CITY OF SIMI VALLEY
DEPARTMENT OF PUBLIC WORKS
SANITATION ENGINEERING SECTION

MANUAL & STANDARD PLANS FOR THE DESIGN AND CONSTRUCTION OF SANITARY SEWERAGE FACILITIES

DATE: AUGUST 28, 2006

CITY OF SIMI VALLEY

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FOREWARD

Purpose: The City of Simi Valley (City), via the Department of Public Works, establishes uniform policies and procedures for the design and construction of sanitary sewerage facilities within City right-of-way and on projects subject to approval by the City, including areas outside the City limits that are within the City service area.

It is not the intent of this manual that any standard of conduct or duty toward the public be created or imposed by the publication of this manual. **The manual is not a textbook or a substitute for engineering knowledge, experience or judgment.** The methods and procedures contained herein shall be reviewed by the engineer using them to assure they are applicable to the project being worked on. The engineer may request a variance from standards as provided in the manual. Amendments to this publication may be issued from time to time. The users of this publication should check with the City to insure that they have the current edition of each page.

The following publications have been adopted by the City for regulating the design and construction of sanitary sewer systems. If there is a conflict between or among these documents, the document of highest precedence shall control. The precedence shall be:

First:	CITY Sewerage Design and Construction Standards (Manual)
Second:	Ventura County Sewerage Manual (VCSM)
Third:	Standard Specifications for Public Works Construction (SSPWC), latest edition

The scope of each publication is contained within each respective publication. The City Sewerage Manual shall be used as the general requirements in the design and construction of sewerage systems within the City of Simi Valley. With the City's approval, materials in VCSM and SSPWC may be referenced in Plans and Specifications and used to Supplement the requirements of this manual.

REVISIONS

From time to time, revisions to this manual become necessary. When revisions are made and approved, they will be issued to registered holders of this manual who have paid the fee for keeping the manual up-to-date. Each time a revision is made, the revision index sheet will be reissued showing the date of the currently active pages in the book.

Page No.	*Rev. 1 Date Approved*	*Rev. 2 Date Approved*	*Rev. 3 Date Approved*	*Rev. 4 Date Approved*	*Rev. 5 Date Approved*	*Rev. 6 Date Approved*	*Rev. 7 Date Approved*	*Rev. 8 Date Approved*

SECTION 1.0
INTRODUCTION AND GENERAL POLICIES

1.0 INTRODUCTION

This Manual is published as a reference and guideline for design and construction of wastewater facilities. No legal liability toward the public is created or implied by its publication; the Manual is not to be interpreted as establishing legal standards.

1.1 PURPOSE

This Manual summarizes policy, practices and procedures developed to optimize City efficiency. The various sections of the manual as dated supersede all prior Standard Practice Instructions, Office Standards, Special Orders and all other directives relating to the material covered.

1.2 SCOPE

This Manual covers all phases of work relating to the City sewer system. Sound judgment must be exercised in the application of the Manual's provisions to specific circumstances. Requests to modify or deviate from a standard within this manual may be made. Such requests must be presented in writing for the City's approval, through the Director of the Public Works Department, clearly specifying the modifications or deviations, clearly describing the nature and purpose of the modification or deviation, and citing the standard to which such change applies. References to other published engineering standards (not other municipal standards, rather general engineering standards) are encouraged where applicable.

1.3 REVISIONS

The City will revise the Manual as needed to keep it current and to include new or changed policy, data and/or methods. The Public Works Director shall have the primary responsibility for the coordination and preparation of new material or revisions to the Manual.

1.4 DISTRIBUTION

The City will make the Manual and its revisions available to outside agencies and individuals. The Manual is intended to be used primarily for work within the boundaries of the sewer service area of the City of Simi Valley. It is available for purchase by all interested parties. The sale of the Manual, and any revisions will be available at rates established by the City.

1.5 DEFINITIONS AND TERMS

Whenever in these specifications the following terms, abbreviations or definitions are used, the intent and meaning shall be interpreted as follows:

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
"Manual"	Term referring to "Sewerage Design and Construction Standards" (this book)
"Tract Sewers"	The system of street sewers, house laterals, and other sewer facilities constructed by a developer within an approved tract.
"Trunk Sewer"	A main sewer which receives flow from tracts and other collecting sewers.
"Principal/Senior Engineer"	A registered civil engineer employed by the City and designated by the City to manage the daily operation of the Sanitation system.
"Sewer Main"	Wastewater Main
"Sewerage"	Wastewater Collection System
"City"	City of Simi Valley

1.6 APPLICABLE CODES AND POLICY

A. Ordinances, requirements and applicable standards of governmental agencies having jurisdiction within the City service area shall be observed in the design and construction of sewers. Such requirements include but are not limited to the latest edition of the following:

- The Uniform Building Code as amended by the local authorities (City, County, State, etc.).
- The Uniform Plumbing Code as amended by the local authorities (City, County, State, etc.).
- Road Encroachment Regulations of the City and the County of Ventura.

- Standard Specifications - State of California Business and Transportation Agency, Department of Transportation Standard Specifications, current edition (CALTRANS).

- Ventura County Sewerage Manual.

- The City Road Standards.

- Standard Specifications for Public Works Construction.
- City of Simi Valley "Suggested BMP's for erosion and sedimentation control."

- Reclaimed Water Standards, Ventura County Waterworks District No. 8.

- Water Standards, Ventura County Waterworks District No. 8.

1.7 PUBLIC/PRIVATE SEWAGE DISPOSAL

A public sewer connection is required where any one or more of the following situations exist:

A. The City or County Health Department declares a private disposal facility within the City sewer service area to be a public nuisance or health hazard.

B. Septic tank system fails and needs replacement and a public sewer is accessible within 200 feet.

C. All new developments, all individual single-family lot developments, except for an individual single-family lot development, with its property line being greater than 200 feet away from accessible public sewer. Connections of any cesspool seepage pit, septic tank or any other private disposal system to any sewer main line or service lateral is strictly prohibited.

1.8 CITY JURISDICTION

The City must approve design plans and specifications of all wastewater facilities within the public right-of-way. Custody of all drawings reviewed and accepted by the Engineer, as evidenced by the Engineer's signature, shall be with the City. This shall apply to all City funded or developer funded and constructed projects. Reproducibles of the original drawings shall be provided to the developer. The developer shall be charged for the reproduction costs of the aforementioned reproducible drawings.

Where repairs or replacement of a lateral is required subsequent to initial construction, it shall be the responsibility of the property owner, including that section between the main sewer and the property line, unless the property owner can clearly demonstrate that the damage was caused to the section of the lateral outside the property line by factors such as public tree root intrusion and/or excessive street loads.

1.9 RESPONSIBILITY OF DEVELOPER'S ENGINEER

These standards establish uniform policies and procedures for the design and construction of the City's wastewater system. They are not intended to be a substitute for engineering knowledge, judgment, or experience. If a deviation from a standard is necessary or desirable, the engineer of design (developer's engineer) shall inform the City in writing, of such deviation so that it can be evaluated for a possible change. The procedures contained in this manual shall be reviewed by the developer's engineer and shall be applied as necessary to the project. The contents of this manual do not preclude use of different methods when special or emergency conditions warrant and when authorized by the Engineer.

The developer's engineer needs to be familiar with the City's Master Plan for the wastewater system, and to indicate mainline relocations, extensions, or over sizing on the tentative tract conditioned by the City. Verification of the adequacy of the downstream or surrounding wastewater system rests with the developer.

All plans, specifications, reports or documents shall be prepared, signed, and stamped by a registered civil engineer licensed to practice in California.

Acceptance of Plans does not in any way relieve the developer's engineer of the responsibility to meet the requirements of the City and good engineering practices. The plans shall be revised or supplemented at any time if it is determined that the City requirements have not been met.

1.10 REFERENCED SPECIFICATION

References to any other standards shall refer to the latest edition of such standards.

1.11 ACCEPTANCE OF SEWER SYSTEM

The City will inspect and approve sewer installations. Acceptance by the City will be provided after all work has been inspected and accepted by the City and after all fees, permits, video tapes, testing results, and record drawings have been submitted, reviewed, and accepted by the City.

SECTION 2.0
DESIGN CRITERIA

2.1 WASTEWATER CAPACITIES, HYDRAULICS AND SIZES

A. Quantity of Flow: Sewage flows shall be determined from maximum potential sewage generation of the tributary area. Average flow rates shall be determined using the designated land use (Table 2.1) or number of equivalent dwelling units (EDU) assigned (Table 2.2). The method which produces the greater rate of flow shall be used as the governing factor. The peak flow rate at any point shall be the average flow of all tributary areas times the peak factor using the Average Flow - Peak Flow Graph (Standard Plan No. SV 40-310).

Sample Calculation:

Use of the Average Flow - Peak Flow Graph (Standard Plan No. SV 40-310)

To determine the peak sewage flow from an average flow, project the average flow value on the ordinate to the flow curve and read the peak sewage flow on the abscissa. To determine the peak factor, project the average flow value to the factor curve and read the peak factor on the abscissa.

Example: A local sewer with an average flow of 2.5 cfs is to discharge into an interceptor where the average flow is 5.4 cfs.

Find: The peak flow in the interceptor sewer below the confluence point.

Average Flows

2.5 cfs
+5.4 cfs
7.9 cfs

The resulting flow below the confluence point is 7.9 cfs average, which converts to 17 cfs peak by use of the Average Flow - Peak Flow Graph. All flow computations should be made with average flows and converted to peak only for final results.

Table 2.1

LAND USE	ABR.	AVERAGE COEFFICIENT
High Density	H.D.	140 People/Acre (100 gpcd)
Medium Density	M.D.	75 People/Acre (100 gpcd)
Low Density	L.D.	20 People/Acre (100 gpcd)
Suburban	Sub	10 People/Acre (100 gpcd)
Hillside	H.S.	7 People/Acre (100 gpcd)
Agriculture	Agr	2.5 People/Acre (100 gpcd)
Light Industry	L.I.	0.008 cfs/Acre
Heavy Industry	H.I.	0.008 cfs/Acre
General Commercial	Gen	0.006 cfs/Acre
Limited Commercial	Ltd	0.006 cfs/Acre
Hospital	H	0.387 cfs/Hospital
School	S	0.062 cfs/school
University or College	U	0.371 cfs/Univ.
Civic or Administrative Center	C.C.	0.006 cfs/Acre
Airport	A	0.001 cfs/Acre
Park	P	0.0003 cfs/Acre
Future Park	F.P.	0.0003 cfs/Acre
Golf	G	0.0003 cfs/Acre

B. Hydraulics: Sewers shall be designed to accommodate future tributary flows, in addition to those from the project. Pipe capacities shall be determined from peak

flow rates by Manning's Formula using an "n" value of 0.011 (or higher when appropriate) for all pipelines. Sewers less than 12 inches in diameter shall be designed to flow half full at peak flow rates. Sewers 12 inches and larger shall be designed to flow two-thirds full at peak flow rate.

When the design involves nonuniform flow, backwater calculations shall be made to the extent necessary to locate hydraulic jumps, to assure that the limiting design depth of flow is not exceeded, and to assure that flow conditions meet all preceding design requirements for the conduit and structures.

The invert drop across junction (confluence) and transition structures shall be calculated and not arbitrarily established. Where calculations indicate a rise of the invert across the structure from the inlet to outlet, the structure shall be designed with the invert level. An additional amount for infiltration shall be added when a sewer is to be constructed below the ground water level. This amount must first be approved by the City.

Table 2.2

EQUIVALENT DWELLING UNIT ASSIGNMENT

CATEGORY	EDU'S
Residential	
Single Family Detached/Attached	1.00
Multiple Family (Condos, Apts., Airspace Townhouses)	0.75
Mobile Home	0.60
Commercial	
Hotel/Motel	
Per unit without kitchen	0.33
Per unit with kitchen	0.55
Churches/Theatres/Auditoriums	
110 seats or less	1.00
Each additional seat	0.00091
Restaurants	
42 seats or less	2.60
Each additional seat	0.0625
Bars, Cocktail Lounge per seat	0.06
Automobile Service Stations	
Per restroom	0.33
Auto service & repair shops (additional)	0.34

Table 2.2

EQUIVALENT DWELLING UNIT ASSIGNMENT

CATEGORY	EDU'S
Comfort Station	
Per water closet or urinal	0.33
Self-Service Laundry/Car Wash per washer/day	0.40
Shop and Store Buildings (gross bldg. sq. ft.)	
10,000 sq. ft. or less – per 1,000 sq. ft.	0.33
Each additional area – per 1,000 sq. ft.	0.22
Office Buildings	
Medical – per 1,000 sq. ft.	0.60
All other – per 1,000 sq. ft.	0.33
Industrial/Manufacturing	
Dry Industry – per 1,000 sq. ft.	0.36
Wet Industry – case-by-case determination	--
Warehouse – per 1,000 sq. ft.	0.08
Institutional	
Schools	
Elementary/Nursery, Etc. – 60 students or less	1.00
Each additional student	0.02
High School – 30 students or less	1.00
Each additional student	0.033
Hospitals – per bed	0.60

Categories not covered by the above table shall require special approval.

NOTE: Equivalent dwelling unit (EDU) is defined as the unit of measure, which is based on the flow characteristics of an average single-family residence in terms of sewage quantity and constituent quality. QEDU = 275 gal/day (2.75 persons/DU x 100 gal/person/day).

C. Velocity: A main line sewer shall be designed to provide a mean velocity of not less than 2.5 feet per second flowing one-half full. Where there is conflict between design by velocity and design using minimum slopes in Section 2.4, the design resulting in the steepest slope shall be used.

D. Inverted Siphons: Inverted siphons are not allowed. If an exception is to be considered, the following minimum conditions must be met:

1. Maintaining an adequate scouring velocity for at least several hours each day. A minimum velocity of 3 fps is recommended to provide adequate scouring.

2. Limiting the rising slope of the downstream leg to a maximum of 0.15 foot per foot.

3. Providing a sufficient number of barrels to ensure flexibility for operation under varying flow conditions.

Gate Structures: The inlet and outlet structures shall be smoothly transitioned to prevent excessive head loss and turbulence. Inverts of all barrels at the inlet or outlet shall be the same elevation. Under no circumstances shall steps be provided in the inverts. The protection of the exposed concrete or mortar from a corrosive sewer atmosphere must be provided.

The Siphon: Vertical curves shall be used for all changes of slope. Maximum radius of curvature should be sought.

Air Lines: The necessity for a conduit between the inlet and outlet structures of the siphon to provide for movement of a corrosive or offensive sewer atmosphere must be analyzed. If an airline is required, it shall have a cross sectional area at least equal to one-half the cross sectional area of the inlet sewer.

Air lines shall be constructed of corrosion resistant pipe or fully lined pipe approved by the Engineer. The air line shall be laid on as straight an alignment and profile as practicable. Sufficient slope or slopes shall be provided to drain the water from condensation or infiltration.

E. Oversizing and Extra Depth: Oversizing of certain tract sewers may be required where such sewers can logically serve an upstream tributary area.

F. Minimum Diameter: The minimum diameter for wastewater main shall normally be 8 inches.

2.2 LOCATION OF LINES (STREETS)

A. In streets (including hillside streets): Sewers designed to serve the adjacent property on both sides of the street shall usually be located parallel to and 5 feet southerly or easterly of the street center line. Exceptions to these location requirements may only be made upon approval by the Public Works Director.

Because large trenching equipment may have a side overhang of approximately 7 feet from the trench centerline, deep or large sewers requiring such equipment should be located, where practical, in the roadway a minimum of 7 feet from the

curb face in order to avoid interference from poles, signs, electroliers, traffic signals, etc., placed immediately behind the curb.

Where existing concrete pavement has a longitudinal construction joint on the street centerline and the sewer needs to be placed in the center of the street, the sewer should be offset far enough laterally to insure that only the slabs on one side of the centerline is cut. If practical, in order to reduce the amount of resurfacing required, one edge of the trench should be on or near the longitudinal joint.

If the sewer will serve the property on one side of the street only, it shall be located on that side of the street and five feet off the centerline.

Sewers may be located between the curb and property line only if conditions will not permit location within the roadway, and only upon approval by the Public Works Director.

A sewer which will serve only the high side of a hillside street shall have a depth sufficient to provide a house connection sewer depth of 3½ feet minimum at the curb or other similar grade line.

B. In Alleys: Sewers in alleys which contain power or telephone poles should be located on the side of the alley opposite the poles.

Where possible, the center of the manhole covers should be located at least 3 feet from the center of the alley or flow line of the alley and at least 4 feet from the property line.

C. Substructure Interference: The maximum practical distance between proposed sewers and parallel existing substructures is desirable. A minimum of 5-feet of horizontal clearance shall be maintained between proposed sewer lines and any existing or proposed storm drain pipelines in a parallel alignment. The clearance shall be measured from the nearest outside edges of the facilities. Another factor which must be considered when setting clearance distances is the relative depths of the sewer and substructure involved.

Except under very unusual circumstances, the sewer shall be located so that no portion of existing structures lie closer than five foot from the limits of the sewer trench. The width of the sewer trench, for this purpose, is defined as the diameter of the outside of the barrel of the sewer pipe plus 8 inches on each side (see Standard Plan No. SV 40-20). It is assumed that the trench walls are plumb for this purpose.

Close proximity to parallel power conduits and to high pressure water, gas, gasoline and other high pressure mains shall be avoided if possible because of the hazards involved in disturbing them. If the sewer to be constructed is in proximity to a thrust block at a bend in a pressure main, consult the owner of the main involved.

Where a proposed sewer line crosses another pipeline, or another pipeline is to cross a sewer line, special care is required to prevent loading and deflecting or damaging the pipeline being crossed. See Standard Plan Nos. SV 40-20, SV 40-50 and SV 40-220.

D. Criteria for the Separation of Sanitary Sewers and Water Mains:

1. Basic Separation Standards:

a. Horizontal Separation: The horizontal distance between sewer line and any existing or proposed water mains shall be at least 10 feet measured from the nearest outside edges of the facilities.

b. Crossing: Water mains shall be at least one foot (measured edge to edge) above sewer lines where these lines must cross.

c. Common Trench: Water mains and sewer lines must not be constructed in the same trench.

2. Alternate Criteria for Construction:

The construction criteria for sewer lines where the basic separation standards cannot be attained are shown in Standard Plan No. SV 40-10.

3. Special Provisions:

a. 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 high groundwater exist.

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

c. In the installation of 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.

d. 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 a septic sewage which produces corrosive hydrogen sulfide.

