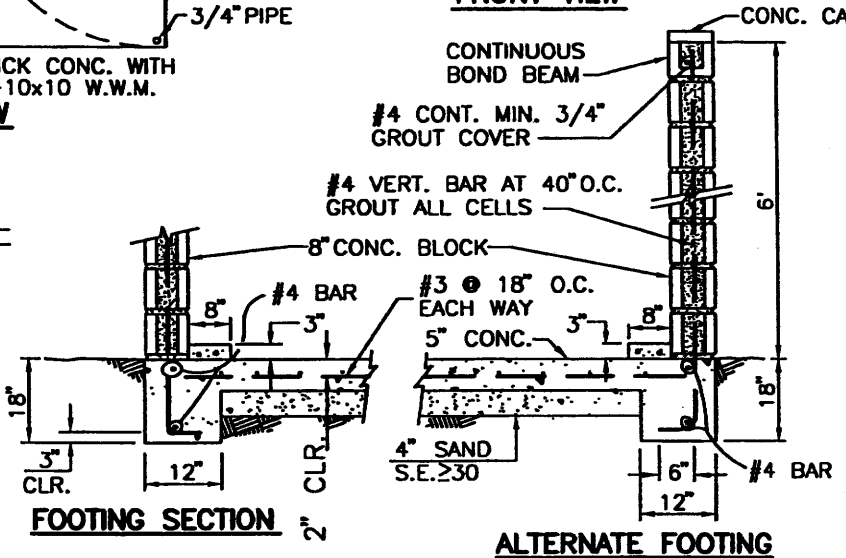
PLAN VIEW
(4 YARD)



FRONT VIEW

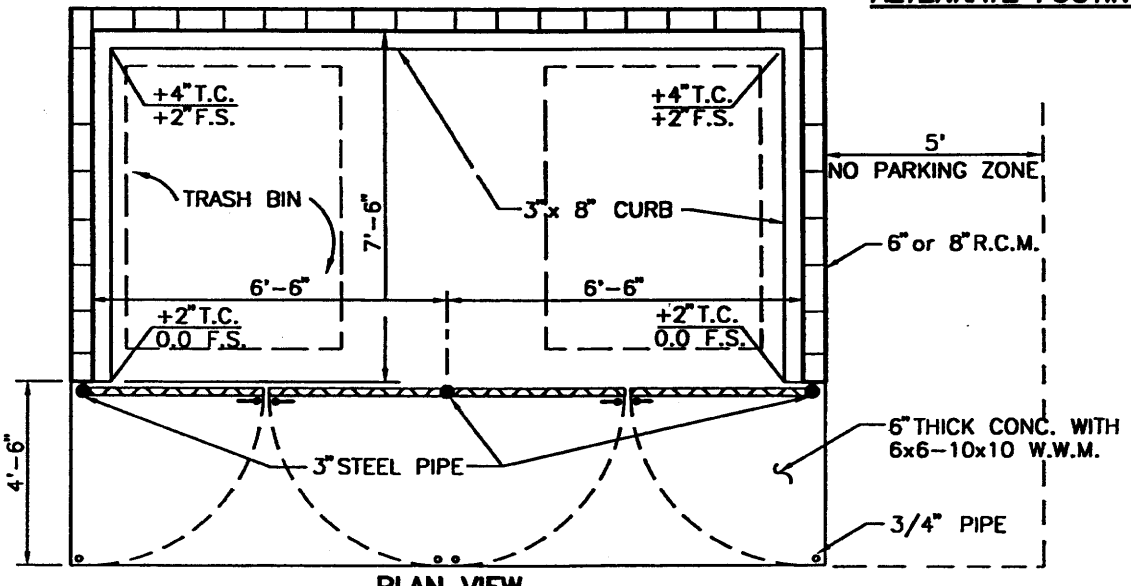


GATE SECTION



FOOTING SECTION

ALTERNATE FOOTING



PLAN VIEW
(DOUBLE 4 YARD)

REV. APPR. BY DATE

REV. APPR. BY DATE

CITY OF Oxnard

Department of Public Works

PERPENDICULAR REFUSE CONTAINER ENCLOSURE WITHOUT SIDE ENTRANCE

DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 606

SHEET 1 OF 2

NOTES:

1. WALLS: SLUMPSTONE BLOCK, REINFORCED AND CAPPED. STRUCTURE TO BE APPROVED PRIOR TO CONSTRUCTION BY BUILDING AND SAFETY DEPARTMENT.
2. GATES: SHALL BE STEEL FRAMED WITH STEEL ANGLE BRACE TYPE METAL 18 GAUGE AND STEEL MINI V-BEAM PANEL AND THE GATE ITSELF, SHALL BE HUNG ON A 3" STEEL PIPE, CONCRETE FILLED THAT IS NOT ATTACHED TO THE ENCLOSURE. SHALL NOT OPEN INTO DRIVING LANES OR PARKING SPACES.
3. SIZE: ENCLOSURE SIZE FOR SINGLE FOUR YARD CONTAINER IS TO BE 7' DEEP AND 7'-6" WIDE AND FOR DOUBLE FOUR YARD IS TO BE 7' 6" DEEP AND 15' WIDE. SIZE OF ENCLOSURE TO BE DETERMINED IN ADVANCE OF CONSTRUCTION BY THE REFUSE SUPERINTENDENT.
4. LOCATION: TO BE DETERMINED IN ADVANCE OF CONSTRUCTION FROM PLANS SUBMITTED TO THE REFUSE SUPERINTENDENT. CONSTRUCTION SHALL BE IN ACCORDANCE WITH CITY OF OXNARD ORDINANCE-SECTION 34-9.4, 15-19, AND 15-26.
5. FLOOR: SHALL BE OF CONCRETE, WITH A MAXIMUM SLOPE OF 2" TO DRAIN ENCLOSURE, AND FLUSH WITH ADJOINING PAVEMENT
6. LATCH: A LATCHING ASSEMBLY IS REQUIRED WITH CANE BOLTS ON BOTH GATES TO HOLD IN OPEN AND CLOSED POSITION WITH 3/4" PIPE TO HOLD THE CANE BOLT.
7. ACCESSABILITY: ENCLOSURE LOCATIONS SHOULD NOT BE BEHIND ANY LOCKED GATES, CHAINS, OR FENCES. IF ENCLOSURE LOCATIONS ARE SITUATED BEHIND LOCKED COMPLEXES, THE CONDITIONS FOR PICKUP WILL BE FORMALIZED IN A WRITTEN AGREEMENT SIGNED BY THE OWNER AND APPROVED BY THE REFUSE SUPERINTENDENT. THIS AGREEMENT MUST BE APPROVED PRIOR TO APPROVAL OF PLANS. CONTACT THE REFUSE PROGRAM FOR DETAILS AT 385-8060.
8. ROOF: A SOLID ROOF WITH 8 FEET OF CLEARANCE IS REQUIRED ON ALL TRASH ENCLOSURES.
9. GREASE INTERCEPTOR: TRASH ENCLOSURES SERVING FOOD PREPARATION FACILITIES, GAS STATIONS AND GROCERY STORES SHALL INCLUDE A TRAFFIC RATED TRENCH DRAIN WITHIN THE ENCLOSURE WHICH DRAINS THROUGH A GREASE INTERCEPTER TO THE SEWER SYSTEM. OTHER USES MAY BE REQUIRED TO INSTALL A TRENCH DRAIN AS DIRECTED BY THE CITY ENGINEER.
10. FIRE SPRINKLER: FIRE SPRINKLER MAY BE REQUIRED BY THE CALIFORNIA BUILDING CODE OR THE THE UNFORM FIRE CODE.
11. PARKING: NO PARKING SPACES ARE ALLOWED WITHIN 5 FEET OF EDGE OF ENCLOSURE.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard
Department of Public Works