4. 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 have at least a one foot clear separation 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 10 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 a pipe material with a minimum rated working pressure of 200 psi pressure rating and per Ventura County Waterworks District No. 8 Standard.

E. Unless within the City sewer easements, all sewer lines located in private property shall be privately owned and shall be governed by Building and Safety Design and Construction Criteria.

2.3 LOCATION OF LINES (EASEMENTS)

Easements should be avoided where a reasonable alternative solution exists. Unless there are either physical limitations or extreme economic penalties, wastewater lines should be installed within streets. When easements are required, there shall be careful consideration of how the line is to be maintained and/or replaced, if necessary. Where easements are necessary and where the slope of the natural ground exceeds 1 vertical to 2 horizontal then the plans shall clearly indicate contours within the easement.

In general, all manholes within easements shall be accessible by conventional maintenance vehicles traveling over paved roads or driveways unless otherwise approved. Manholes within private property are discouraged and subject to special approval.

Laterals should not be connected to a main line within an easement unless specifically approved.

A. Width: Wastewater easements for pipes up to 15 inches in diameter should normally be a minimum of 20 feet wide. However, additional easement width shall be required where the depths of pipe exceed 15 feet or as deemed necessary by the Engineer. The plans should clearly indicate any known block walls, trees, pavement or other obstruction within the proposed easement. Such items are contrary to the City policy and require a special approval. Included with such approval may be monetary obligation toward the operation and maintenance of the wastewater line within easement.

B. Pipeline Location: Pipelines shall generally be placed 3-feet from the center of an easement; only under special circumstances will a line be approved which is closer to the centerline. Unless specifically approved otherwise by the City, the line shall be straight without horizontal bends or deflections.

C. Easement Location: The full easement width shall be on one lot or property in such manner that access to manholes will not be obstructed by walls, trees or permanent improvements. Where this requirement cannot be met without interfering with existing buildings, easements may straddle lot lines provided that approval is received from the Engineer and the sewer line itself does not straddle the lot lines.

D. Oversizing of Line: If a sewer line within an easement is over 15 feet deep, the City may require the oversizing of the sewer line (such as from 8-inch to a 10-inch line) to facilitate future slip lining.

E. Deeds: Deeds for easements shall provide for restriction of permanent construction within the easement to provide ingress and egress for maintenance.

F. Easement Provisions: Easements shall be provided as follows:

1. For subdivision maps - The owner of land shall dedicate for City use, the wastewater easements so designated on the final map.

2. For other than subdivision maps - Dedication of sewer rights-of-way shall occur by means of deeds of conveyance to the City. For all dedications other than those dedications created by subdivision map.

2.4 SLOPES OF WASTEWATER LINES

Minimum slope requirements are necessary to assure self-cleaning velocities and to avoid significant generation of hazardous, odorous, and corrosive sulfur compounds. Where possible, use of the minimum slopes should be avoided and should not be constructed as guidelines for system design.

A. Minimum Slopes: The minimum slopes for commonly used pipe sizes are as follows:

Pipe Size (Inches)	Slope (Foot per Foot)
8	0.0044*
10	0.0036
12	0.0024

Pipe Size (Inches)	Slope (Foot per Foot)
15	0.0016
18	0.0014
21	0.0010

*The City may require a slope of 0.006 or greater for an 8-inch sewer main if physically attainable.

B. Maximum Grades: The maximum grade for sewers shall normally be 15 percent except in steep terrain where the sewer grade may approximate the finished grade over the sewer. In no case shall the grade exceed 45 percent without special approval. Prior to the design of any sewer on a slope over 30 percent, Section 2.11 and Standard Plan Nos. SV 40-20 and SV 40-30 should be referred to for typical details. To minimize the turbulence in manholes, the grade of any incoming sewer shall not exceed the grade of the outgoing sewer by more than 10 percent. Refer to Section 2.11 for further discussion of steep grades. This approval shall be designated on the construction plans.

C. Substandard Grades: If grades below the standard minimum must be used in order to avoid pumping, the designer shall advise the City and obtain approval from the Engineer before proceeding with design.

2.5 DEPTH OF LINES

Depth of cover is measured as the distance to the top of pipe from the finished grade surface over the sewer centerline.

Sewers shall be installed at a depth which shall provide suitable service to the properties connected and will allow subsequent installation of water lines and other substructures. Refer to the Water/Wastewater Separation Standard Plan No. SV 40-10.

A. Standard depth of cover is 7 feet. Where deeper cover must be maintained, other details may be required, such as higher strength pipe, pipe encasements, special backfill, or concrete trench slabs (see Standard Plan Nos. SV 40-60 and SV 40-70). Depths of cover less than 7 feet require special approval and are discouraged. The use of concrete encasements or trench slabs will in general be required for depths of cover less than 3 feet.

B. Maximum depth of cover is detailed in Standard Plan No. SV 40-30 and SV 40-35. For ductile iron pipes, the maximum depth of cover shall be in accordance with the requirements of ANSI/AWWA C150/A21.50 and the manufacturer's recommendations. Bedding for DI pipes shall be as shown on Standard Plan No. SV 40-30.

C. Designs not in accordance with standard depths shall be submitted to the Engineer for approval.

2.6 HORIZONTAL AND VERTICAL CURVES

Sewers Constructed on Curves: In general, it is most desirable to have sewers constructed with a straight alignment between manholes. Straight sewers are easier to inspect after construction, and it is easier to clean or to locate a sewer main that is straight between manholes.

There are, however, situations where it is necessary to construct sewer lines with curves between manholes. These situations might be to avoid other substructures, to avoid an excessive number of manholes in curved and hillside streets or to avoid short radius curves in manholes where high velocity flow may overtop the channel. In this latter case, the designer should calculate the super elevation of the water surface in the manhole.

In curved streets, the sewer shall follow the street curvature without crossing the centerline. In general, combination of vertical and horizontal curves will not be allowed between manholes unless it is demonstrated that another solution is not reasonably feasible. Vertical curves should not be used unless excessive depth would be occur. See Section 2.6-C below, for further discussion of vertical curves. Allowable joint deflections shall be the more stringent of those set forth below and the manufacturer's recommendations.

A. Curves - PVC Pipe: Deflection at the joints is very limited due to the joint design. Curvature can be obtained by bending the pipe along its length within the trench. Beveling pipe ends is not allowed. The following table should be used to establish curvature:

Table 2.6A
CURVES FOR PVC PIPE

Pipe Size (Inches)	Minimum Radius of Curvature (Feet)
6	175
8	225
10	275
12	325
15	400

The above values are independent of pipe length since curvature is not achieved through joint deflection. Curves with smaller radii require deflection fittings or smooth curve "sweeps."

B. Curves- Ductile Iron Pipe: The deflections listed in the following Table are maximum deflections for push-on-joint pipe and should not be exceeded. For design purposes, deflections should be limited to 80 percent of the values shown.

Table 2.6B

CURVES FOR DUCTILE IRON PIPE

Nominal Pipe Size (Inches)	Deflection Angle (Degree)	Approx. Radius of Curvature Produced by Succession of Joints for Pipe Length of:	
		18 Feet	20 Feet
3" to 12"	5°	205'	230'
14" to 36"	3°	340'	380'

Ref: Handbook of Ductile Iron Pipe
Ductile Iron Pipe Association

C. Vertical Curves: Vertical curves in sewers shall conform to the requirements for horizontal curves except that the radius shall not be less than 400 feet. Vertical curves may be either circular or parabolic in profile. An approximate formula for determining the required minimum length of a parabolic curve is:

Formula

$$L \text{ min.} = (S1 - S2)(R\text{min.})$$

Where:

L min. = Minimum horizontal length of vertical curve (feet).

R min. = Minimum radius of curvature permitted (feet); based on type of joint, pipe size, and maximum pipe length.

S1 and S2 are the two sewer grades being used (expressed in feet per foot), with S1 being the steeper grade.

In addition to the above guidelines, the following requirements shall be met in the design of curved sewer.

1. Minimum invert slope of horizontally curved sewer shall be 0.01 except that sewers with a radius of 200 feet or more will have the same requirements as straight sewers.

2. Vertical curves may be used in combination with horizontal curves where invert slopes exceed 0.01 throughout the reach between manholes.

3. Maximum combined horizontal and vertical deflection at any joint shall in no case be more than 3E.

4. The arithmetic sum of all horizontal and vertical deflections in curved sewers between adjacent manholes shall not exceed 60E.

D. The following data shall be shown for each sewer to be constructed on a horizontal curve:

The central angle, delta; for example, = 32E36'43"
The radius of curvature; for example, R = 120.00'
The tangent length; for example, T = 35.10'
The length of curve; for example, L = 68.30'

The P.I., B.C. or E.C. shall be tied to the nearest street or alley centerline monument by right angle ties as described. The B.C. and E.C. shall be shown by fine dashed lines plotted at right angles to the tangent sewer or radially to the curved portion. The B.C. and the E.C. shall be stationed and the abbreviation "B.C." or "E.C.," as appropriate, shall be shown on the line.

2.7 SELECTION OF PIPE MATERIAL

The designer is referred to Section 3.3 and 3.4 "Materials," for discussion of this subject.

2.8 MANHOLES

The maximum distance between manholes shall be as shown in the following table, although the approved distance for any particular reach may be modified by the items listed below. Brick and mortar blockouts for future extensions are preferred over stub and capped pipes except where the exact orientation and slope of the future extension is known at the time of plan submittal.

Table 2.8A

SPACING OF MANHOLES

Size Sewer (in inches)	Maximum Distance Between Manhole Center Line (in feet)
8" - 24"	350'
27" - 48"	400'
Over 48"	Greater intervals depending on local circumstances.

On large diameter sewers, manholes shall be placed at the beginning or end of each curve.

Unless otherwise approved, all manholes should be accessible to standard maintenance vehicles. Therefore, manholes should not be placed in back or side yards. Every reasonable effort should be made to provide a paved or gravel roadway to manholes in open space areas.

For a discussion of materials to be used in the construction of manholes, see Section 3.9.

A. Location: Manholes shall be located at the following locations:

1. At all abrupt grade changes (too large for a vertical curve).

2. At all changes in horizontal alignment (except on curves).

3. At all changes in pipe size.

4. At the terminal end of all lines exceeding 100 feet in length from the next downstream manhole. Manholes will be required in cul-de-sacs which have three (3) or more fronting lots.

5. At all junctions of main sewers.

6. At the point of tangent of each reverse curve. (No reverse curves will be allowed between manholes, except where the Engineer determines that the nature of the reverse curve will not be significant or detrimental to the system.)

7. At all changes in pipe materials.

Manholes shall generally be located no less than 15 feet from the curb line when within a cul-de-sac. Also, manholes shall not be located within the street such that runoff is directed to the manhole.

Manholes (and cleanouts) shall generally be located at least 10 feet upstream of the downstream property line of the last property served. Where future extensions of the wastewater line will be required, then the manhole shall be located parallel with the upstream property line, if required (i.e., within the street along the property's entire frontage).

B. Slope of Manhole Channels: Grades of the channels within manholes shall be as follows:

1. When sewers of uniform size and slope pass through a manhole, the slope shall be maintained and the invert at the center of the manhole shall be given.

2. In sewers that change slope but are uniform in size, the slope of the incoming sewer(s) shall be carried through to the outlet and the invert elevations at the inlet(s) and outlet shall be given.

3. When diameters of sewer pipes change, and in junctions involving major direction or slope changes, additional fall in the invert equal to the loss in energy head shall be provided for continuity of the water surface profile.

The slopes in manhole channels indicated below are minimum values and must be increased where required by hydraulic considerations with the manholes.

Table 2.8B

ADDED DROP THROUGH MANHOLES (in feet)

Diameter of Inlet Pipe	DIAMETER OF OUTLET PIPE				
	8"	10"	12"	15"	18"
8"	--	.10	.33	.50	.67
10"	--	--	.25	.42	.58
12"	--	--	--	.17	.33
15"	--	--	--	--	.17

When the incoming sewer makes an angle of 45E to 90E with the outlet sewer, add 0.10' to the above values with the exception that the minimum drop shall be 0.20'. When the angle is 15E to 45E, add 0.05 to the tabulated value with a minimum drop of 0.15'. In all cases, the minimum drop shall be 0.10'.

C. Drop Manholes: While not encouraged, drop manholes may be required because of some physical constraint or if the difference in elevation inflow and outflow sewers exceeds 12 inches. They should not be used to merely avoid extra depth in

trenches unless unusual circumstances exist on prior written City approval, the drop shall be constructed in accordance with Standard Plan No. SV 40-290.

D. Undeveloped Areas: Manholes in undeveloped areas require special protection as discussed in Section 3.9, Materials.

E. Rim Elevations of Manholes: Top elevations for all manholes shall be shown on the profile. In paved areas, the manhole rim elevation shall match the finished grade. In other than paved areas or traveled way, the height of the manhole rim will normally be 6 inches above the finished grade, high water mark, or above the top of future fill areas. 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.

F. Design (Size): Standard manholes (see Tables 2.8A and 2.8B) shall be in accordance with Standard Plan No. SV 40-100 (4-foot and 5-foot diameters). Shallow manholes shall be in accordance with Standard Plan No. SV 40-110. Five (5) foot diameter manholes are required if manhole has more than one main line going into manhole and also for lines 18" in diameter and larger or where the depth to pipe invert exceeds 18 feet, and as required by the City.

G. Protection: Where new sewers are to be connected to a manhole which is in active use, the designer shall require such protection as is necessary to prevent construction debris from being washed into the active sewer. Plugged inlets or other suitable protection shall be required for the active manhole before beginning manhole modification or cleaning of new sewers. Bypass methods shall be to the satisfaction of the Engineer. A bypass submittal shall be submitted and approved by the Engineer before any bypass work can begin.

2.9 TERMINAL CLEANOUTS

Dead end lines under 100 feet long may terminate in a cleanout unless otherwise required. If a future extension of said dead end line will include a manhole within 400 feet of the uppermost manhole, a temporary cleanout is permitted.

A. Location: Refer to applicable portion of Section 2.8.
B. Design: Cleanouts shall be constructed in accordance with Standard Plan Nos, SV 40-160 or SV 40-170.

2.10 SERVICE LATERALS AND CONNECTION CLEANOUTS

City will inspect the construction of service laterals from the main sewer line to the property line.

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 to the property line as a part of the street sewer construction prior to paving. An independent service lateral shall be provided for each owner. Service laterals shall be installed in general conformity with

Standard Plan Nos. SV 40-180 through SV 40-230. A surface cleanout shall be installed on the lateral at the property line for maintenance and for marking the location of the lateral at the property line. Cleanout location and details shall be in accordance with Standard Plan No. SV 40-230. Unless unfeasible, surface cleanouts shall not be installed in driveways.

A. Size: Service laterals shall be 6-inch minimum diameter.

The maximum size lateral connection by wye or tee fitting to a larger diameter sewer shall be six (6) inches. A manhole shall be installed when an eight (8) inch or larger sewer is connected to an equal or larger diameter sewer.

B. Depth: Service laterals shall be constructed at a 2.0 percent grade unless otherwise approved. In addition, the depth at the curb or property line shall normally be five (5) feet minimum from top of pipe to ground surface.

C. Future Connection: Unused openings shall be tightly sealed and supported in a manner to facilitate their future location and use. The developer's engineer shall select an appropriate service lateral location and shall instruct the contractor to locate the lateral according to the design elevations and locations. Likewise, the adequacy of such in place laterals shall be verified by the owner/developer prior to the future connection.

D. Laterals in Cul-de-sac Streets: Where numerous laterals connect to the end of a sewer, they shall be tied into the mainline downstream of a standard manhole.

E. Backflow Prevention: It is the designer's responsibility to recognize the possibility of reverse flow in service laterals serving lots or buildings with plumbing fixtures below the nearest upstream manhole rim. In such instances, a suitable backflow or overflow device shall be provided. Also, a backflow prevention device (backwater valve) will be required where any pad elevation is less than 6-inches above the next upstream manhole rim. The lots where prevention is required shall be indicated on the plans; the device or valve used shall be approved and inspected by the Building and Safety Department. See Standard Plan No. SV 40-240 for details regarding installation.

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

2.11 STRUCTURAL REQUIREMENTS

A. Under 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 loading per AASHTO Standard Specifications (truck loading with impact).

B. Other Pipes and Structures: Sewers designed to cross under or over other pipes or structures shall be protected from damage and shall be constructed to prevent endangering the other pipe or structure (see Standard Plan Nos. SV 40-50 and SV

40-220). In this regard, particular attention should be given to the possibility and prevention of settlement caused damage. Also, where future replacement of any line may be extremely difficult due to the pipe or structure, special design consideration may be required. Any of the Standard Plates which detail various encasements or other protection may be required by the Engineer in such instances.

C. 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 24-inches of such structure.

D. Steep Grades: Sewers laid on grades steeper than 10 percent which are not under nor intended to be under pavement should be examined for possible erosion protection. Where the slope exceeds 30 percent (3.33 horizontal to vertical) a redwood check dam (Standard Plan No. SV 40-260) shall be installed across the trench line at 20-foot intervals to reduce erosion.

Concrete anchors in accordance with Standard Plan No. SV 40-270 will only be required in special instances, where such anchorage is deemed necessary to prevent pipe movement.

2.12 PRIVATE (RESIDENTIAL) PUMPING SYSTEMS

General City policy is to avoid private residential pumping systems except in those cases where such a system is either: (1) in the City's best interest (as determined by Engineer) or (2) the only method for sewering a lot which cannot be adapted to a gravity system. In any case, the use of a private pumping system requires specific City review and approval.

Where such a system is employed, it shall be the responsibility of the private landowner to operate and maintain the private pumping system. The City will not accept responsibility for the operation and maintenance of the private system; a document recorded against the property shall confirm this.

Where a pumping unit is proposed, it shall be requested prior to tentative tract map approval, except for those cases where the City may decide to approve the unit at a later date.

2.13 FORCE MAINS AND LIFT STATIONS

All sewage shall reach the system by gravity flow, in a fresh (nonseptic) condition susceptible to conventional sewage treatment processes. Where extreme hardship conditions prevail and the area cannot be sewered by gravity sewers, in accordance with these requirements, a sewage lift station may be considered. No pumping facilities shall be designed or incorporated in sewer plans without prior approval of the Engineer. While the design responsibility rests with the developer/owner, the following are considered to be minimum standards by City:

A. Lift Stations Design: Lift stations, where permitted by the Engineer, shall be designed in accordance with the following City requirements:

1. Lift station shall be designed as a Wemco Hidrostal Prerostal System or approved equal.

2. Design shall be provided to handle ultimate peak flow from the tributary area with the standby pump out of service. Staged installation of pumps will be permitted if space is provided for future pump units.

3. Access shall be provided to the site for removal and repair of equipment.

4. Lift stations shall not be located in road right-of-way, but shall be located on a separate parcel of land and shall include fences, gates, landscaping, etc. Lift stations located in road right-of-way will only be considered when it can be demonstrated to the governing body of the road right-of-way and the Engineer that no other site is possible. Lift stations shall not be constructed in swamps or other areas susceptible to flooding. The site shall be graded with positive drainage away from the station.

5. Pumps and fittings shall be designed to permit the passage of three (3) inch diameter spheres (minimum) through the pump.

6. Standby power with automatic pump drive transfer shall be provided. Consideration should be given to alternative fuel engines when possible. Fuel capacity shall be sufficient to operate the lift station for 2 days, which operating at design conditions.

7. Overflow storage tank with 24-hour flow capacity installed adjacent to the wet well. A valving/piping system shall be design to return any overflow back to the wet well.

8. Two sets of controls must be provided. One system may either be ultrasonic or hydrostatic and the backup system shall consist of mechanical float switches.

9. Alarm redundancy will require installing two notification systems. An auto-dialer using a phone connection along with the Mission Communications cellular alarm service.

10. Backup electrical power shall be provided using a backup generator with sufficient fuel capacity to operate the lift station for 2 days while operating at design conditions.

11. A separate above ground structure should also be designed to house the generator equipment and electrical panels and controls. It will be important for the structure to provide sound attenuation for the generator as well as aesthetic treatments to minimize visual impacts to the community.

B. Force Mains: Force mains shall be designed in accordance with the requirements of City including but not limited to the following features:

1. Force main design shall be based on providing capacity for the estimated minimum and maximum pumping rates while maintaining a velocity of at least 2.5 fps to keep normal domestic waste in suspension.

2. Minimum size of force main shall be 4 inches in diameter.

3. Force mains shall be laid on a continuous positive grade and to grades designed to eliminate air pockets in the line. Where this is not possible, air release valves shall be provided at all high points in the force main to prevent air locking.

4. Force mains should enter the gravity sewer system at a point not more than 2 feet above the flow line of the receiving manhole.

5. The force main and fittings, including thrust blocks, shall be designed to withstand normal pressure and pressure surges (water hammer).

C. Construction of Special Structures: Design criteria for special facilities (i.e., junction boxes, etc.) that are not covered in previous sections are to be prepared individually for each specific job, subject to approval by the Engineer.

2.14 INDUSTRIAL WASTE DISCHARGE

The developer/engineer should be aware that the City regulates the physical and chemical content of wastewaters discharged to the sewerage system. If an applicant proposes to generate wastewater from other than "domestic" quality, an evaluation must be made including submittal of an application to the City Pretreatment Program. Should the wastewater generated contain hazardous/toxic materials, heavy metals, or other substances harmful to the sewage collection or treatment process, the wastewater must be pretreated or it cannot be discharged into the sewer.

Questions and further details concerning these regulations should be directed to the City Environmental Compliance Division.

Also, Standard Plan No. SV 40-250 details a sampling well which may be required of any non-domestic discharges.

2.15 ABANDONMENT

A. General: All existing wastewater mains/lines or structures which are to be abandoned shall be identified on the drawings by the developer's engineer. In general, it shall be demonstrated that the abandonment will not adversely affect the wastewater system.

All abandonment must be approved prior to any such work.

B. Wastewater Mains/Lines: Wastewater mains/lines to be abandoned shall be entirely filled by pumping and/or slurry into them. The pump mix shall be a mixture sufficiently workable for the purposes intended and shall be a concrete mix of 2000 psi minimum and/or concrete slurry. Laterals to be abandoned shall be cut 6-inches from main sewer lines and at the property line plugged at both locations. The remaining portion of the lateral, between the property line and the main sewer line shall be entirely filled with concrete mix of 2,000 psi minimum and/or concrete slurry.

C. Manholes: Manholes to be abandoned shall have all openings, inlets and outlets sealed off as set forth in Section 2.15B above. The manhole shall then be removed to a minimum depth of 4 feet below proposed finish grade and filled with imported sand (see materials section) if structure is within street right-of-way, or filled with earth and compacted if outside of street right-of-way.

2.16 SALVAGED MATERIAL

Disposal of salvaged materials such as frames and covers and other metal appurtenances, shall be the developer's responsibility unless otherwise specified by City.

SECTION 3.0
MATERIALS

3.1 GENERAL REQUIREMENTS

This section establishes the material requirements for pipe products, backfill materials, manholes, and structures. Approval to use any of these materials on a specific project is subject to the constraints imposed by other pertinent sections of these standards.

Materials shall be chosen for their strength, durability and ease of maintenance, with due consideration for dead, live and dynamic loads, beam strength and resistance to corrosion. Pipe joints shall be selected to provide positive protection against entrance of roots and groundwater, with sufficient flexibility to adjust to the trench bedding. Pipe fittings and sewer laterals up to the property line shall be the same material as the mainline. All materials, unless specifically approved otherwise, shall be new.

In general, pipe installations for most projects will use either Poly Vinyl Chloride (PVC) (SDR-35), Ductile Iron (DI), or High Density Polyethylene (HDPE-DR 17) products. Unless the City takes exception during the plan checking process, it can be assumed that any of these products are acceptable. However, if exception is made, such shall be reflected in the next plan check. Where alternate materials are shown, the various load factors for each reach must be indicated by the corresponding pipe material. Ductile iron pipe and fittings or HDPE-DR 17 are required where pipe is installed within unpaved City easements.

3.2 TESTING AND FINAL ACCEPTABILITY OF MATERIAL

City shall require such tests and certifications as deemed necessary to show that the specified materials have been employed. Not withstanding prior factory or yard inspections, the City representative shall have the right to reject any damaged or defective materials found on the job and order its removal from the site.

3.3 RIGID PIPES

Rigid pipe, fittings, and joint materials specified consist of Ductile Iron (DI). All rigid pipe shall be bedded and backfilled as specified in Standard Plan No. SV 40-30 and SV 40-35.

A. Ductile Iron Pipe and Fittings: Ductile iron (DI) pipe and fittings shall conform to AWWA C151 and AWWA C110, respectively. All pipes and fittings shall be of sufficient thickness to withstand the designed working pressure and depth of cover. Each pipe length shall be marked with either "DI" or "Ductile Iron" and either a strength class or thickness.

The ductile iron pipe and fittings shall be lined with one of the following materials:

- A polyurethane lining complying with the requirements of a type V system per ASTM D 16 two component polyisocyanate material and having a nominal thickness of 40 mils. Such a liner shall be similar to that manufactured under the trade name "POLYTHANE."

- A polyethylene liner shall be a blend of high-density and low-density polyethylene powders complying with ASTM D 1248 compounded with an inert filler and carbon black to provide resistance to ultraviolet rays during storage above ground. Such a liner shall be similar to that manufactured under the trade name "POLYLINED."

- A ceramic epoxy liner which shall be a high build multi-component amine cured novalac epoxy. Such a liner shall be similar to that manufactured under the trade name, "PROTECTO 401 CERAMIC EPOXY."

All ductile iron pipe and fittings, together with connecting ferrous bodied fittings, which are to be buried shall be encased in polyethylene film (baggy). Polyethylene encasement (baggy) shall conform to AWWA C105 (ANSI A21.5).

3.4 FLEXIBLE PIPES

Plastic pipes, fittings and joint materials specified herein consist of PolyVinyl Chloride (PVC) and High Density Polyethylene (HDPE). All materials incidental to plastic pipe installations such as gaskets, joint lubricants, cements, etc., shall be supplied by the pipe manufacturer. All plastic pipe shall be bedded and backfilled as specified in Standard Plan No. SV 40-30.

All plastic pipe entering or leaving a manhole shall have a standard gasket as supplied by the pipe manufacturer firmly clamped around the pipe exterior and cast into the concrete structure base or near the structure wall center as a water stop.

A. PVC Pipe and Fittings: Pipe and fittings (4" to 15") shall conform to the quality requirements and strength characteristics of ASTM D3034 "Type PSM Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings." The standard dimension ratio (SDR), which is the ratio of pipe diameter to wall thickness shall be 35 minimum. Minimum pipe stiffness shall be 46 psi unless otherwise approved. Pipe shall have an Integrated Bell Gasketed Joint. Rubber sealing gaskets shall meet the requirements of ASTM D3212. Pipe bells shall have the rubber ring present in the bell groove at the factory. No solvent cement joints will be allowed.

Pipe shall be clearly marked as follows at intervals of five feet or less:

- Manufacturer's name or trademark
- Nominal pipe size
- PVC cell classification (12454-B or 12454-C or 13364-B)
- Legend "Type PSM SDR-35 PVC Sewer Pipe"
- ASTM D3034

Fittings shall be clearly marked as follows:

- Manufacturer's name or trademark
- Nominal size
- Material Designation "PVC"
- "PSM"
- "ASTM D3034"

B. HDPE Pipe and Fittings: Unless otherwise approved, all High Density Polyethylene (HDPE) pipe and fittings shall conform to the quality and strength requirement of ASTM D1248 Type III with PPI recommended designation of PE3406. The pipe material shall contain ingredients to provide protection against ultraviolet degradation during processing and subsequent weather exposure. The approved method of joining pipe and fittings to one another shall be by the thermal butt fusion system. All fusion must be done by personnel trained by the pipe supplier, or other qualified person, using approved tools. Also, a qualified person must "ream" the inside of the pipe after joining to remove the beads created on the inside. In addition, pipe lengths, fittings and flanged connections to be used shall be of the same type, grade, and class of polyethylene compound and supplied by the same raw material supplier. Pipe class or thickness shall be the higher of the manufacturer's recommendations or as required by the City. Pipe shall include a white, light gray, gray, or light green colored lining for enhanced video inspection. Pipe shall be Chevron Phillips Driscop Pipe, "Driscopley," CSR "Greenview" or approved equal. All internal, beads must be removed from the HDPE pipe without damaging the fused joints.

Marking on the pipe shall include the following, at intervals of five (5) feet or less:

- Manufacturer's name or trademark code
- Nominal pipe size
- Type of plastic material "PE3406"

HDPE pipe usage is reserved for special conditions.

3.5 OTHER PIPE MATERIALS

Other pipe materials may be approved by the City for a specific project.

3.6 PIPE TRENCH MATERIALS

Refer to Standard Plan No. SV 40-20 for trench cross-section terminology.

The materials listed below should be considered as standards unless specific approval is received to deviate from the values shown. In such instances, the request should be made prior to any installation. All sand/gravel mixtures shall be free of organic matter, clay balls, trash or rubbish, or any other deleterious substances.

A. Type A Material: shall be **well graded imported sand** conforming to the following gradations:

SIEVE SIZE	PERCENT PASSING BY WEIGHT
3/8"	100
No. 4	75-100
No. 30	12-50
No. 100	5-20
No. 200	0-10

Additionally, this material shall have a sand equivalent of not less than 30.

B. Type B Material: shall be an **imported sand/gravel mixture** conforming to the following gradations:

SIEVE SIZE	PERCENT PASSING BY WEIGHT
3/4" (200 mm)	100
No. 4	35 - 65
No. 200	0- 10

Additionally, this material shall have a sand equivalent of not less than 30.

C. Type C Material: shall be an **imported sand/gravel mixture**, which may be approved as an alternate to type B material, conforming to the following gradations:

SIEVE SIZE	PERCENT PASSING BY WEIGHT
3/4" (20mm)	100
1/2" (13mm)	90 - 100
3/8" (9 mm)	40- 100
No. 4	30 - 80
No. 8	0 - 45
No. 200	0 - 5

D. Type D Material: shall be an **imported gravel/rock mixture** conforming to the following gradations:

SIEVE SIZE	PERCENT PASSING BY WEIGHT
¾" (20mm)	100
1/2" (13mm)	90 - 100
No. 4	10 - 30
No. 8	0 - 15

E. Type E Material: shall be an **imported gravel/rock mixture** conforming to the following gradations:

SIEVE SIZE	PERCENT PASSING BY WEIGHT
1" (20mm)	100
3/4" (19mm)	90 – 100

SIEVE SIZE	PERCENT PASSING BY WEIGHT
3/8" (9.5mm)	20 - 25
No. 4	0 - 10
No. 8	0 - 5

The above material corresponds to ASTM D448, Size #67 and AASHTO M-43 Size #67.

F. Type F Material: shall be **native earth material** removed from the trench excavation or nearby surroundings. Material must be fine-grained, free from organic matter, clay balls, trash or other rubbish, and any other deleterious matter and rocks larger than 3-inches. Less than 50% shall pass a No. 200 sieve. At least 40% shall pass a No. 4 sieve. This material shall be used in the backfill zone.

G. Type G Material: shall be **a crushed natural rock** conforming to the following gradation: (Table 200-1.2A ¾" crushed rock of the SSPWC).

SIEVE SIZE	PERCENT PASSING BY WEIGHT
1"	100
3/4"	90-100
1/2"	30-60
3/8"	0-20
NO. 4	0-5

This material is primarily intended where the trench has been over excavated so that a firm foundation can be made in areas of excessive groundwater flow. In such cases, a transition material must be used to separate the pipe from the coarser type G material. Such transition material must be well chocked (water jetted) into the voids of the coarser material.

3.7 SPECIFIC USES OF PIPE TRENCH MATERIALS

The following chart may be used as a guide for the selection of proper trench materials, along with the information contained on the standard plates. However, if the designer feels that more stringent backfill materials should be specified, then this should be done.

MATERIAL TYPES

Zone	Material Type
Foundation	G
Bedding	G
Haunching	A
Initial Backfill	A
Final Backfill	F or 2-Sack Slurry

Refer to the Standard Plans for additional details. Also, the selection of any pipe trench material should consider a well graded product within the limits specified above. This will lessen the incompatibility of adjacent materials and subsequent trench settlement.

3.8 ROADWAY MATERIALS

Pavement materials for resurfacing of trenches cut into existing pavement shall comply with the requirements of the City Road Standards and all subsequent amendments thereto (for information, Standard Plan No. SV 40-30 and SV 40-35 contains portions of those requirements). Asphalt, aggregate base and aggregate subbase specifications are those set out by the latest published edition of the Standard Specification for Public Works Construction (Greenbook).

3.9 MANHOLES

Manhole materials shall conform to those listed in Standard Plan Nos. SV 40-100 through SV No. 40-150. Manholes located in groundwater shall be installed with a cured-in-place fiberglass manhole lining system per SSPWC Section 500-2.5, manufactured by Poly-Triplex Technologies Inc., or approved equal. Manholes not exposed to groundwater shall be installed with a PVC liner to protect concrete from sulfide corrosion, T-lock, Dura Plates, or approved equal.

Undeveloped Areas: When manholes are constructed in natural or man-made drainage courses or flood channels, the manhole covers shall be watertight and shall be fitted with a composition

gasket and bolted down with eight (8) stainless steel cap screws. To further alleviate infiltration, all exterior joints of the manhole structure, including but not limited to ring and shaft joints, pipe penetration joints, and all component interface joints, shall be filled and/or applied with paste grade Bituminous asphalt sealant (or an external concrete joint wrap, Rub'R-NEK by Henry, or approved equal). The remaining exterior concrete surfaces of the manhole structure shall then be coated with a pourable Bituminous asphalt sealant. Sealant shall be "Bitumasic" by Koppers, or approved equal. Finished thickness shall be a minimum of 50 mils. In other undeveloped areas above the high-water level, bolt-down vandal-proof manhole covers shall be used as specified on Standard Plan No. SV 40-140.

3.10 MANHOLE/CLEANOUT LIDS

All public manhole covers shall also be coated with a bituminous material and shall have "CITY OF SIMI VALLEY" cast around the perimeter of the top with minimum 1-1/2-inch letters followed by the word "sewer" indicating the use of the manhole. Two-inch letters are preferable but not required. For private sewers, omit "CITY OF SIMI VALLEY" on the lid and substitute "Private Sewer." Sewer cleanout lids shall also include the word "Sewer."

3.11 CONCRETE MATERIAL

Approved concrete material shall be based on the 28-day compressive design strength and shall be chosen according to the following chart showing its intended use:

Class	Application	Minimum 28 Day Comprehensive Strength (psi)	Maximum Aggregate Size (Inches)	Slump (Inches)	
				Min.	Max.
A	Walls, drip structures & reinforced structural encasement	4,000	1-1/2"	3"	6"
B	Manhole bottoms, drop pipe encasement, pipe bedding, non-structural use	3,250	1-1/2"	2"	6"
C	Pump mix for abandoning line	2,000	3/8"	--	--

3.12 REINFORCING STEEL

A. Bar Reinforcement: Minimum rebar size of ½" diameter or No. 4 bars conforming to ASTM A615, accurately placed and secured in position to accomplish the intent of the design plans. Where bars are spliced they shall be lapped at least fifty (50) bar diameters except where otherwise shown on the plans.

B. Mesh Reinforcement: Mesh reinforcement shall conform to the requirements of ASTM A185; wire gauge and mesh dimensions will be as shown on the plans.

SECTION 4.0
PLAN PREPARATION

4.1 SHEET SIZE

Overall dimensions 24" X 36"

4.2 MARGINS

1-1/4" on left, all other 1/2".

4.3 SIGNATURE BLOCK

Title sheet of the plans shall have a signature block. All other sheets of the plans shall have a reviewed signature block for the City. The acceptance block shall be signed before any construction occurs. Any changes to the plans after initial approval is given shall be shown as revisions and shall be approved by the Engineer.

4.4 PLAN SHEETS

"First Sheet" is the title sheet and shall contain:

A. A key map with an overall plan at a scale of 1" = 200 feet showing general layout of sewer lines, pipeline diameters, manhole locations and numbers, flow direction arrows, street names, tract boundaries, lot boundaries and numbers, a sheet index, and other pertinent information. Care must be exercised to make sure scale and orientation is correct. Index maps are used to produce a wastewater atlas and/or a GIS map.

B. A vicinity map with a scale of 1" = 1,000 feet showing tract boundary, streets, adjacent tracts, major streets outside of tract boundaries and the location of the bench mark.