PERPENDICULAR REFUSE CONTAINER ENCLOSURE WITHOUT SIDE ENTRANCE

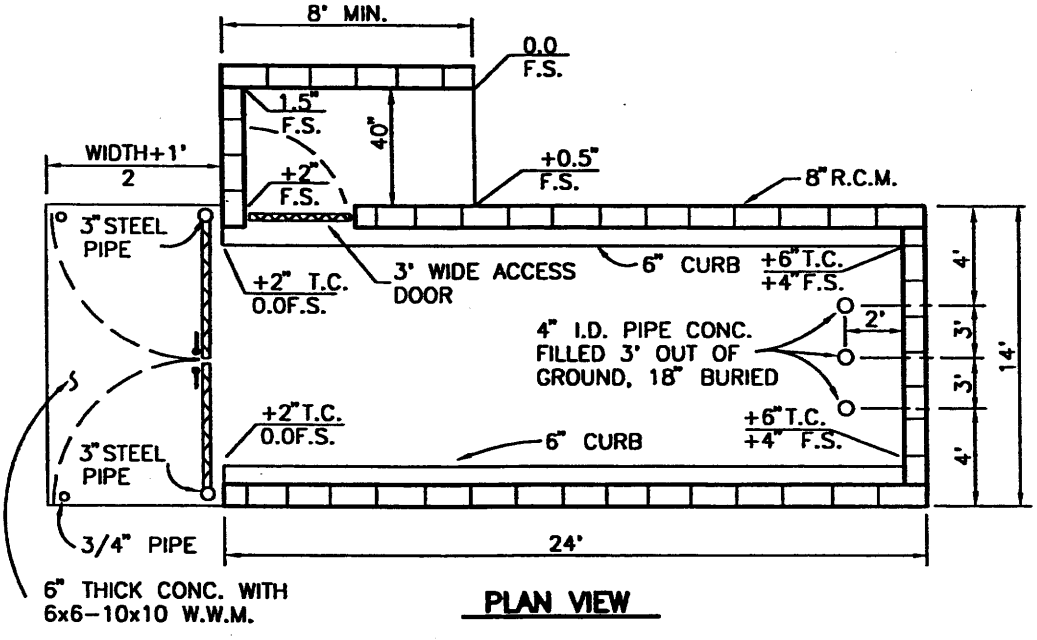
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