C. All bench marks used in the project shall have elevations, descriptions, locations, etc., spelled out as illustrated below:

B.M. No._____ Elev._____ F.B._____ Page_____

Type of Marker_____

Location_____

_____

All elevations used in preparation of standard plans shall be based on United States Coast and Geodetic Survey (U.S.C. & G.S.) mean sea level datum adjusted to 1961.

D. The general notes shall be shown on the title sheet and need not be shown on the other sheets. The general notes shall include a note requiring compliance with these standards and five day notice prior to beginning construction.

E. A table of material quantities.

4.5 PLAN OF WASTEWATER SYSTEM

Plan drawings shall show location of wastewater mains, laterals and other structures in relation to survey lines and stations. Provide all data for horizontal deflections or curves and indicate limits of any easements. Any known pad locations which are adjacent to an easement should be shown as well as fences, walls, trees, etc. which are within the easement. Show and label, on the plans, the size and ownership of all existing and/or proposed underground utilities that cross or parallel the sewer.

4.6 PROFILE OF WASTEWATER SYSTEM

Profiles shall show the grade, including any vertical curve data, size and type of pipe and the distances between manholes and other structures. Also show depth and elevation of laterals at main and at property line or at edge of easement. The type of encasement required to carry loads on the pipe shall also be shown. For each section of sewer, the profile shall show alternate acceptable pipe materials that are permissible or whether only one material is acceptable. Show elevations to 0.01 foot of sewer invert. Any pipeline or utility which crosses the sewer, such as water, gas, telephone, power, storm drains, television and oil lines, shall be shown and labeled on the profile. The grade of major paralleling lines within 5 feet of the sewer shall be shown as dashed.

"DISCLAIMER" City is not responsible for the accuracy of the location of underground lines, and approval of sewer plans by the City does not constitute a representation as to the accuracy of the location of, or the existence or nonexistence of, any underground utility, pipe, or structure within the limits of the project.

4.7 LETTERING

With the exception of titles, lettering on sewer plans and profiles may be either freehand or mechanical, and either inclined or vertical.

Mechanical lettering shall be used in titles and shall be vertical.

If mechanical lettering is used in the "Notice to Contractors," it should be vertical.

Freehand lettering used on sewer plans and profiles shall be single stroke, inclined (Reinhardt) or vertical, with no unnecessary hooks or appendages. Except for titles or for emphasis, lower case lettering may be used. The bodies of the lower case letters shall be 2/3 the height of the upper case letters and numerals.

The minimum height of freehand upper case letters and numerals shall be 3/32 inch (No. 3 on standard lettering guides) except for lot and cut dimensions, which may be slightly smaller, provided that they are clearly legible.

For drawings that are to be reduced to half size (Assessment Act Sewers), the minimum height of freehand upper case letters and numerals shall be 1/8 inch (No. 4 on standard lettering guides), except for lot and lot cut dimensions which may be as small as 3/32 inch (No. 3 on standard lettering guides).

Mixed vertical and inclined (or slant) lettering shall not be used on the same construction sheet, titles excepted.

The minimum height and boldness of the lettering used for street names shall be LeRoy 240-3 or equal. Street names shall be shown in all capital letters.

4.8 GRAPHIC SCALE AND NORTH ARROW

A. In order to reduce the possibility of confusion, graphic scales shall be shown on all plans submitted for approval except for revisions to previously approved plans. The graphic scale may be used by itself or in combination with the normal scale notation.

When drawn individually, such graphic scales should be very simple; examples are shown on Figure 4.8A.

Horizontal: 1" = 40 feet
Vertical: 1" = 4 feet (or as approved)

Horizontal	Vertical
1" = 10' 1" = 20' 1" = 40' 1" = 50'	1" = 4' Vertical 1" = 5' Vertical 1" = 8' Vertical

B. A north arrow oriented toward the top or to the right only, as shown in Figure 4.8B, or as otherwise approved.

4.9 PROCEDURE FOR APPROVAL

Before wastewater improvements can be constructed, the developer must submit construction drawings to the Development Engineering Section of the City for plan checking. The developer must also pay various fees and obtain a permit prior to beginning construction.

4.10 PLAN CHECKING LIST

Table 4.10 is intended as a guideline to assist the preparer. It is not represented to be a complete list of requirements.

Table 4.10

CHECK LIST
PLAN CHECKING AND PROJECT REQUIREMENTS
WASTEWATER

A. **SEWER COVER SHEET** (Required if more than two sewer plan sheets. If no cover sheet is required, cover sheet items must be included on the first sewer plan and profile sheet).

1. Sewer Standard notes shown (latest edition) ☐
2. Graphic sheet index ☐
3. Sheet index provided ☐
4. Cleanout detail shown ☐
5. Bench mark referenced (N.G.V. Datum) ☐
6. Legend ☐
7. Trench Detail ☐
8. Underground Service Alert Stamp ☐
9. Public Services Listing ☐
10. Signature Blocks ☐
11. Quantities Table ☐
12. Developer's Engineer's stamp and signature ☐

B. **SEWER PLAN AND PROFILE SHEETS**

1. North arrow shown (oriented to either top or right of sheet) ☐
2. Scale noted ☐
3. Graphic scale shown (plan and profile) ☐
4. Plan view provided (including street name, street width and right-of-way width ☐
5. Lot line and numbers shown ☐
6. Dimensions and location per The City standard plates ☐
7. Curve data listed ☐
8. Water and storm drain pipe locations shown ☐
9. Profile provided (flow line and top of the pipe elevations noted at all junctions and manholes) ☐
10. Pipe size, material, class and bedding noted ☐
11. Slope between manholes noted ☐
12. Minimum 5' of cover provided ☐
13. Utility and storm drain crossing detailed (plan and profile) ☐
14. Special crossing construction detailed ☐
15. Manhole spacing noted (out to out) ☐
16. Manhole rim elevations noted ☐
17. Manhole flow line and invert elevations provided (inlet and outlet) ☐

18. Manholes and cleanouts numbered consecutively ..... ☐
19. Drop of 0.1' across M.H. (on straight runs), 0.2' drop (at intersections) provided ..... ☐
20. Lateral size and slope noted ..... ☐
21. Lateral station or location noted (distance from property line) ..... ☐
22. Water/sewer separation per Health Department Standards provided ..... ☐
23. Depth or flow line elevation of sewer lateral at property line shown ..... ☐
24. Stationing shown along centerline of sewer main ..... ☐
25. Finished grade over sewer lines shown on profile ..... ☐
26. Bearing and length of all sewer lines shown ..... ☐
27. No lateral connections to manholes ..... ☐
28. Laterals shown perpendicular to sewer main (if at end of main, show station of lateral at main and at property line) ..... ☐
29. No sewer laterals under driveways or sidewalks ..... ☐
30. Are sewer manholes in easements accessible to maintenance vehicles ..... ☐
31. Engineers stamp and signatures ..... ☐

4.11 STANDARD NOTES

The standard notes shown on the following page(s) shall be included on the cover sheet. These notes are subject to change to suit the needs of the City.

General Wastewater Notes

1. Contractor shall notify the City five (5) days prior to commencing construction.

2. All construction shall conform to City Sewerage Design & Construction Standards adopted and as amended.

3. Pipes installed shall be:

   a. Polyvinyl chloride (PVC) gravity sewer pipe and fittings, conforming to the requirements of ASTM D3034, S.D.R. 35 latest revision; or

   b. Ductile Iron (DI) Pipe and fittings shall conform to AWWA C151 and C110, respectively, with minimum pressure class of 350 for pipe sizes up to and including 12-inches in diameter. For pipe size diameters larger than 12-inches, the pipe class shall be approved by the Engineer. Joints shall be mechanical or push-on, except where noted; or

   c. Unless otherwise approved, all polyethylene HDPE, DR-17 pipe and fittings shall conform to the quality and strength requirement of ASTM D1248, type III and PPI recommended designation of HDPE 3406. The pipe material shall contain ingredients to provide protection against ultraviolet degradation during processing and subsequent weather exposure. The approved method of joining pipe and fittings to one another shall be by the thermal butt fusion system. All fusion must be done by personnel trained and certified by the pipe supplier, or other qualified person, using

approved tools. Also, a qualified person must "ream" the inside of the pipe after joining to remove the beads created on the inside. In addition, pipe lengths, fittings and flanged connections to be used shall be of the same type, grade and class of PE compound and supplied by the same raw material supplier. Pipe class or thickness shall be the higher of the manufacturer's recommendations or as required by City. Pipe shall include a white or light gray colored lining for enhanced video inspection. Pipe shall be Phillips Driscope "Opticore," CSR "Greenview" or approved equal.

4. The contractor shall install the same type pipe between manholes. No combination of pipe type will be allowed. If PVC pipe is used, only Class I, II, or III ASTM bedding material having a minimum in-place relative compaction of 90 percent shall be utilized.

5. All Ductile Iron Pipes and fittings shall have lining and coating per AWWA C104, except the lining shall be polyurethane. Provide polyethylene encasement in accordance with ANSI/AWWA A21.5/C105.

6. Except where designated on the plans, piping shall be installed per City Standard Plan No. SV 40-30 and SV 40-35.

7. Warning: Connection to existing wastewater lines shall be performed only in the presence of a City inspector.

8. The location of, and existence or nonexistence of, underground utilities has been determined to the best of the City inspector's ability, but it shall be the sole duty of the Contractor to verify the location of the existing utilities and to take all necessary precautions to avoid damage to these utilities. The Contractor shall assume sole responsibility for any damage done to existing utilities during construction.

9. All sewer stationing shall be along the centerline of the sewer line.

10. Vertical trench shoring shall conform with the orders of the State of California, CAL/OSHA Guide for Construction Safety.

11. If groundwater is encountered, sewer construction shall not begin or continue until the excavation is dewatered. Provisions for continuous drainage of the sewer trench shall be made in order to keep the trench free of groundwater.

12. Sewer laterals shall be constructed as nearly as possible to the location shown on the plans, with minimum clearance of water mains and laterals to conform to City Standard Plan No. SV 40-10.

13. The contractor shall keep a strict and accurate record of the types of pipe material used and the location of all wyes, tees, laterals, and stubs to be shown on the record drawings ("As-Built") plans. Final locations of sewer laterals shall be

shown on the record drawings ("As-Built") plans and shall be marked on the curb with "S" 2-inches high and a minimum of 1/8-inch deep chiseled into curb face.

14. All underground utilities and service laterals shall be placed prior to the construction of curbs, gutters, sidewalks, and pavements.

15. List of Standard Plates of the City sewer manual to be adhered to:

Title of Standard Plan	Plan Number
Pipe Bedding for Existing Street	SV 40-30
Pipe Bedding for Proposed Street	SV 40-35
Standard Service Lateral	SV 40-180
Steep Service Lateral	SV 40-210
Standard Manhole	SV 40-100
End-of Main Cleanouts	SV 40-160
Separation Requirement for Sewage and Water Supply Facilities	SV 40-10

16. A backwater valve in accordance with Standard Plan No. SV 40-240, is required in structures where any finish floor elevation is less than 6-inches above the next upstream manhole rim. An elevation overflow device shall be installed at the building sewer outlet for the above condition.

17. Separation between wastewater and water lines shall be in accordance with Standard Plan No. SV 40-10.

18. All trench backfill and compaction in public right-of-way above the pipe zone will be under the supervision of City.

19. All laterals to new sewer main pipelines are to be tied into the main lines through use of wyes or other approved fittings. Cut-in saddles are not allowed.

20. The house laterals shall be extended beyond the street right-of-way to edge of P.S.E. (public service easement).

21. After the pipe has been laid, backfilled, road base material placed, and compacted to 95% relative compaction per the project soils report, an air test shall be made on each section of pipe line between manholes. This test shall be performed after the

mandrel test and in conformance with the Standard Specifications for Public Works Construction, Section 306-1.4.

22. Approval of Plans shall remain effective for two (2) years after the date of signature by the Engineer.

23. Pipe Diameter Ring Deflection Test (Mandrel Test per SSPWC Section 306-1.2.12):

Upon completion of the backfill and road base paving (if applicable), and prior to video taping and final paving (CAP) and acceptance of the air test, each main pipeline shall be checked for ring deflection by pulling a template or mandrel through the main pipeline. This test shall be performed no sooner than four days after backfilling operations are completed but before final paving occurs. This mandrel shall be cylindrical in shape with a diameter as follows:

Nominal Pipe Diameter	Minimal Mandrel Size	Minimum Barrel Length
6"	5.619"	6"
8"	7.524"	8"
10"	9.405"	10"
12"	11.191"	12"

24. Prior to final paving (cap), the contractor shall provide the City, for review and acceptance, a video tape of the entire sewer system. The contractor shall notify the Sanitation staff at (805) 583-6447 a minimum of 48-hours prior to video taping.

25. Contractor shall be required to install and maintain sand traps in manholes at the downstream end of project. Prior to removal of the sand traps, the lines and manholes shall be cleaned of all debris. The sand traps shall not be removed unless authorized by the City and in the presence of the project's inspector.

26. Contract shall submit digital files (Autocad) of signed improvement plans prior to pre-construction meeting and issuance of permits.

27. "Record Drawing" plans shall be submitted prior to final walk-through inspection and acceptance of the improvements by the City.

28. Contractor shall submit digital files (Arc information or DXF format compatible with the City's GIS database) of "Record Drawings" prior to final acceptance of the project.

4.12 STATIONING

The stationing of the sewer shall be shown to the nearest hundredth of a foot. Stationing shall increase upstream. Outfall, interceptor and relief sewers may be stationed continuously throughout their length regardless of street location.

When existing sewers are being extended in the same street, alley, or right-of-way, or in the same direction, the stationing on the new sewer shall be a continuation of the stationing on the existing sewer. Otherwise, on lateral sewers the centerline of the existing sewer into which the proposed sewer will outlet shall be station 0+00 of the proposed sewer.

Where lateral sewers change direction at a manhole, and the upstream portion is located in a street, alley, or right-of-way different than the downstream portion, a sewer line number other than that assigned to the downstream sewer shall be assigned. The P.I. of the sewer centerlines shall become station 0+00 for the upstream sewer.

At confluence structures, all proposed sewers emptying into the structure, which are not a continuation of the outlet sewer shall be assigned sewer line numbers different from the outlet sewer. Station 0+00 for such sewers shall be located either at the intersection of the sewer centerlines within the structure or at the structure centerline transverse to the outlet sewer, whichever is applicable.

Sewers Serving Adjacent Property: All streets, alleys, and right-of-way adjoining the proposed sewer shall be shown, and the name or designation and the width of each given. All lots, recorded lot cuts, or other legal lot or parcel subdivisions to be served by the proposed sewer shall be shown. Any additional lots in the block (on the same side of the street) shall also be shown. Tract names, block and lot numbers, lot frontages, and references to County Records shall be shown, and proposed tracts labeled as such. Proposed easements shall show the right-of-way number in addition to the width.

Cut lines are lines (other than lot lines) dividing ownerships, present or past. A single owner may arbitrarily record a dividing line within his property or may have different proprietary interest in two abutting parcels.

Individual parcels of record shall be shown even though they belong to the same owner.

The location of alleys with reference to adjacent streets shall be indicated by lot frontages or depths.

Calculated lot frontages shall be shown in parentheses. Frontages of separate parcels of cut lots or fractional lots shall also be shown in parentheses. The lines indicating the cuts shall be dashed.

Existing and proposed easements shall be shown as dashed lines unless one side of the easement coincides with a lot or property line. Such a lot or property line shall be delineated as a solid line on that side of the easement.

Sewers Not Serving Adjacent Property: When the plans are for the construction of sewers not primarily designed to serve adjacent property, lots in the blocks not served need not be shown. Where one or more house connection sewers in any block are constructed, remodeled or abandoned in connection with the construction of the new sewer, the lots and lot numbers on the affected side of that block shall be shown.

4.13 SURFACE IMPROVEMENTS

All existing and proposed surface improvements and objects which will have some effect on the bidding or construction of the proposed work shall be shown on the plans. Existing features shall be shown by dashed lines or by symbols as shown on the legend. Improvements of relatively small size which are shown in numerous locations on the plans shall be shown in the legend. It is assumed that the improvements shown in the legend are existing unless labeled "proposed."

Where surface improvements are labeled, the label shall be connected to the delineation by leaders and arrowheads. If the delineation enclosed the label or the label is placed immediately above the delineation, however, the leaders and arrowheads may be omitted.

Railways which affect location, design or construction of proposed work in their correct location, and their ownership will be shown.

4.14 SUBSTRUCTURES

All known substructures, including abandoned lines, crossing or paralleling the sewer being designed shall be delineated on the plans. Any known paved over rails or rail beds should be delineated on the plans. Substructures shall be delineated as shown in Figure 4.14, Substructure Legend.

4.15 SUBSTRUCTURE LEGEND

Leaders to all conduits other than sewers and storm drains shall show size, ownership and tie to nearest property line. (Ties to street centerlines or transit lines are optional) If any conduit is a high pressure main, it shall be so labeled in bold upper case letters on the leader.

Contract plans shall clearly differentiate between utilities which are: (a) abandoned in place, (b) to be abandoned in place (c) to be relocated, (d) to be removed, or (e) proposed. The contractor's responsibility for removal, relocation, protection or avoidance of interfering utilities shall be explicitly noted on the plans. The information shall be called out on the leaders.

Storm drains shall be tied to street centerlines or transit lines. The size, type of conduit and the plan number thereof shall be shown. Storm drain laterals crossing the proposed sewer shall be shown in their correct location with the size indicated; for example "EX. 24" R.C.P. S.D." If the storm drain lateral was constructed from a plan or profile number from which the lateral was constructed shall also be shown.

Utility conduits and structures shall be delineated, tied and labeled as shown in the Substructure Legend. If desired, utilities may be tied to the street centerline or transit lines by dimension lines and numerals instead of being tied to property lines.

When utilities cannot be avoided and must be removed, place the words "TO BE REMOVED BY OTHERS" on the plan near that portion of the utility to be removed. Use bold, upper case lettering and tie with a leader or leaders and arrowhead(s). The extent of the removal shall be shown.

Where improvements other than sewers are labeled "Proposed" it shall mean that these improvements are to be constructed under the same contract as the sewer. The plan numbers of these proposed improvements shall be shown on the first sheet of the sewer plans under "NOTICE TO CONTRACTORS" in spaces especially provided for such plan numbers.

4.16 PROPOSED SEWERS

Delineate proposed sewers and the appurtenant structures as shown in the Substructure Legend. Sewers 33-inch and smaller shall be shown as a single line approximately 1/30-inch in width.

Except where the delineation of the sewer or its appurtenant structures is repeated in a detail, the sewer to be constructed shall be shown only once on the plans, as a solid, unbroken line. If the delineation of a portion of the sewer or its appurtenant structures is repeated on the same sheet or on other sheets, they shall be shown as dashed lines and reference made to the location or sheet on which the sewer and its appurtenant structures were originally shown; for example, "12-inch" Sewer shown elsewhere hereon," or "8-inch Sewer shown on Sheet No. 4." The direction of flow shall be shown. Where the portion of the sewer shown to be constructed terminates at a manhole on an outlet sewer, the manhole shall be shown to be constructed with the outlet sewer.

4.17 ABANDONMENTS

Existing sewers which are to be abandoned with the project shall be delineated and labeled. All manholes on the portion of the sewer to be abandoned and the nearest manholes on the same line shall be stationed.

Manholes in the portion of sewer being abandoned shall not be separately indicated to be abandoned.

Sewers shall be shown to be abandoned only once on the plans. Where the same portion of sewer to be abandoned is shown on more than one sheet, it shall be ordered abandoned on one sheet only and reference to its abandonment made on any other sheets on which it is shown; for example, "8-inch Sewer Abandoned. See Sheet 6."

4.18 PROPOSED SEWERS (DATA TO BE SHOWN BETWEEN MANHOLES)

The following data shall be shown for each portion of the proposed sewer between manholes, or extending beyond the last upstream manhole:

Size of pipe in inches.
Slope of pipe.
Length of pipe.
Pipe material.
Direction of Flow (Flow Arrow).
Pipe encasement.

4.19 DATA TO BE SHOWN FOR PROPOSED SEWER STRUCTURES

Manholes: Station to nearest 0.01-foot. Where the M.H. stationing on one line equals some other station on a confluent line, show both stations and sewer line numbers; for example, 12+62.87 N&S = 0.00 E&W. When there is an equation in the same line, indicate which station applies to downstream stationing and which applies to upstream; for example, 6+72.24 back = 6+74.63 ahead. Where the 0+00 of the proposed sewer equals some other station on the sewer into which it outlets, indicate the stations. For example "0+00 = 45+23.72 on Ex. 18-inch Sewer". If an existing sewer is intercepted by a proposed sewer, indicate the stations, thus: 12+24.42 = 8+67.73 on Ex. 8-inch Sewer. Type and Size: Indicate the manhole type immediately beneath the leader to the manhole on which the manhole station is shown.

Chimneys: Show station and type. For a drop pipe other than 6 inches in diameter, specify the size. Unless shown otherwise on the plans, the "Y" branches of single "Y's" will be faced to the right; double "Y's will be faced perpendicularly to the sewer centerline. If "Y" branches are to be faced in some other direction, specify it; for example: "Face "Y" Branch Left," or "Face "Y" Branches Parallel to Sewer C.L." See Standard Plan No. SV 40-210.

4.20 TIES

Sewers located in streets or alleys shall be tied at right angles to applicable transit or centerline.

Manholes, and terminal cleanout structures adjacent to street or alley transit line or centerline intersection, B.C's, or E.C.'s, shall be tied by right angle ties. Street or alley transit or centerline P.I.'s may be used as points to which ties may be made. Ties to structures shall be shown to the nearest 0.01 foot.

Where it is obvious from the plan that the structure is on a transit or centerline intersection, or on the P.I., B.C. or E.C. of a street or alley transit or centerline, no tie is required.

In a right-of-way extending between two streets or alleys, the manhole closest to the street or alley shall be tied to the nearest centerline intersection or other known point. Intermediate manholes may be tied to one another by angles and distances or may be tied to a random survey line. Where there is a discrepancy between the measured and the calculated or recorded angle, the measured angle shall be used.

Where sewers are to be constructed on curved or irregular width streets, and the center line of the sewers or structures are not parallel to the existing survey control lines, a separate sketch showing survey control and the centerline of the proposed sewer, and their relationship to one

another, should be placed on the plan. This sketch should show all angles and distances of the survey control line and the ties to the sewer structures, angle points, curve data and sewer stationing. This sketch need not be to true scale.

4.21 DUCTILE IRON PIPE AND JACKED CASINGS

Ductile iron pipe and jacked casings shall be delineated on the plans. The limits of the pipe or casing shall be shown by stationed leaders connected by a dimension line. When applicable, the class of ductile iron pipe should be shown on the dimension line. In the case of a jacked casing, a reference to a typical section should be shown in the dimension line. The typical section should show the required method of laying the sewer within the jacked casing, and details of construction.

4.22 SPUR LINES

When a sewer is specified from a manhole to an edge of pavement, the sewer line shall be designed to the next manhole and tied in.

The balance of the sewer line shall be dashed and labeled "To be Constructed Under Separate Contract." Indicate plan number when possible. The sewer shall be shown to be capped and the end bricked and tagged in accordance with the Standard Specifications.

SECTION 5.0

CONSTRUCTION STAKING

5.1 GENERAL REQUIREMENTS

Construction staking is the responsibility of the developer, its engineer or contractor. Stakes will be set parallel to the sewer alignment at an offset distance and direction agreed upon with the contractor, but in no case shall construction stakes be offset more than 10 feet. Stakes will be set at no greater interval than 50 feet on straight alignments when the sewer slope is 0.6 percent or more. For horizontally curved sewers at less than 0.6 percent slope the stake interval shall be 10 feet and for curved sewers above 0.6 percent slope and for straight sewers below 0.6 percent slope the stake interval shall be 25 feet. Stakes shall also be set at each wye on the mainline sewer.

5.2 PRESERVATION OF STAKES

Construction stakes shall be carefully preserved by the contractor until after the completed work has been accepted by the City. If two or more consecutive stakes are knocked out during construction, new stakes shall be set at the contractor's expense.

5.3 RECORD DRAWINGS ("AS-BUILT")

For all street sewers, regardless of alignment or slope, the developer's engineers shall determine record drawing ("As-Built") elevations at the invert centerline of each manhole and shall provide a written record of such elevations to the City inspector. Also, the stationing for each lateral is required on the record drawings.

For each lateral, a stake shall be placed near the property line and at the main (wye); referenced to show its horizontal and vertical distance from the lateral invert at the property line.

SECTION 6.0

CONSTRUCTION

Construction of the wastewater system shall be in accordance with the provisions of the latest edition of the "Standard Specifications for Public Works Construction" (SSPWC) prepared by the Southern California Chapter of the American Public Works Associations and Southern California District of the Associated General Contractors of California.

SECTION 7.0

REQUIREMENTS FOR FINAL ACCEPTANCE

7.1 RECORD DRAWING ("AS-BUILT") ORIGINALS

Original record drawings ("As-Built") and two sets of blue line prints shall be submitted to the City. The record drawings shall reflect the actual improvements made and give the accurate location of all new/or relocated facilities. The following certificate shall be signed and shall appear on the cover sheet of the wastewater plans:

Record Drawing ("As-Built") Certificate

I hereby certify that the work shown on drawing _____ sheet _____ through _____ marked "Record Drawings" has been constructed in conformance with lines and grades and requirements as shown on said plans, drawings and referred specifications.

_____	_____	_____
Registered Civil Engineer	Number	Date

7.2 WASTEWATER CONNECTION FEES

Developer shall pay, or make arrangements, satisfactory to City to pay wastewater connection fees in accordance with the applicable Municipal Codes and City ordinances.

7.3 ON-SITE PLUMBING PLANS

Approved on-site plumbing plans shall be submitted to the City when requested for by the City staff.

7.4 NOTICE OF COMPLETION

The developer shall submit a copy of the recorded notice of completion of the wastewater system to the City.

7.5 GRANT DEED

The developer shall submit the original unrecorded grant deed executed by the developer conveying the system to the City that includes notarization of all signatures.

7.6 ITEMIZED COST/ADDITIONAL FEES

A certified and itemized copy of the cost of the facilities offered for dedication shall be submitted. Such certification should consist of copies of the signed contractual agreement with any change orders. If the final cost is found to be more than the originally approved engineer's cost estimate, developer shall pay the City in the amount of an additional plan check

and inspection fees, based on the difference between the estimate and the final cost, based on the current rates of such fees.

7.7 ACCEPTANCE

When all requirements (field and administrative) have been met, staff will prepare a resolution recommending City acceptance of the improvements and exoneration of the performance bond (10 percent of the performance bond remains in force for the one-year maintenance and guarantee period). Results of the action will be provided to the developer and his surety. Once acceptance has been made by the City occupancy of the homes/premises will be granted.

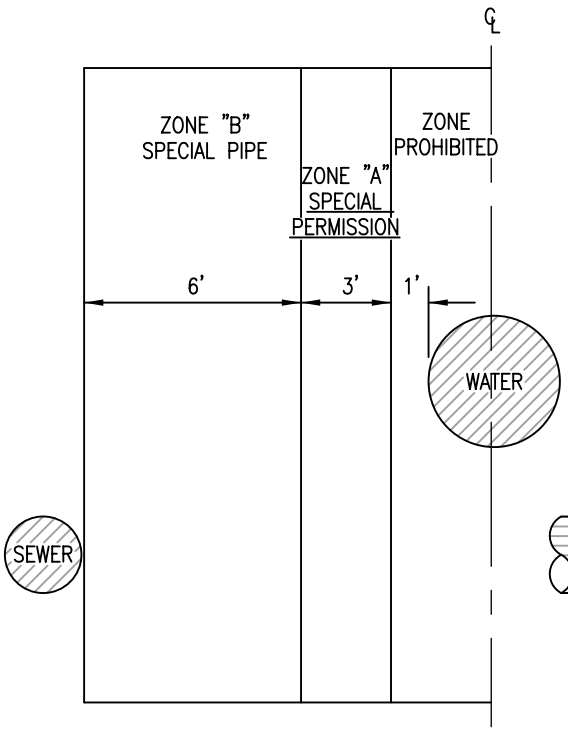
Whereas, the normal maintenance and guarantee period is one year and the bond retention 10 percent, both of these may be increased if in the opinion of the City the normal period and amount are not sufficient.

7.8 STATUS DURING MAINTENANCE AND GUARANTEE PERIOD

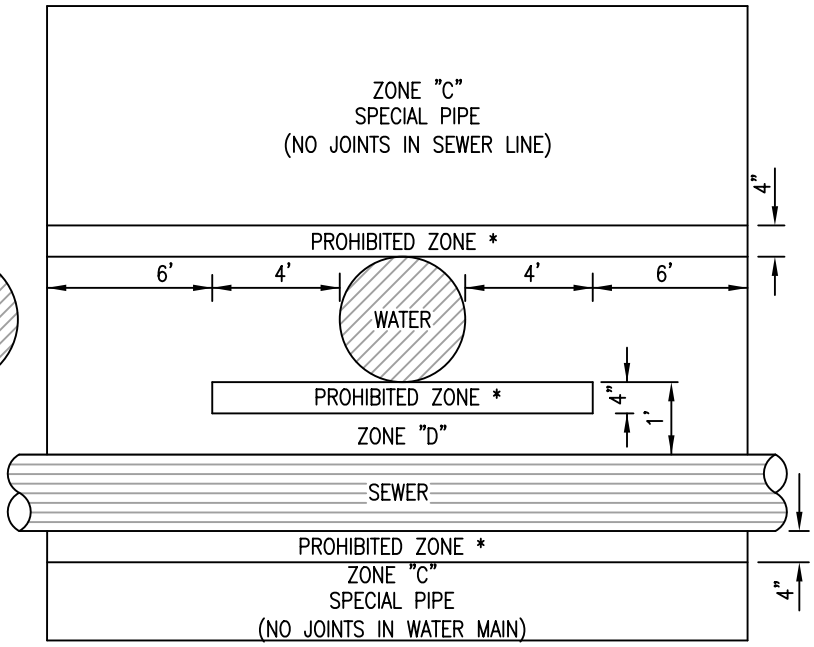
The developer/contractor is responsible for the full guarantee period for the proper cleaning and maintenance of the wastewater system. Should City crews have to perform any of this work, the costs for same will be invoiced to the developer/contractor.

SECTION 8.0
STANDARD PLANS

Title of Standard Plan	Standard Plan No.	No. of Sheets
Separation Requirements for Water and Wastewater Lines	40-010	1
Trench Construction and Terminology	40-020	1
Pipe Trench Detail for Existing Street	40-030	2
Pipe Trench Detail for Proposed Street	40-035	2
Pipe Bedding for Special Conditions	40-040	1
Wastewater Special Support Under/Over Obstruction	40-050	1
Standard Concrete Encasement Type A, B, & C	40-060	1
Reinforced Concrete Trench Slab	40-070	1
Special Pipe Encasement for Drainage Courses	40-080	1
Standard Plugs and Pipe Encasements	40-090	1
Standard 4' and 5' Diameter Precast Manhole	40-100	3
Shallow Manholes	40-110	4
Standard for Manhole Raising with False Bottom	40-115	2
Typical Concrete Base and Joint Detail	40-120	1
Watertight and Standard Manhole Frame and Cover	40-130	1
Manhole Securing Details for Undeveloped Areas	40-140	1
Miscellaneous Manhole Details	40-150	1
Terminal Cleanout Structure, Type " A"	40-160	3
Terminal Cleanout Structure, Type "B"	40-170	2
Typical House Connection	40-180	1
Saddle Connection to Main	40-190	2
Standard House Connection (Sewer Lateral) for Slopes Less Than 30%	40-200	2
Deep Cut House Connection (Sewer Lateral Chimney) for Slopes Greater than 30%	40-210	1
Sewer House Lateral at Utility Intersection	40-220	1
House Connection Cleanout	40-230	1
Backwater Valve	40-240	1
Sampling Well	40-250	1
Redwood Checkdam Backfill Stabilizers	40-260	1
Private Pumping Systems	40-270	1
Cleanout Sewer Force Main	40-280	1
Drop Sewer Manhole	40-290	2
Sand Trap	40-300	1
Average Flow - Peak Flow Graph	40-310	1



PARALLEL CONSTRUCTION
NOT TO SCALE

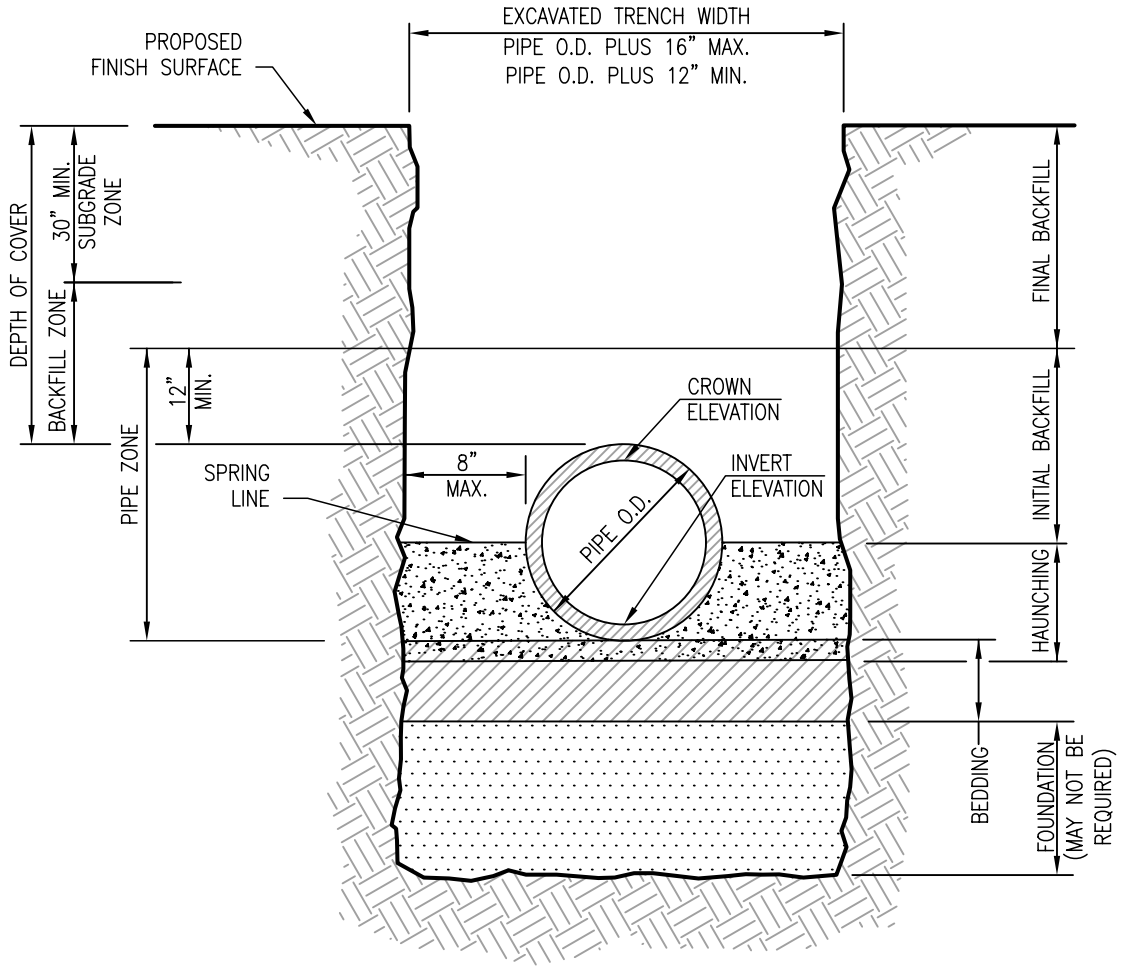


* PER SECTION 64630 (E)(2) OF CCR TITLE 22

CROSSINGS
NOT TO SCALE

ZONE	SEWER CONSTRUCTION REQUIREMENTS
A	SEWER LINES PARALLEL TO WATER MAINS SHALL NOT BE PERMITTED IN THIS ZONE WITHOUT SPECIFIC APPROVAL FROM THE CITY.
B	1. PLASTIC SEWER PIPE WITH RUBBER RING JOINTS [PER ASTM D 3034] OR EQUIVALENT. 2. DUCTILE IRON PIPE WITH COMPRESSION JOINTS.
C	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 CROSSED. 3. ANY SEWER PIPE WITHIN A CONTINUOUS SLEEVE (EXCEPT V.C.P. & A.B.S.).
D	1. A CONTINUOUS SECTION OF DUCTILE IRON PIPE WITH HOT DIP BITUMINOUS COATING. 2. A CONTINUOUS SECTION OF CLASS 200 [DR 14 PER AWWA C900] PLASTIC PIPE OR EQUIVALENT. CENTERED ON THE PIPE BEING CLOSED. 3. ANY SEWER PIPE WITHIN A CONTINUOUS SLEEVE (EXCEPT V.C.P & ABS). 4. ANY SEWER PIPE SEPARATED BY 10 FEET x 10 FEET, 4 INCHES THICK REINFORCED CONCRETE SLAB (EXCEPT V.C.P & A.B.S.).