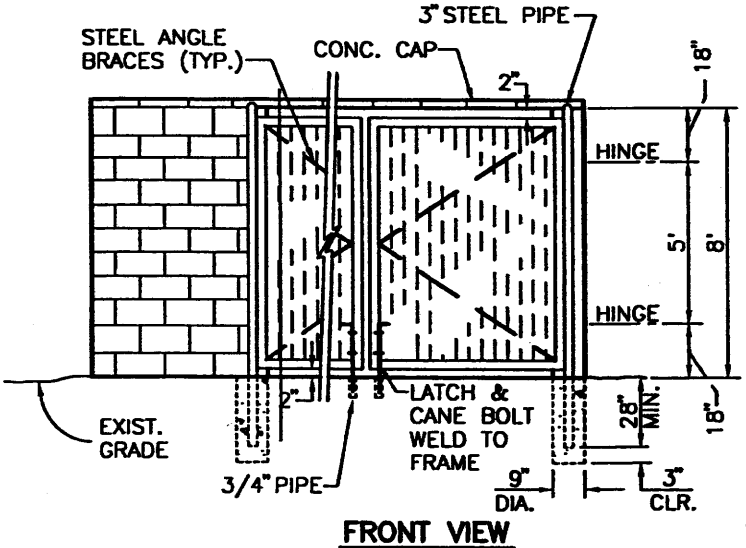
STANDARD PLAN 2002

PLATE 606

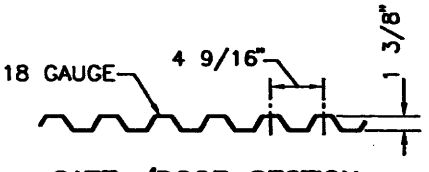
SHEET 2 OF 2



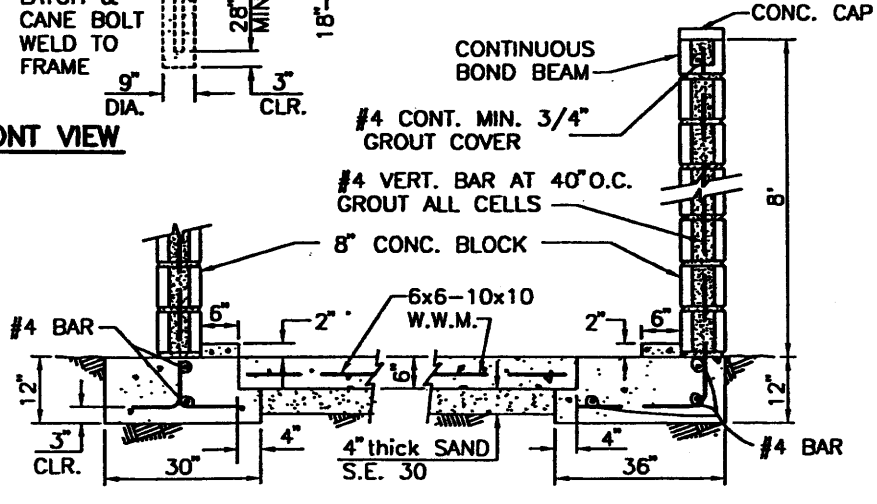
PLAN VIEW



FRONT VIEW



GATE /DOOR SECTION



FOOTING SECTION

ALTERNATE FOOTING

CITY OF Oxnard

Department of Public Works

30 YARD REFUSE CONTAINER ENCLOSURE

DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 607

SHEET 1 OF 2

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

NOTES

1. WALLS: SLUMPSTONE BLOCK, REINFORCED AND CAPPED. STRUCTURE TO BE APPROVED PRIOR TO CONSTRUCTION BY DEVELOPMENT SERVICES DEPARTMENT.
2. GATES: SHALL BE STEEL FRAMED WITH STEEL ANGLE BRACE TYPE METAL 18 GAUGE AND STEEL MINI V-BEAM PANEL AND THE GATE ITSELF, SHALL BE HUNG ON A 3" STEEL PIPE, CONCRETE FILLED THAT IS NOT ATTACHED TO THE ENCLOSURE. SHALL NOT OPEN INTO DRIVING LANES OR PARKING SPACES.
3. SIZE: ENCLOSURE SIZE FOR SINGLE 30 YARD CONTAINER IS TO BE 24' DEEP AND 14' WIDE (OUTSIDE DIMENSION) SIZE OF ENCLOSURE TO BE DETERMINED IN ADVANCE OF CONSTRUCTION BY THE REFUSE SUPERINTENDENT.
4. LOCATION: TO BE DETERMINED IN ADVANCE OF CONSTRUCTION FROM PLANS SUBMITTED TO THE REFUSE SUPERINTENDENT. CONSTRUCTION SHALL BE IN ACCORDANCE WITH CITY OF OXNARD ORDINANCE-SECTION 34-9.4, 15-19, AND 15-26.
5. FLOOR: SHALL BE OF CONCRETE, WITH A MAXIMUM SLOPE OF 2" TO DRAIN ENCLOSURE, AND FLUSH WITH ADJOINING PAVEMENT
6. LATCH: A LATCHING ASSEMBLY IS REQUIRED WITH CANE BOLTS ON BOTH GATES TO HOLD IN OPEN AND CLOSED POSITION WITH 3/4" PIPE TO HOLD THE CANE BOLT.
7. ACCESSABILITY: ENCLOSURE SHALL NOT BE LOCATED BEHIND A LOCKED ENTRY OR GATE. THE ENCLOSURE OPENING MAY NOT BE BLOCKED BY PARKING OR LOADING SPACES. ANY CHANGES OF THIS REQUIREMENT MUST BE APPROVED BY THE REFUSE DIVISION BEFORE CONSTRUCTION.
8. ROOF: A SOLID ROOF IS REQUIRED ON ALL TRASH ENCLOSURES.
9. GREASE INTERCEPTER: TRASH ENCLOSURES SERVING FOOD PREPARATION FACILITIES, GAS STATIONS AND GROCERY STORES SHALL INCLUDE A TRENCH DRAIN WITHIN THE ENCLOSURE WHICH DRAINS THROUGH A GREASE INTERCEPTER TO THE SEWER SYSTEM. OTHER USES MAY BE REQUIRED TO INSTALL A TRENCH DRAIN AS DIRECTED BY THE CITY ENGINEER.
10. FIRE SPRINKLERS: FIRE SPRINKLERS MAY BE REQUIRED BY THE CALIIFORNIA BUILDING CODE OR THE UNIFORM FIRE CODE.
11. PARKING: NO PARKING SPACES ARE ALLOWED WITHIN 5 FEET OF EDGE OF ENCLOSURE.