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28,2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	SEPARATION REQUIREMENTS FOR WATER AND WASTEWATER LINES	STANDARD PLAN N0. SV 40-10 SHEET 1 OF 1

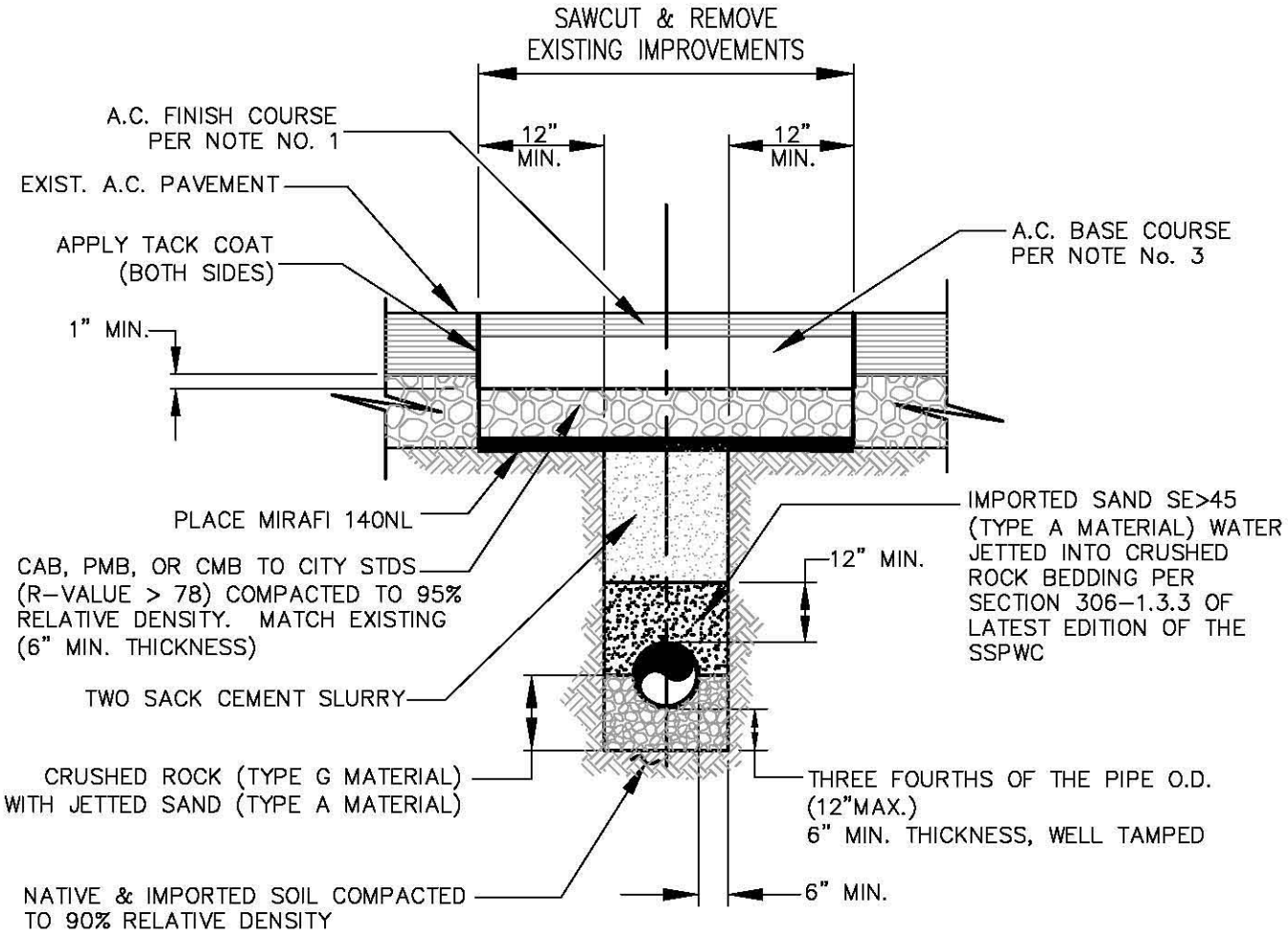


NOT TO SCALE

NOTES:

1. STANDARD DEPTH OF COVER IS 7 FEET. SEE SECTION 2.5 FOR ADDITIONAL INFORMATION.
2. MAXIMUM EXCAVATED TRENCH WIDTH IS PIPE OUTSIDE DIAMETER (O.D.) PLUS 8 INCHES ON EACH SIDE OF PIPE.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	TRENCH CONSTRUCTION AND TERMINOLOGY	STANDARD PLAN N0. SV 40-20 SHEET 1 OF 1



NOT TO SCALE

SEE PAGE 2 FOR NOTES

OPTION 1 ILLUSTRATED ABOVE

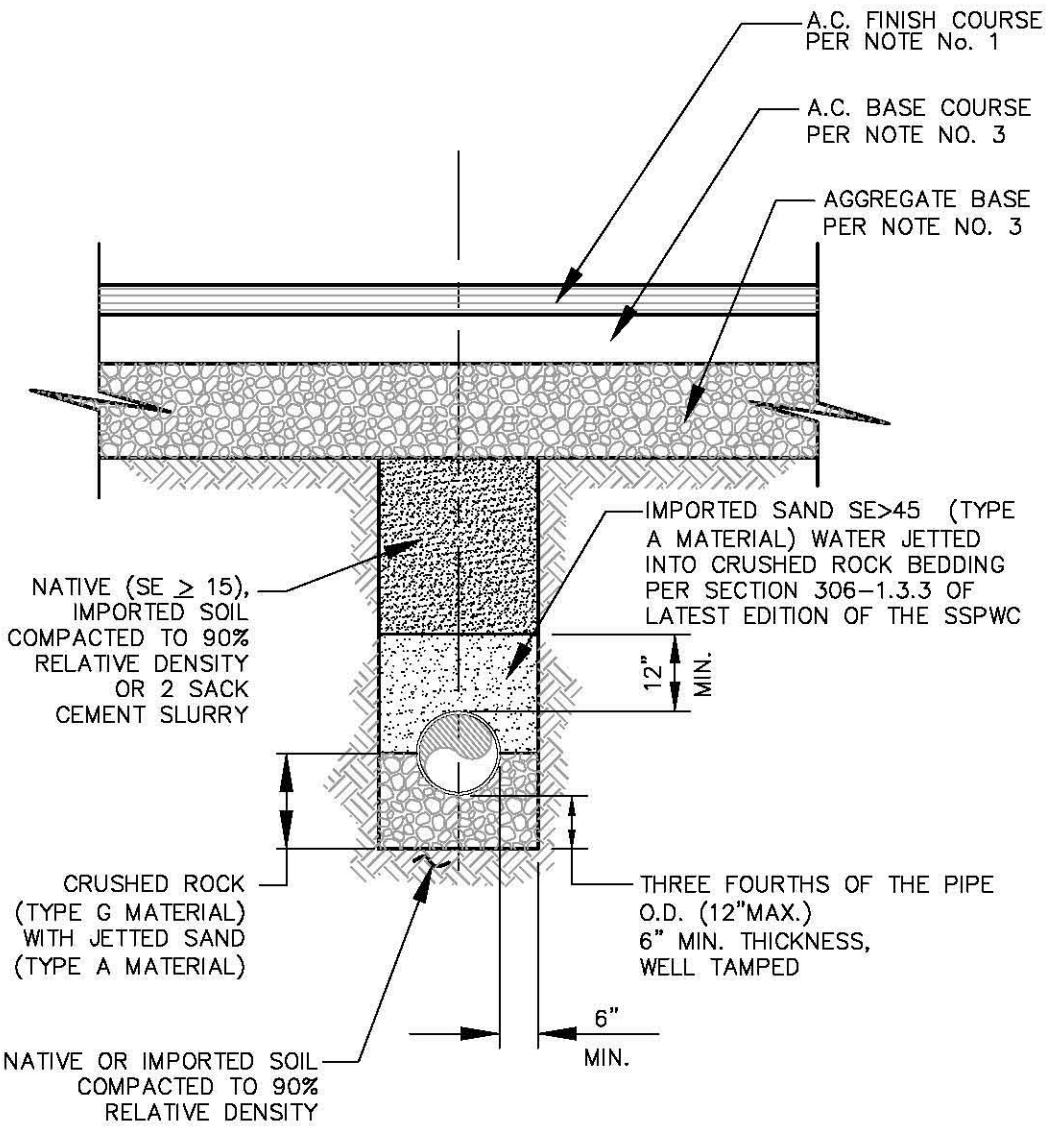
OPTION 2: IN LIEU OF CRUSHED ROCK AND JETTED SAND THE CONTRACTOR MAY SELECT TO PROVIDE GEOFABRIC (AEF FILTER FABRIC-NON WOVEN) AROUND THE PIPE ZONE.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	PIPE TRENCH DETAIL FOR EXISTING STREET	STANDARD PLAN NO. SV 40-30 SHEET 1 OF 2

NOTES:

1. FINAL A.C. FINISH COURSE (CAP) SHALL BE A MINIMUM OF 1-1/2 INCH THICK.
2. COMPACTION TESTING IS REQUIRED FOR ALL NATIVE/IMPORTED SOILS.
3. EXISTING A.C. BASE COURSE THICKNESS SHALL BE 1 INCH MORE THAN EXISTING THICKNESS.
4. TYPE G MATERIAL CORRESPONDS TO SSPWC TABLE 200-1.2 A 3/4 INCH.
5. THIS STANDARD PLAN IS ONLY APPLICABLE FOR THE FOLLOWING CONDITIONS:
   -TRENCH WIDTHS UNDER 40 INCHES (SEE STANDARD PLAN SV 40-20),
   -PIPES UP TO AND INCLUDING 15 INCHES IN DIAMETER,
   -APPROVED PIPE MATERIALS,
   -DEPTHS OF COVER SHALL NOT EXCEED 30 FEET.
   CONDITIONS OTHER THAN THE ABOVE MENTIONED REQUIRE SPECIAL APPROVAL.
6. STANDARD DEPTH OF COVER IS 7 FEET. COVER DEPTHS LESS THAN 7 FEET REQUIRE SPECIFIC DETAIL AND APPROVAL AS DETERMINED BY THE CITY.
7. SEE SECTIONS 3.6 AND 3.7 AND CITY OF SIMI VALLEY STANDARD PLAN SV 40-20 FOR PIPE TRENCH MATERIAL AND DETAILS.
8. HAND SHAPE BEDDING FOR PIPE CURVATURE.
9. ASPHALT CONCRETE (A.C.) BASE COURSE SHALL BE TYPE III B3-AR-4000/8000. ASPHALT CONCRETE FINISH COURSE SHALL BE TYPE III C2-AR-4000/8000.
10. BACKFILL AND COMPACTION SHALL BE IN ACCORDANCE WITH SECTION 306.1.3 OF LATEST EDITION OF THE SSPWC.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28,2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	PIPE TRENCH DETAIL FOR EXISTING STREET	STANDARD PLAN N0. SV 40-30 SHEET 2 OF 2



NOT TO SCALE

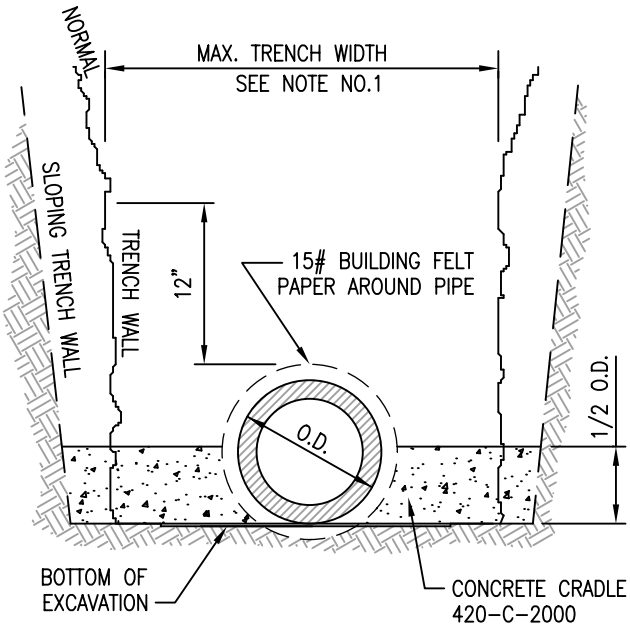
SEE SHEET #2 FOR NOTES

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	PIPE TRENCH DETAIL FOR PROPOSED STREET	STANDARD PLAN N0. SV 40-35 SHEET 1 OF 2

NOTES:

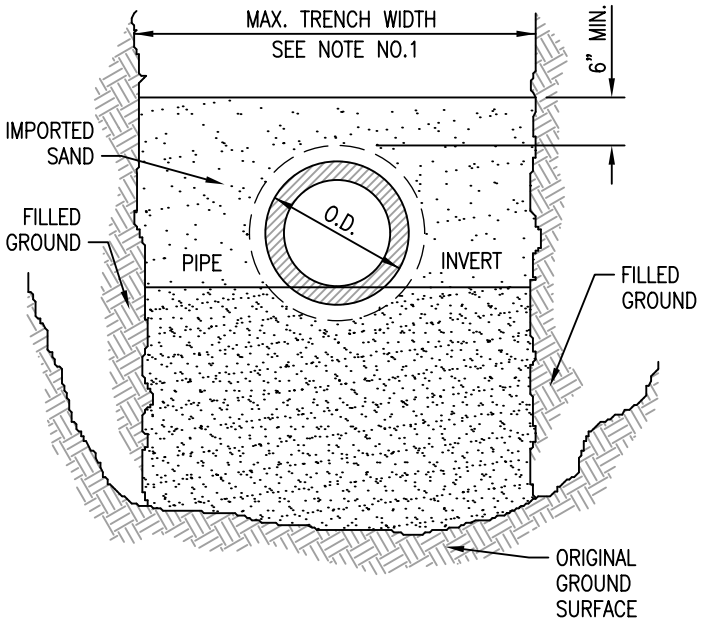
1. FINAL A.C. FINISH COURSE (CAP) SHALL BE A MINIMUM OF 1-1/2 INCH THICK.
2. COMPACTION TESTING IS REQUIRED FOR ALL NATIVE/IMPORTED SOILS.
3. A.C. AND AGGREGATE BASE COURSE THICKNESS PER CITY APPROVED PAVEMENT SECTION.
4. TYPE G MATERIAL CORRESPONDS TO SSPWC TABLE 200-1.2 A 3/4 INCH.
5. THIS STANDARD PLAN IS ONLY APPLICABLE FOR THE FOLLOWING CONDITIONS:
   -TRENCH WIDTHS UNDER 40 INCHES (SEE STANDARD PLAN SV 40-20),
   -PIPES UP TO AND INCLUDING 15 INCHES IN DIAMETER,
   -APPROVED PIPES MATERIALS,
   -DEPTHS OF COVER SHALL NOT EXCEED 30 FEET.
   CONDITIONS OTHER THAN THE ABOVE MENTIONED REQUIRE SPECIAL APPROVAL.
6. STANDARD DEPTH OF COVER IS 7 FEET. COVER DEPTHS LESS THAN 7 FEET REQUIRE SPECIFIC DETAIL AND APPROVAL AS DETERMINED BY THE CITY.
7. SEE SECTIONS 3.6 AND 3.7 AND CITY OF SIMI VALLEY STANDARD PLAN SV 40-20 FOR PIPE TRENCH MATERIAL AND DETAILS.
8. HAND SHAPE BEDDING FOR PIPE CURVATURE.
9. ASPHALT CONCRETE (A.C.) BASE COURSE SHALL BE TYPE III B3-AR-4000/8000. ASPHALT CONCRETE FINISH COURSE SHALL BE TYPE III C2-AR-4000/8000.
10. BACKFILL AND COMPACTION SHALL BE IN ACCORDANCE WITH SECTION 306.1.3 OF LATEST EDITION OF THE SSPWC.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28,2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	PIPE TRENCH DETAIL FOR PROPOSED STREET	STANDARD PLAN N0. SV 40-35 SHEET 2 OF 2



CRADLE FOR EXCESSIVE TRENCH BOTTOM WIDTH

NOT TO SCALE



BEDDING FOR FILLED GROUND

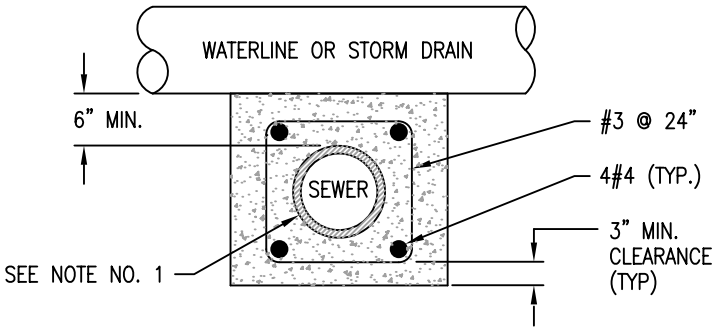
NOT TO SCALE

PIPE ZONE MATERIALS PER CITY OF SIMI VALLEY STANDARD PLAN SV 40-30 BACKFILL MATERIAL BELOW PIPE ZONE SHALL BE PER APPROVED PROJECT SOILS REPORT.