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard

Department of Public Works

30 YARD REFUSE CONTAINER ENCLOSURE

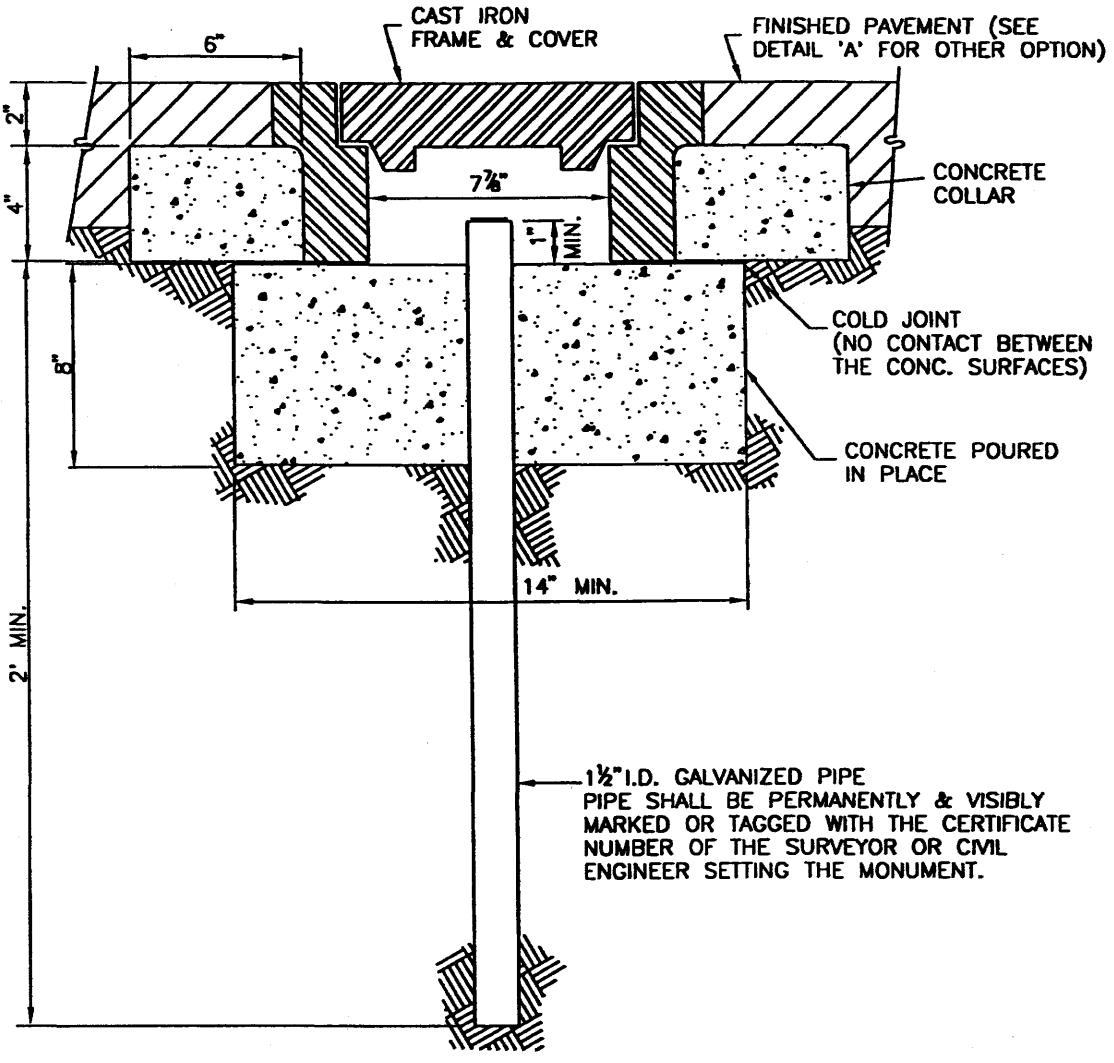
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 607

SHEET 2 OF 2



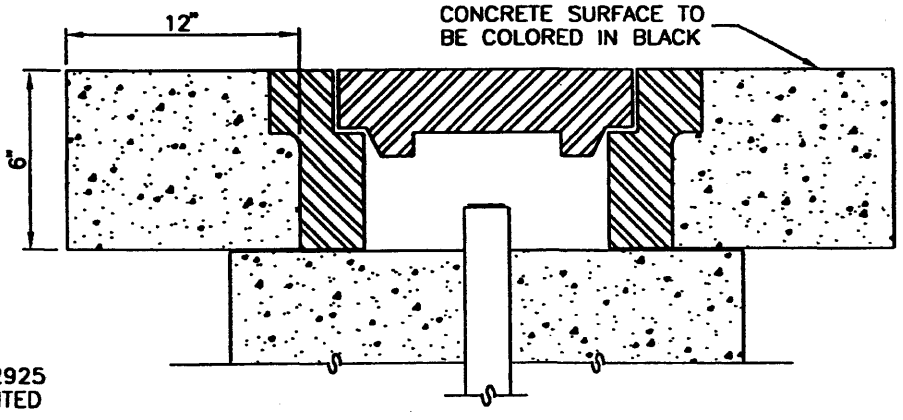
MONUMENT

CITY OF
SURVEY
OXNARD

TOP VIEW

COVER:

ALHAMBRA FOUNDRY No. A-2925
OR APPROVED EQUAL, IMPRINTED
AS SHOWN.



DETAIL 'A'

TO BE USED AS ANOTHER OPTION

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard

Department of Public Works

SURVEY MONUMENT

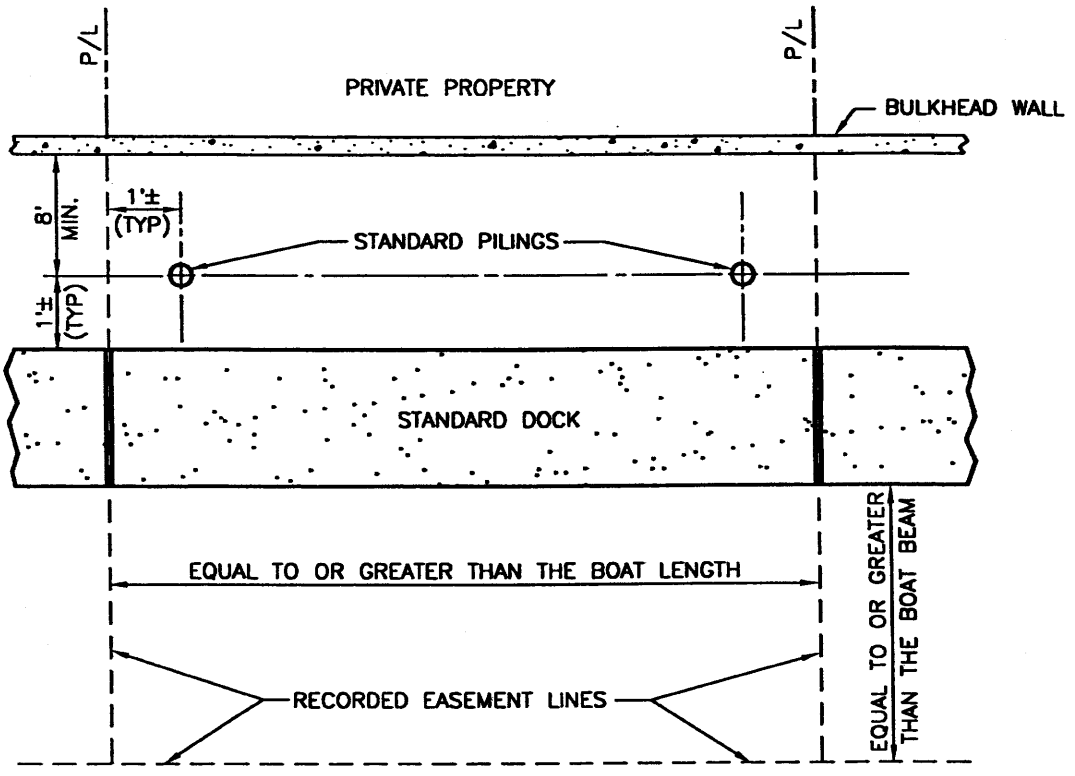
DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 609

SHEET 1 OF 1



STANDARD GUIDELINES:

1. AN ENCROACHMENT PERMIT AND A BUILDING PERMIT ARE REQUIRED FOR EACH INSTALLATION.
2. THIS STANDARD IS INTENDED FOR SMALL CRAFTS WITH THEIR EXTREME LENGTH AND BEAM DIMENSIONS NO GREATER THAN THE AVAILABLE EASEMENT.
3. DOCK AND PILING LOCATIONS SHALL CONFORM TO THIS STANDARD UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER. STRUCTURAL, MATERIAL AND OTHER STANDARDS SHALL CONFORM TO BUILDING AND SAFETY DIVISION'S REQUIREMENTS.
4. A 4-FOOT MINIMUM OPENING BETWEEN DOCKS SHALL BE PROVIDED FOR MAINTENANCE PURPOSES AT LOCATION(S) DESIGNATED BY THE CITY ENGINEER.
5. ANY MODIFICATION, EXTENSION, ADDITION OR VARIATION TO THIS STANDARD MAY BE GRANTED SUBJECT TO THE FOLLOWING GUIDELINES AS APPROVED BY THE CITY ENGINEER.
   a) NO PILING, DOCK OR RAMP SHALL BE LOCATED OUTSIDE THE DESIGNATED EASEMENT.
   b) ALL PILINGS AND DOCK SHALL HAVE A 8-FOOT MINIMUM CLEARANCE FROM THE BULKHEAD WALL FOR MAINTENANCE PURPOSES AND TO PROTECT THE WATERWAY SLOPE PAVING.
   c) PILING DOCK AND APPURTENANCES SHALL BE DESIGNED AND CONSTRUCTED TO AVOID POTENTIAL FAILURE AND BREAKAWAY OF DOCK
   d) LOCATION AND CONFIGURATION VARIATION OF PILING, DOCK AND APPURTENANCES SHALL BE DESIGNED SUCH THAT NO BOAT SHALL ENCROACH INTO OTHER EASEMENT(S) WHEN LEAVING THE DOCK OR DURING DOCKING OPERATION, AND NO BOAT SHALL ENCROACH OUTSIDE ITS DESIGNATED EASEMENT WHEN MOORED.
6. ALL PILE AND DOCK INSTALLATION SHALL HAVE PRIOR CLEARANCE AND/OR PERMIT REQUIRED BY THE COASTAL COMMISSION AND CORPS OF ENGINEERS.
7. PILES MAY NOT BE INSTALLED BY JETTING OR ANY OTHER METHOD THAT WOULD COMPROMISE THE INTERGRITY OF THE BULKHEAD WALL OR THE WATERWAY SLOPE PAVING. METHOD OF INSTALLATION MUST BE SPECIFIED ON PLANS.

REV. APPR. BY DATE

REV. APPR. BY DATE

CITY OF Oxnard

Department of Public Works

PARALLEL DOCK AND PILING LOCATIONS

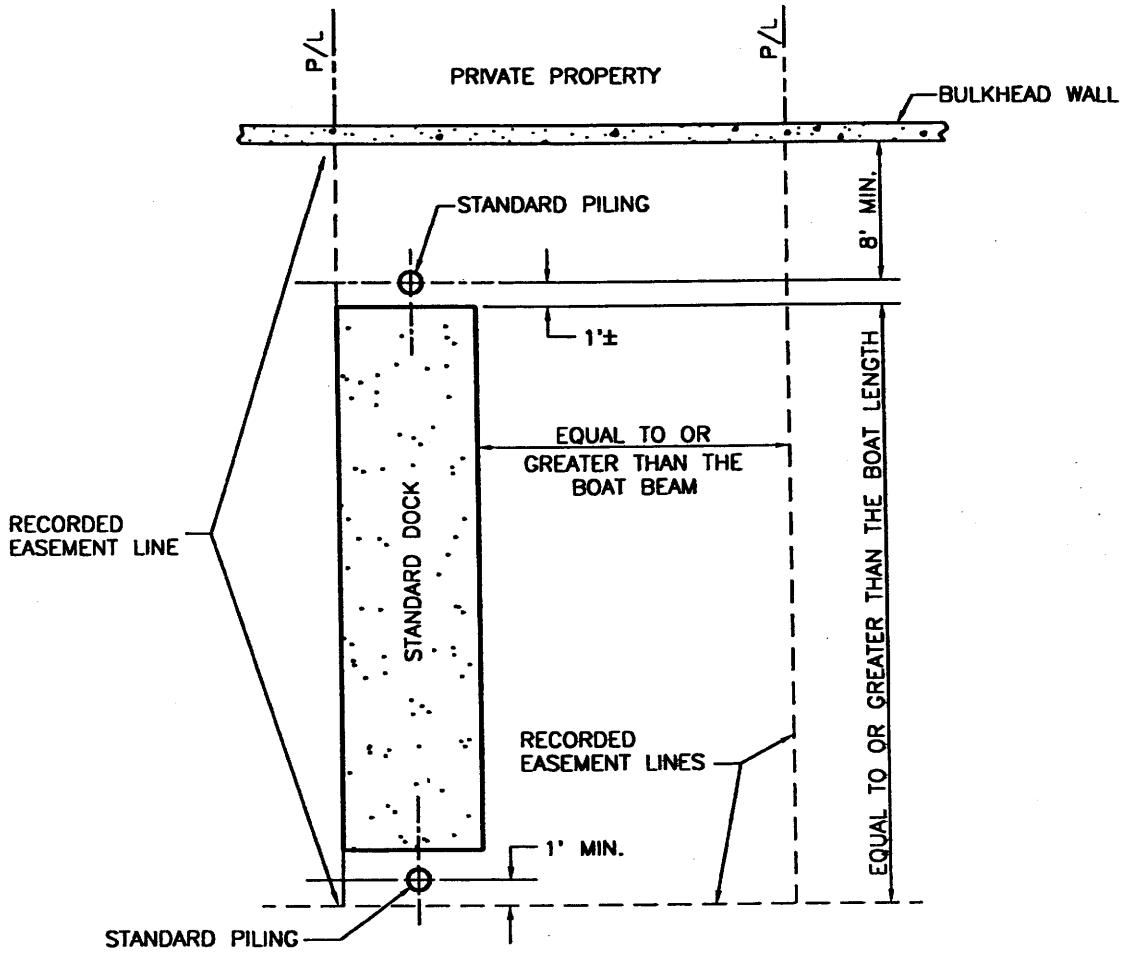
DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 610