NOTES:

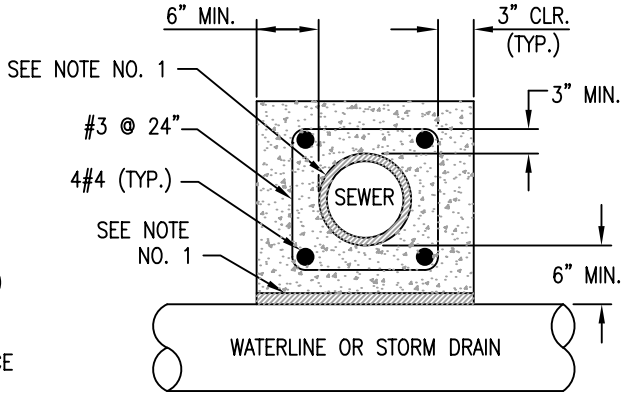
1. EXCESSIVE TRENCH BOTTOM WIDTH IS DEFINED AS EXCEEDING 36 INCHES WITHIN THE PIPE ZONE FOR PIPES 12 INCHES IN DIAMETER AND SMALLER, AND UNLESS SPECIAL APPROVAL IS OTHERWISE GIVEN.
2. A FLEXIBLE COUPLING OR PIPE JOINT IS REQUIRED WITHIN 12 INCHES OF EACH END OF CRADLE.
3. FOR CONSTRUCTION IN FILLED AREAS THE GRADE SHALL BE COMPACTED TO AT LEAST 4 FEET ABOVE PIPE INVERT BEFORE THE PIPE TRENCH IS EXCAVATED. COMPACT PER SPECS.
4. TRENCH BOTTOM AND/OR ORIGINAL GROUND SURFACE SHALL BE PREPARED IN ACCORDANCE WITH PROJECT SOILS REPORT BEFORE BACKFILLING.
5. BACKFILL SHALL COMMENCE WHEN THE CONCRETE STRENGTH IS 75% OF THE SPECIFIED STRENGTH.
6. BEDDING MATERIAL SHALL BE COMPACTED TO 90% RELATIVE DENSITY.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	PIPE BEDDING FOR SPECIAL CONDITIONS	STANDARD PLAN N0. SV 40-40 SHEET 1 OF 1



UNDER OBSTRUCTION

NOT TO SCALE



OVER OBSTRUCTION

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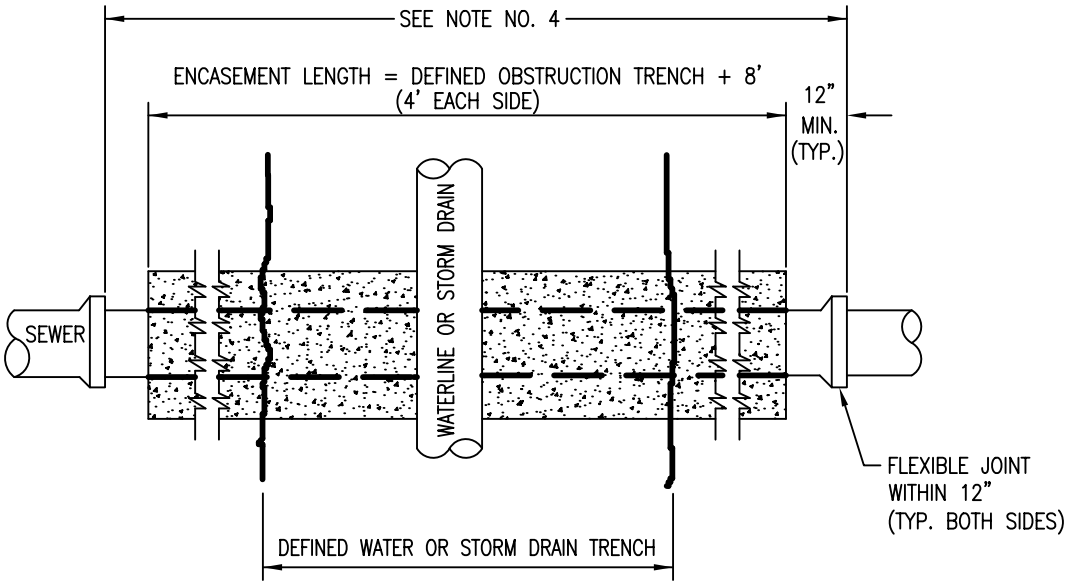
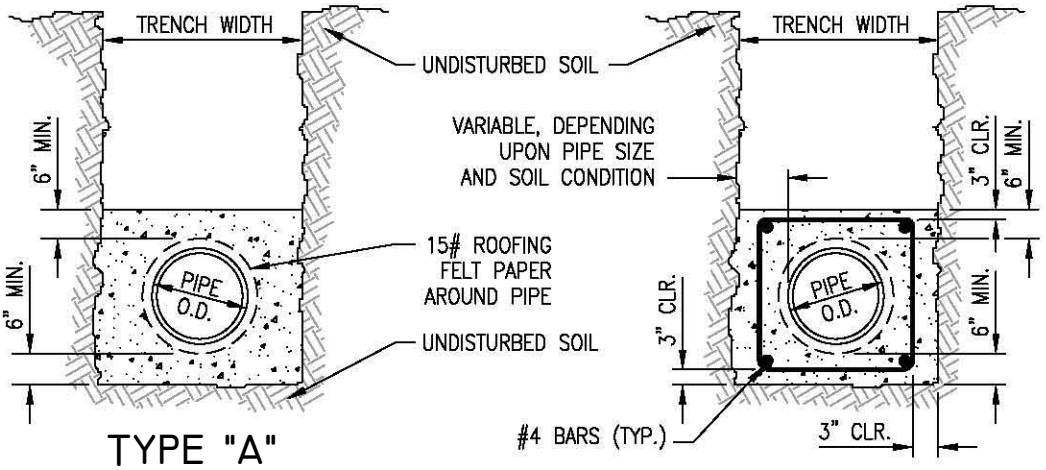


NOTES:

1. PROVIDE 15# ROOFING FELT AROUND PIPE PRIOR TO CONCRETE POUR.
2. THIS CONSTRUCTION APPLIES WHERE CLEARANCE BETWEEN OUTSIDE OF PIPE OR PIPE/OBSTRUCTION EQUALS 12 INCHES OR LESS.
3. CONCRETE TO BE 560-C-3250, 3 INCHES CLEAR ON ALL REBARS.
4. WHEN CROSSING WATER MAINS USE D.I.P., FOR OTHER OBSTRUCTIONS ALTERNATE PIPE MATERIALS MAY BE ACCEPTABLE SUBJECT TO THE CITY OF SIMI VALLEY APPROVAL.
5. BACKFILL SHALL COMMENCE WHEN THE CONCRETE STRENGTH IS 75% OF THE SPECIFIED STRENGTH.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	WASTEWATER SPECIAL SUPPORT UNDER/ OVER OBSTRUCTION	STANDARD PLAN NO. SV 40-50 SHEET 1 OF 1

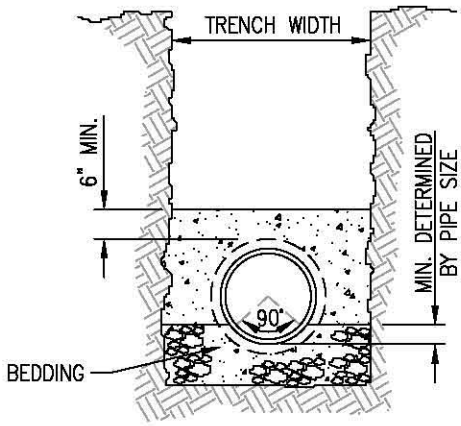


TYPE "A"

NOT TO SCALE

TYPE "B"

NOT TO SCALE



TYPE "C"

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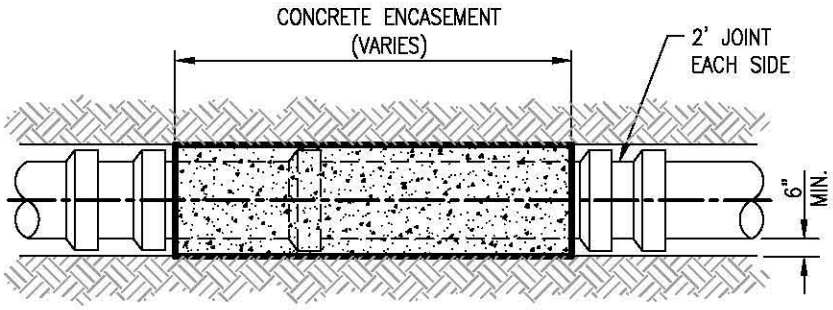


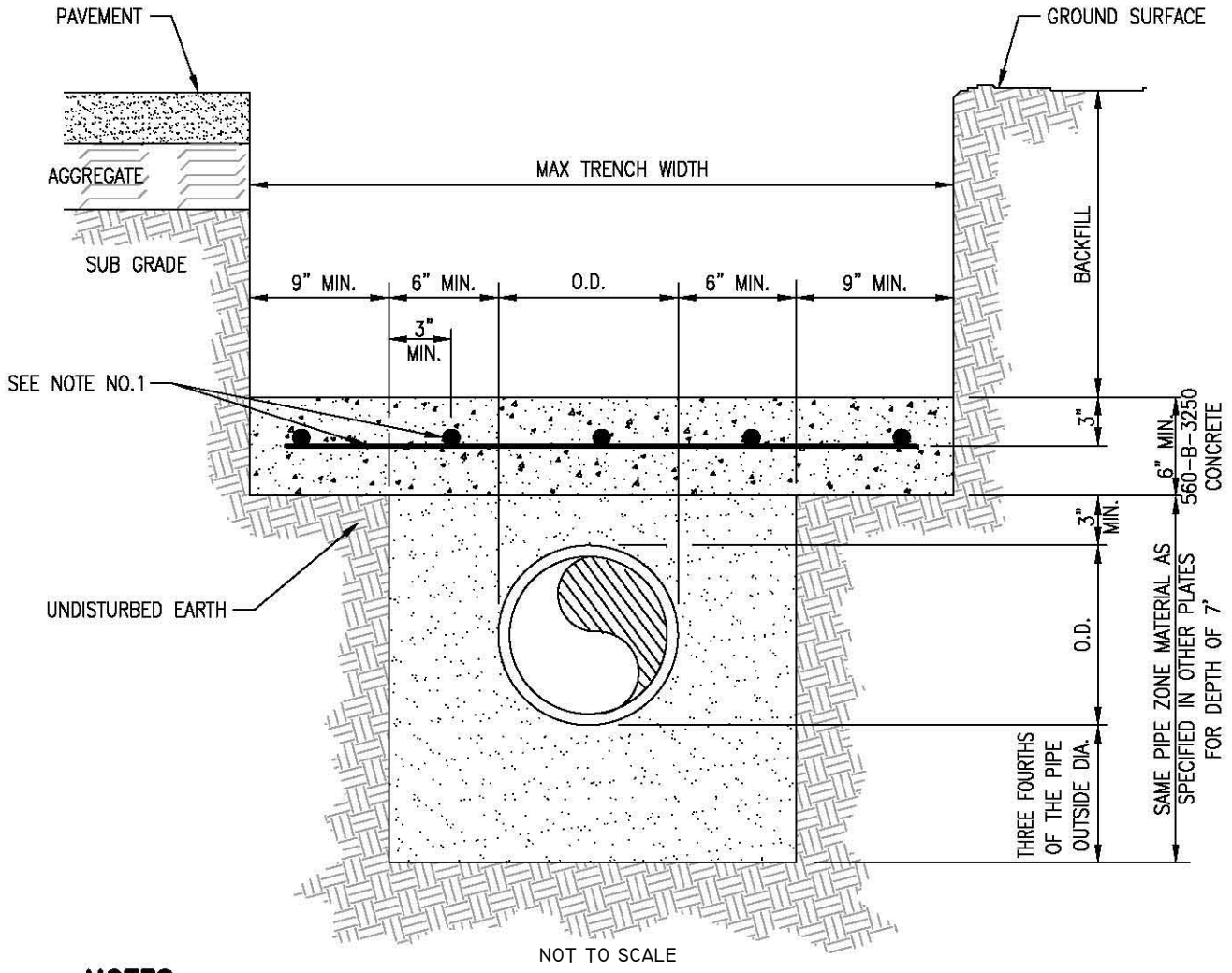
TOP VIEW

NOT TO SCALE
ROTATED 90°

NOTES:

1. CONCRETE ENCASEMENT SHALL BE USED WHEN COVER IS LESS THAN 3 FEET.
2. ENCASEMENT TO BE PLACED AGAINST UNDISTURBED NATURAL GROUND OR FILL COMPACTED TO 90% RELATIVE COMPACTION, UNLESS OTHERWISE SPECIFIED.
3. #4 STEEL REINFORCING BARS SHALL BE USED AS SPECIFIED.
4. TYPE OF CONCRETE ENCASEMENT TO BE USED WILL BE SHOWN ON PLANS TO MEET FIELD CONDITIONS.
5. WHERE SLOPE TRENCHES ARE USED, WALLS WILL NOT BEGIN TO SLOPE CLOSER THAN 12 INCHES FROM THE TOP OF THE PIPE.
6. ENCASEMENT CONCRETE TO BE 450-C-2500, USE 560-C-3250 WITH REINFORCEMENT.
7. BACKFILL SHALL COMMENCE WHEN THE CONCRETE STRENGTH IS 75% OF THE SPECIFIED STRENGTH.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	STANDARD CONCRETE ENCASEMENT TYPE A, B, &C	STANDARD PLAN N0. SV 40-60 SHEET 1 OF 1

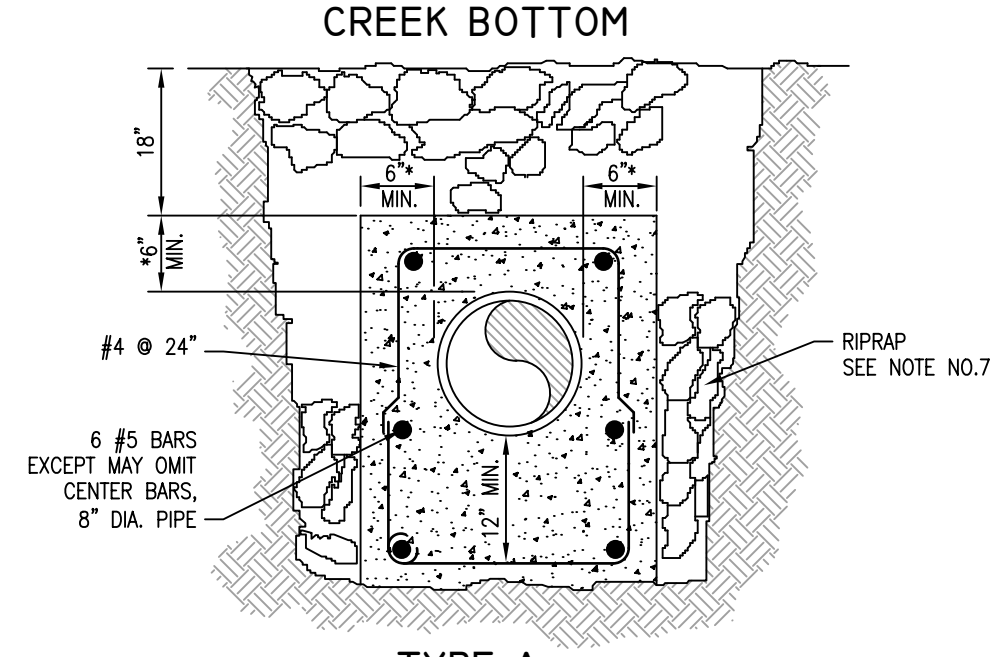


NOT TO SCALE

NOTES:

1. #4 @ 16 INCHES O.C. BOTH WAYS.
2. CONCRETE TO BE VIBRATED.
3. THE MINIMUM DISTANCE BETWEEN TOP OF SLAB AND BOTTOM OF SUBGRADE (IF PAVED) OR FINISHED SURFACE (IF NOT PAVED) SHALL BE 6 INCHES AND 12 INCHES RESPECTIVELY.
4. THIS DETAIL MAY BE USED FOR SHALLOW TRENCHES.
5. BACKFILL SHALL COMMENCE WHEN THE CONCRETE STRENGTH IS 75% OF THE SPECIFIED STRENGTH.
6. BEDDING MATERIAL SHALL BE COMPACTED TO 90% RELATIVE DENSITY.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	REINFORCED CONCRETE TRENCH SLAB	STANDARD PLAN NO. SV 40-70 SHEET 1 OF 1



TYPE A

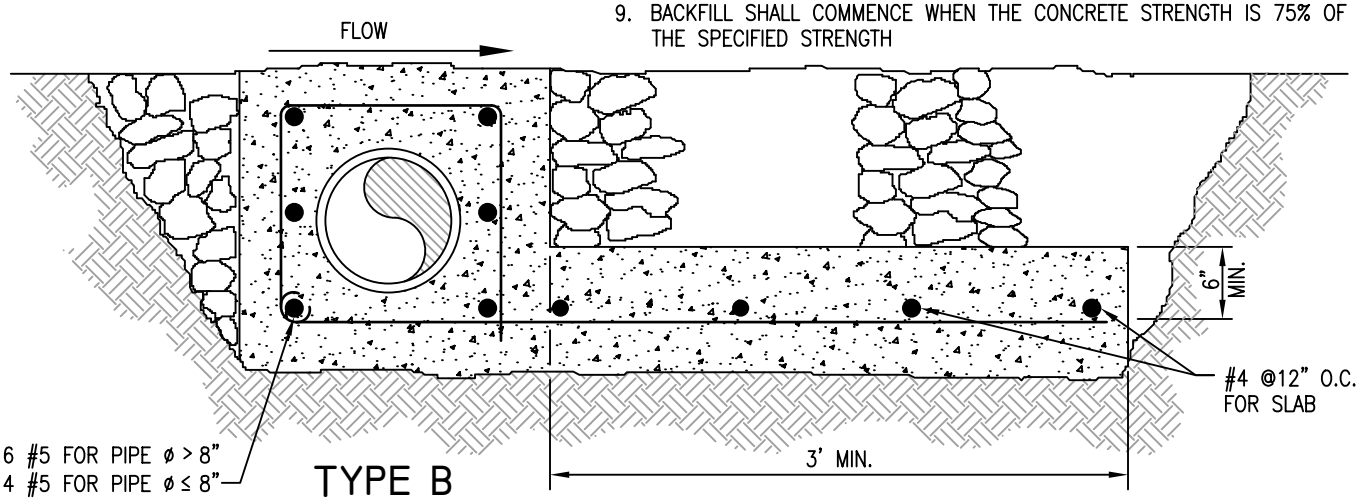
NOT TO SCALE

NOTES:

1. REFER TO PROJECT SOILS REPORT FOR ADDITIONAL REQUIREMENTS.
2. WRAP PIPE WITH 15# ROOFING PAPER. PIPE WRAPPING IS NOT REQUIRED FOR PLASTIC PIPE.
3. ALL JOINTS TO BE TIED DOWN TO PREVENT FLOATING.
4. FOR ALL REBARS KEEP MIN. 3 INCHES OF CLEARANCE.
5. CONCRETE SHALL BE VIBRATED.

*6. PLACE 6 INCHES MINIMUM CONCRETE ABOVE THE PIPE AND @ BOTH SIDES FROM PIPE.