SHEET 1 OF 1



STANDARD GUIDELINES:

1. AN ENCROACHMENT PERMIT AND A BUILDING PERMIT ARE REQUIRED FOR EACH INSTALLATION.
2. THIS STANDARD IS INTENDED FOR SMALL CRAFTS WITH THEIR EXTREME LENGTHS AND BEAM DIMENSIONS NO GREATER THAN THE AVAILABLE EASEMENT.
3. DOCK AND PILING LOCATIONS SHALL CONFORM TO THIS STANDARD UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER. STRUCTURAL MATERIAL AND OTHER STANDARDS SHALL CONFORM TO BUILDING AND SAFETY DIVISION'S REQUIREMENTS.
4. A 4-FOOT MINIMUM OPENING BETWEEN DOCKS SHALL BE PROVIDED FOR MAINTENANCE PURPOSES AT LOCATION(S) DESIGNATED BY THE CITY ENGINEER.
5. ANY MODIFICATION, EXTENSION, ADDITION OR VARIATION TO THIS STANDARD MAY BE GRANTED SUBJECT TO THE FOLLOWING GUIDELINES AS APPROVED BY THE CITY ENGINEER.
   a) NO PILING, DOCK OR RAMP SHALL BE LOCATED OUTSIDE THE DESIGNATED EASEMENT.
   b) ALL PILINGS AND DOCK SHALL HAVE A 8' FOOT MINIMUM CLEARANCE FROM THE BULKHEAD WALL FOR MAINTENANCE PURPOSES AND TO PROTECT THE WATERWAY SLOPE PAVING.
   c) PILING DOCK AND APPURTENANCES SHALL BE LOCATED OR DESIGNED AND CONSTRUCTED IN SUCH A MANNER TO AVOID POTENTIAL FAILURE AND BREAKAWAY OF DOCK ESPECIALLY ON EXTREME LOW TIDE LEVELS.
   d) LOCATION AND CONFIGURATION VARIATION OF PILING, DOCK AND APPURTENANCES SHALL BE DESIGNED IN SUCH A MANNER THAT NO BOAT SHALL ENCROACH INTO OTHER EASEMENT(S) WHEN LEAVING THE DOCK OR DURING DOCKING OPERATION, AND NO BOAT SHALL ENCROACH OUTSIDE ITS DESIGNATED EASEMENT WHEN MOORED.
6. ALL PILE AND DOCK INSTALLATION SHALL HAVE PRIOR CLEARANCE AND/OR PERMIT REQUIRED BY THE COASTAL COMMISSION AND CORPS OF ENGINEERS.
7. PILES MAY NOT BE INSTALLED BY JETTING OR ANY OTHER METHOD THAT WOULD COMPROMISE THE INTERGRITY OF THE BULKHEAD WALL OR THE WATERWAY SLOPE PAVING. METHOD OF INSTALLATION MUST BE SPECIFIED ON PLANS.

REV. | APPR. BY | DATE

REV. | APPR. BY | DATE

CITY OF Oxnard
Department of Public Works

PERPENDICULAR DOCK AND PILING LOCATIONS

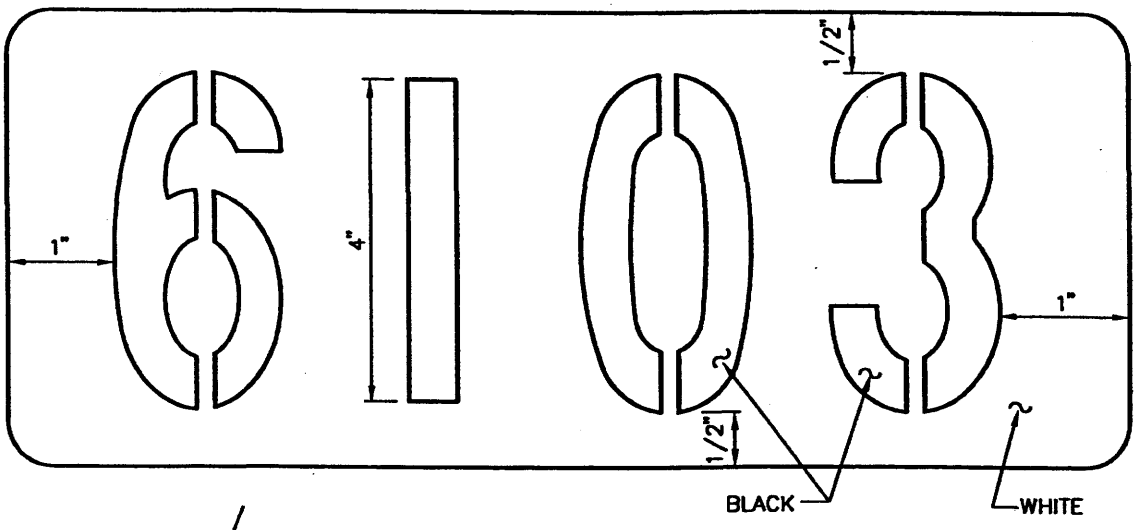
DRAWN: STAFF | CKD.: STAFF

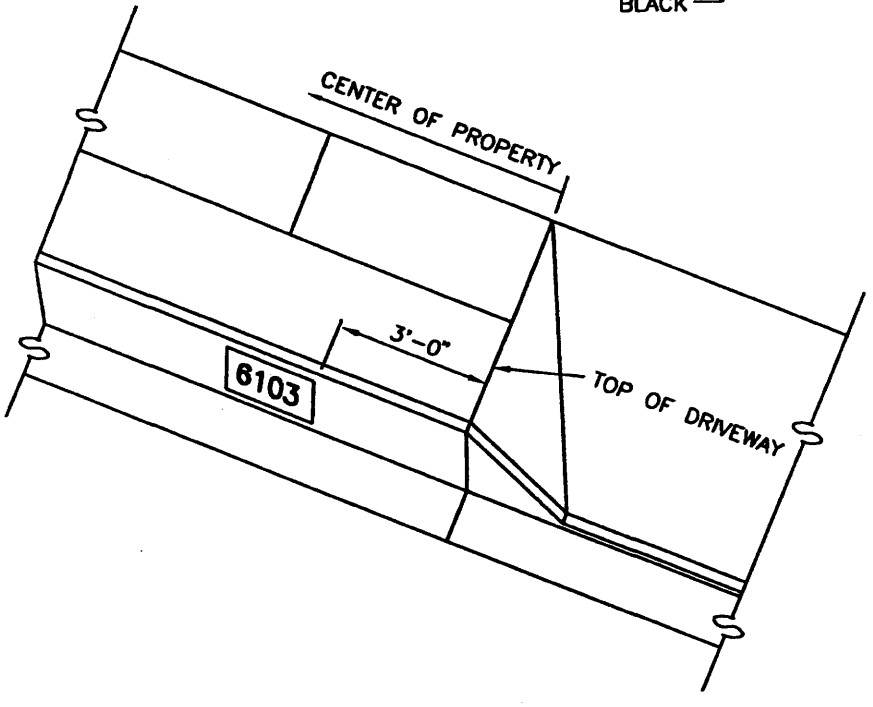
APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 611

SHEET 1 OF 1





REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

NOTES:

1. A RECTANGLE OF WHITE PAINT 5" HIGH AND LONG ENOUGH TO ALLOW 1" MARGIN ON EACH END OF NUMBERS, SHALL BE PLACED AS A BACKGROUND, PARALLEL TO THE TOP OF CURB AT THE EDGE OF THE CURB RADIUS AND ON THE VERTICAL CURB FACE.
   (a) BACKGROUND PAINT MUST BE COMPLETELY DRY BEFORE APPLYING BLACK NUMBERS.
2. NUMBERS SHALL BE STANDARD GOTHIC STYLE 4", BLACK IN COLOR WITH A 1/2" TOP AND BOTTOM MARGIN.
3. NUMBERING SHOULD BE PLACED ON THE CURB 3' FROM THE TOP OF DRIVEWAY TOWARDS THE CENTER OF PROPERTY OR, IF NO DRIVEWAY IT SHOULD BE PLACED ADJACENT TO THE ENTRANCE WALKWAY OR APPROXIMATELY CENTER OF LOT.
   (a) IF THERE IS AN EXISTING HOUSE NUMBER, IT MAY BE RENEWED AT ITS PRESENT LOCATION.
4. PAINT SHALL BE AS RECOMMENDED BY THE MANUFACTURER AS SUITABLE FOR APPLICATION ON CONCRETE.
5. CURB WILL BE THOROUGHLY CLEANED PRIOR TO APPLYING PAINT.

CITY OF Oxnard
Department of Public Works

PAINTED CURB HOUSE NUMBERS

DRAWN: STAFF | CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

PLATE 612

SHEET 1 OF 1

REV.	APPR. BY	DATE

REV.	APPR. BY	DATE

CITY OF Oxnard

Department of Public Works

STANDARD CHAIN LINK FENCE

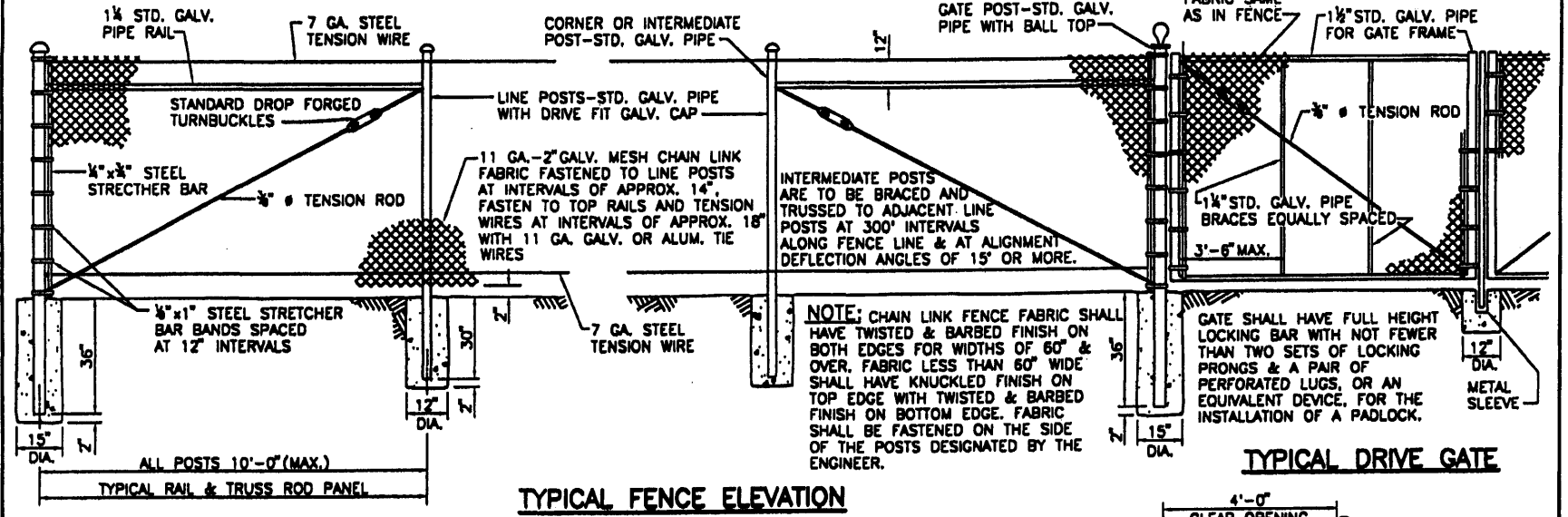
DRAWN: STAFF CKD.: STAFF

APPR. Granville M. Bowman

STANDARD PLAN 2002

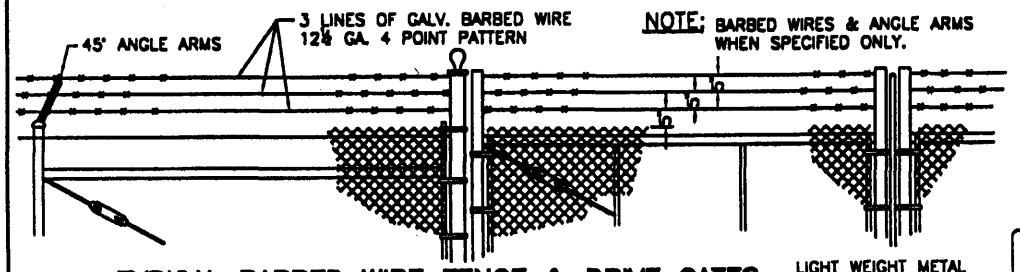
PLATE 613

SHEET 1 OF 1

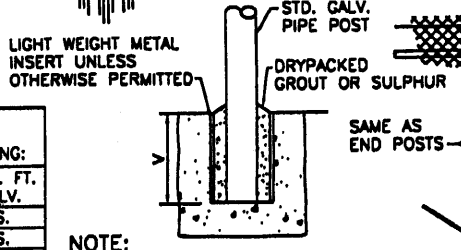


TYPICAL FENCE ELEVATION

TYPICAL DRIVE GATE



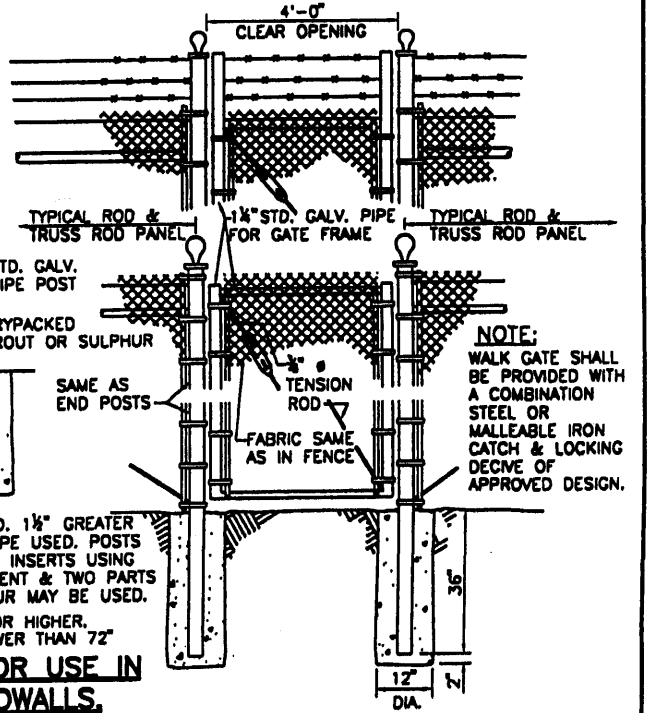
TYPICAL BARBED WIRE FENCE & DRIVE GATES



NOTE:
INSERT SHALL HAVE AN I.D. 1½" GREATER THAN THE O.D. OF THE PIPE USED. POSTS ARE TO BE GROUTED INTO INSERTS USING GROUT OF ONE PART CEMENT & TWO PARTS SAND, OR MOLTEN SULPHUR MAY BE USED.

V=18"FOR 72" FENCE OR HIGHER.
V=12"FOR A FENCE LOWER THAN 72"

POST DETAIL FOR USE IN CONCRETE HEADWALLS, RETAINING WALLS, ETC.



TYPICAL WALK GATE

GENERAL NOTES:

1. ALL POSTS SHALL BE STANDARD GALVANIZED PIPE & SHALL CONFORM TO THE FOLLOWING:

	SIZE PIPE	WT. PER LIN. FT. BEFORE GALV.
FOR 72" FENCE & OVER:		
END, CORNER & INTERMEDIATE POSTS	2½"	5.79 LBS.
LINE POSTS	2"	3.65 LBS.
DRIVE GATE POSTS-SINGLE TO 6' OR DBL. TO 12' OPENINGS	3"	7.58 LBS.
DRIVE GATE POSTS-SINGLE OVER 6' TO 13' OR DBL. OVER 12' TO 26' INCLUSIVE OPENINGS	4"	10.79 LBS.
FOR FENCE LESS THAN 72":		
END, CORNER & INTERMEDIATE POSTS	2"	3.65 LBS.
LINE POSTS	2½"	5.79 LBS.
DRIVE GATE POSTS-SINGLE TO 6' OR DBL. TO 12' OPENINGS	1½"	2.72 LBS.
DRIVE GATE POSTS-SINGLE OVER 6' TO 13' OR DBL. OVER 12' TO 26' INCLUSIVE OPENINGS	3½"	9.11 LBS.

2. ALL POSTS SHALL BE FITTED WITH APPROVED TOPS.
3. ALL WALK & DRIVE GATES SHALL BE HUNG BY TWO MALLEABLE IRON HINGES. BOTTOM HINGE TO BE BALL & SOCKET TYPE.