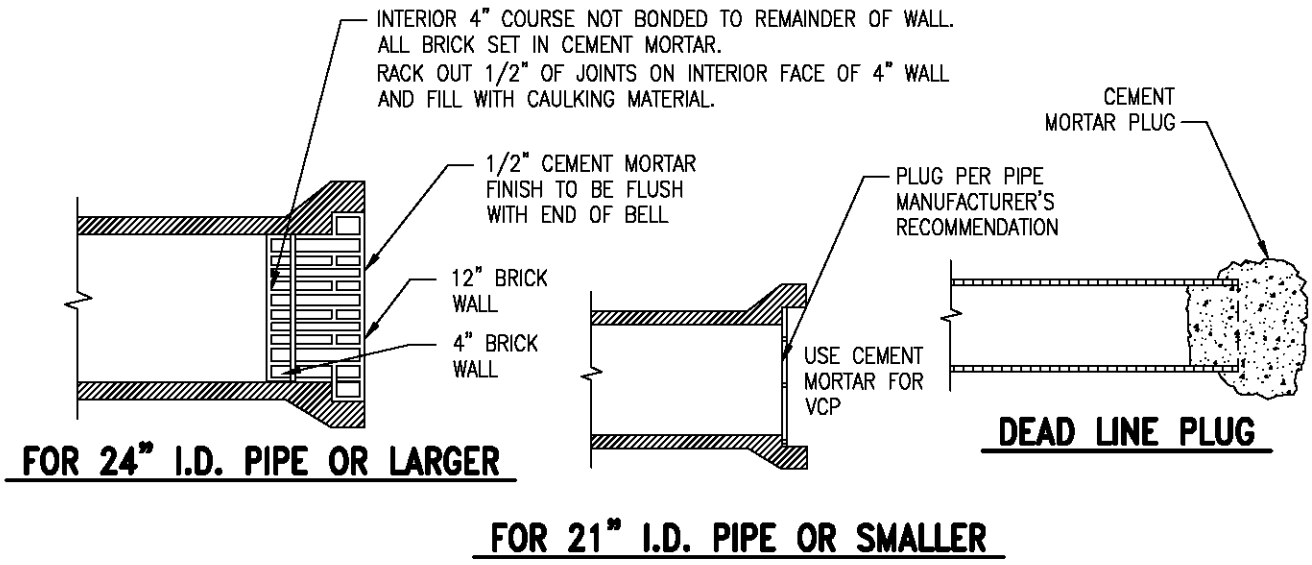
7. 6 INCHES MINIMUM RIPRAP CHOCKED WITH SAND AS REQUIRED.
8. PLACEMENT OF CONCRETE SHALL BE ON A FIRM FOUNDATION.
9. BACKFILL SHALL COMMENCE WHEN THE CONCRETE STRENGTH IS 75% OF THE SPECIFIED STRENGTH



TYPE B

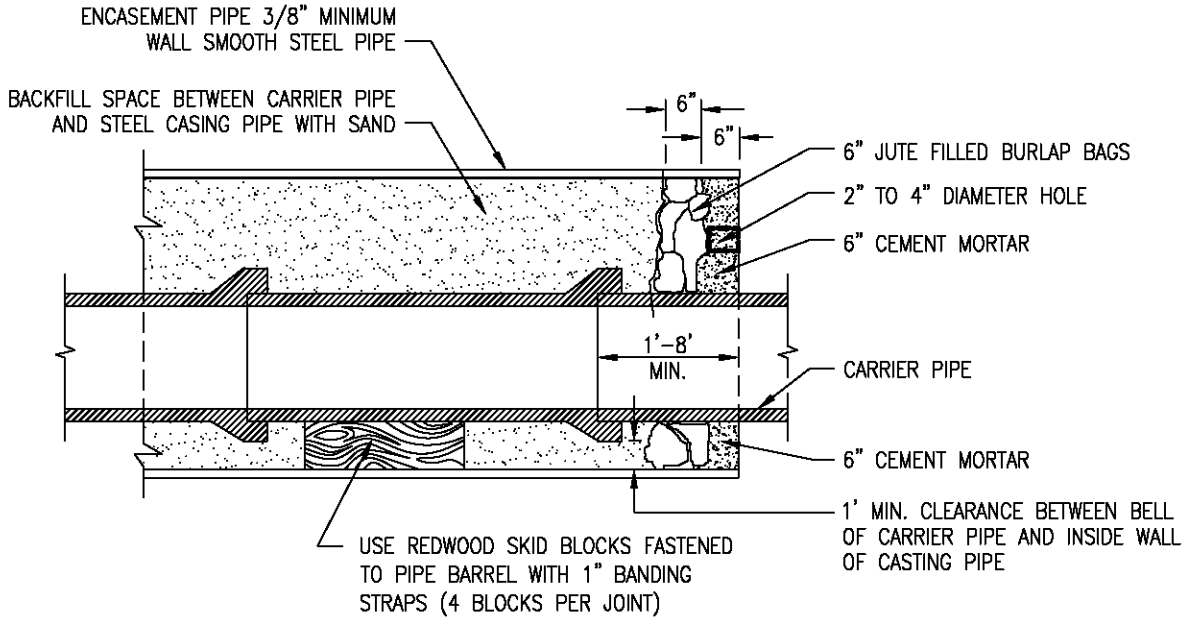
NOT TO SCALE

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	SPECIAL PIPE ENCASEMENT FOR DRAINAGE COURSES	STANDARD PLAN N0. SV 40-80 SHEET 1 OF 1



STANDARD PLUGS FOR UNCONNECTED PIPES

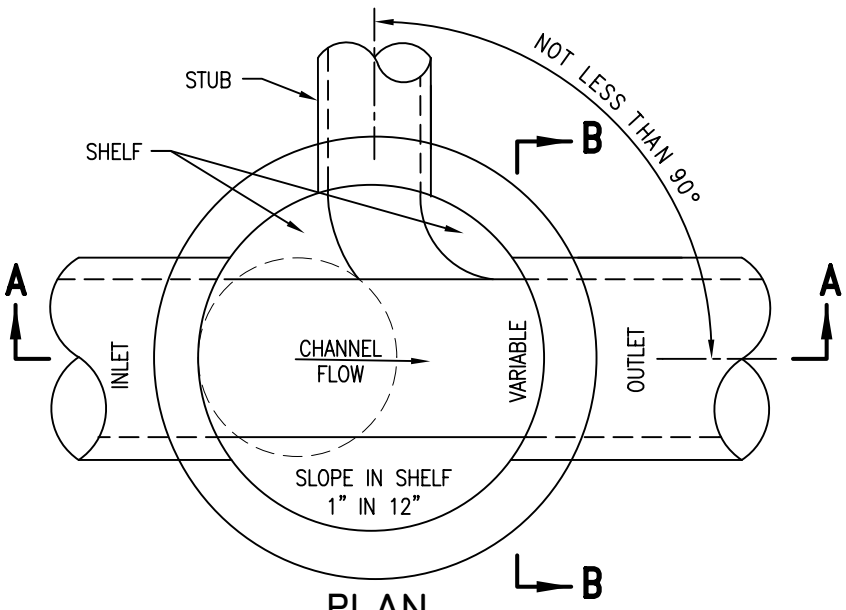
NOT TO SCALE



TYPICAL PIPE ENCASEMENT

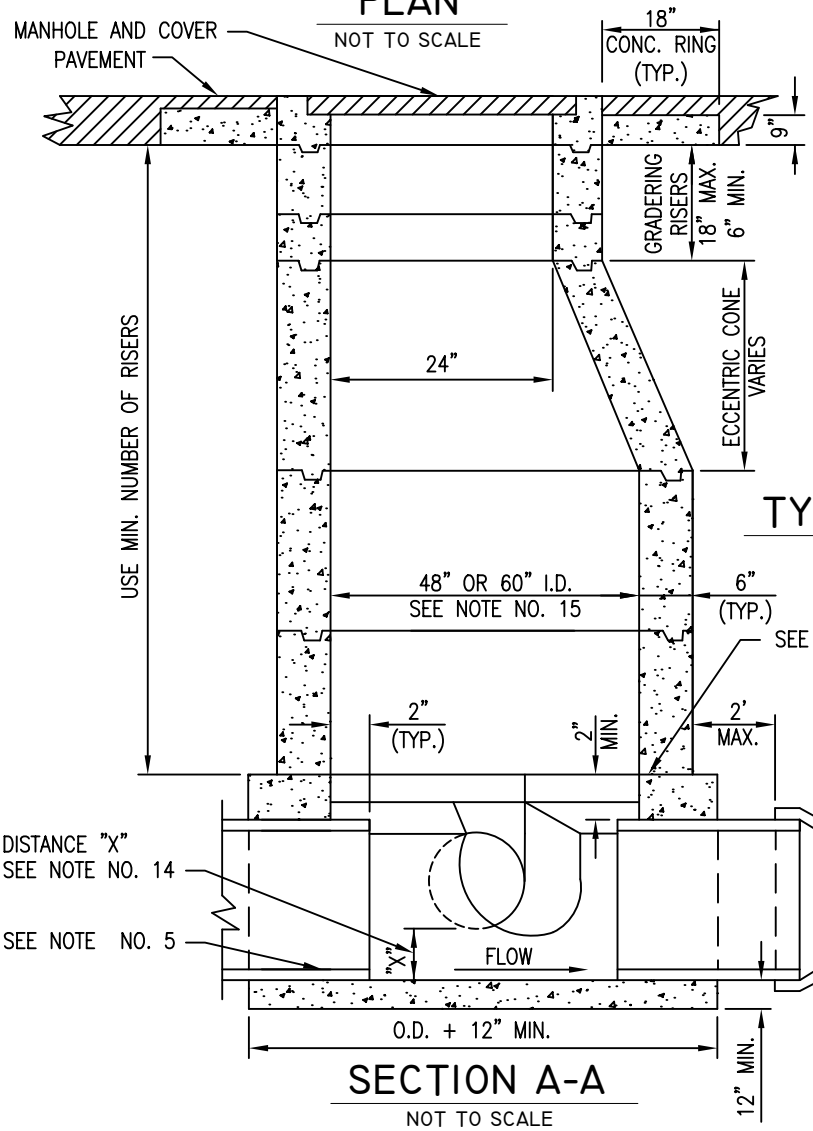
NOT TO SCALE

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	STANDARD PLUGS AND PIPE ENCASEMENTS	STANDARD PLAN N0. SV 40-90 SHEET 1 OF 1



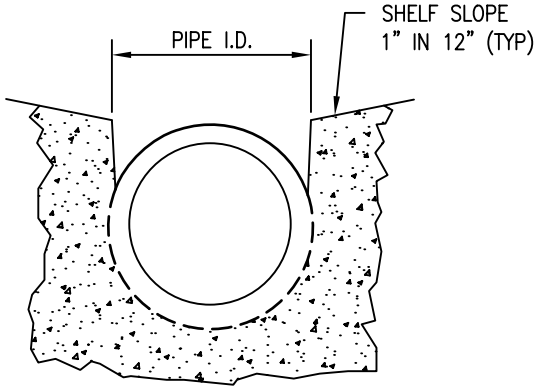
PLAN

NOT TO SCALE



SECTION A-A

NOT TO SCALE



SECTION B-B

TYPICAL CHANNEL SECTION

NOT TO SCALE

NOTE:

SEE ADDITIONAL REQUIREMENTS ON SHEET 2 OF 3 AND SHEET 3 OF 3

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28,2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	STANDARD 4' & 5' DIAMETER PRECAST MANHOLE	STANDARD PLAN NO. SV 40-100 SHEET 1 OF 3

NOTES:

1. EXCEPT AS NOTED HEREON, THE PRECAST UNITS SHALL BE REINFORCED CONCRETE UNITS MANUFACTURED AND TESTED IN ACCORDANCE WITH ASTM C-478 HAVING A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 4000 PSI.

2. RISER SECTIONS SHALL BE REINFORCED CONCRETE UNITS IN ACCORDANCE ASTM C-478. MINIMUM THICKNESS SHALL BE 6 INCHES.

3. PRECAST COMPONENTS SHALL HAVE A MINIMUM OF 2 INCHES OF COVER OVER THE REINFORCING STEEL ON THE INSIDE FACE.

4. CONCRETE FOR THE MANHOLE BASE SHALL BE CLASS 560-C-3250 PER SECTION 201-1.1.2 OF THE SSPWC. BASE SHALL BE POURED IN ONE OPERATION TO A POINT 2 INCHES ABOVE THE INLET AND OUTLET PIPES. USE A METAL FORMING RING AT THE TOP OF THE VASE TO CREATE A TONGUE AND GROOVE JOINT THAT WILL ACCOMMODATE THE FIRST PRECAST SECTION.

5. INSTALL AN APPROVED TIGHT FITTING RUBBER RING AROUND PIPE FOR USE AS A WATERSTOP (TYPICAL).

6. JOINTS SHALL BE TONGUE AND GROOVE CONFORMING TO ASTM C-478 SECTION 14.

7. MANHOLE RISER AND GRADERING JOINTS SHALL BE SEALED WITH A BUTYL RUBBER TYPE SEALANT AS MANUFACTURED BY PRECON PRODUCTS, QUICKSET, INC., OR APPROVED EQUAL.

8. THE CONTRACTOR SHALL COORDINATE AND VERIFY WITH A MANHOLE MANUFACTURER THE DISTANCE BETWEEN THE MANHOLE BASE AND THE FINISHED GRADE OF THE MANHOLE RING TO ENSURE THAT THE SELECTED LINER WILL ACCOMMODATE THE LENGTH OF THE PROPOSED GRADERINGS.

9. ENTIRE EXTERIOR SURFACES OF THE MANHOLE STRUCTURE SHALL BE COATED WITH AN APPROVED BITUMINOUS ASPHALTIC MATERIAL. SEE SECTION 3.9 AND NOTE NO.3 ON CITY OF SIMI VALLEY STANDARD PLAN SV 40-120.

10. WHERE PIPES EXCEED 18 INCHES IN DIAMETER OR DEEPER THAN 18 FEET, USE 60 INCHES DIAMETER MANHOLE. (ALSO SEE NOTE 15 FOR USE OF 60" MANHOLE.)

11. IN UNDEVELOPED AREAS, THE TOP OF THE CONE SHALL BE 6 INCHES ABOVE THE SURROUNDING FINAL GROUND SURFACE AND THE MANHOLE COVER AND FRAME SHALL BE SECURE PER CITY OF SIMI VALLEY STANDARD PLAN SV 40-140.

12. SEE CITY OF SIMI VALLEY STANDARD PLAN SV 40-120 FOR ADDITIONAL MANHOLE BASE AND JOINT REQUIREMENTS.

13. SEE CITY OF SIMI VALLEY STANDARD PLAN SV 40-130 FOR MANHOLE FRAME AND COVER REQUIREMENTS.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	STANDARD 4' & 5' DIAMETER PRECAST MANHOLE	STANDARD PLAN NO. SV 40-100 SHEET 2 OF 3

NOTES:

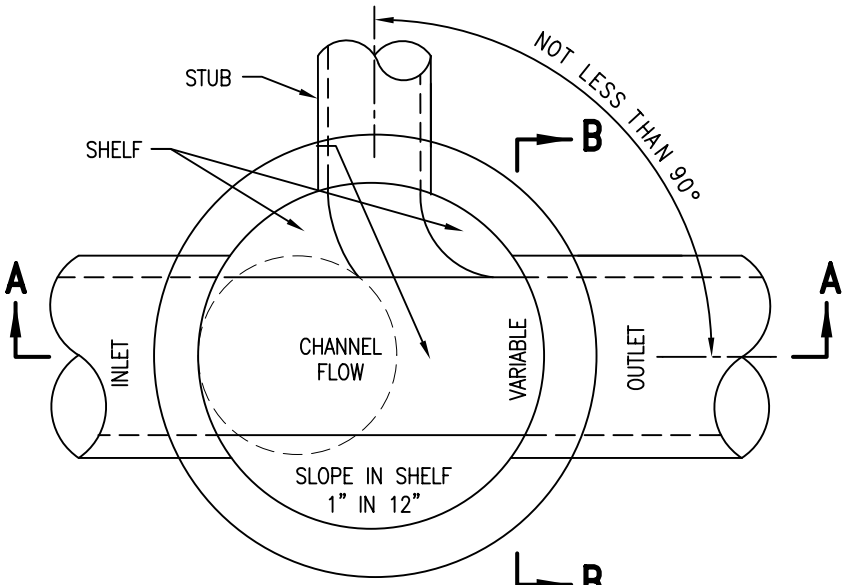
14. WHEN MAIN SEWER LINE IS 15 INCHES OR LARGER IN DIAMETER, AND LATERAL SEWER IS 10–INCHES IN DIAMETER OR LESS, DISTANCE "X" = ONE HALF (1/2) THE DIAMETER OF THE LARGER MAIN SEWER LINE.

15. USE 60 INCH MANHOLE IF MANHOLE HAS MORE THAN ONE MAIN LINE GOING INTO MANHOLE. (ALSO SEE NOTE 10 FOR USE OF 60" MANHOLE.)

16. FOR MANHOLES LESS THAN 5 FOOT DEEP, USE CITY OF SIMI VALLEY STANDARD PLAN SV 40–110.

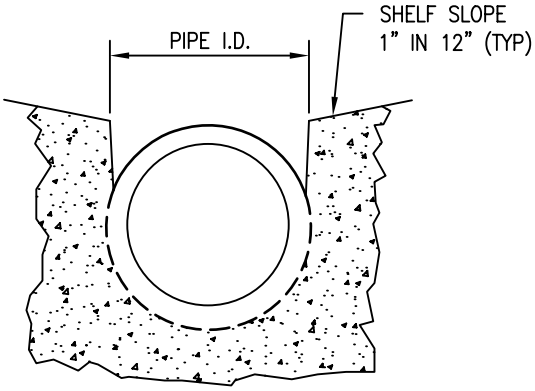
17. MANHOLES LOCATED IN GROUNDWATER SHALL BE INSTALLED WITH A CURED–IN–PLACE FIBERGLASS MANHOLE LINING SYSTEM PER SSPWC SECTION 500–2.5, MANUFACTURED BY POLY–TRIPLEX TECHNOLOGIES INC., OR APPROVED EQUAL. MANHOLES NOT EXPOSED TO GROUNDWATER SHALL BE INSTALLED WITH A PVC LINER TO PROTECT CONCRETE FROM SULFIDE CORROSION, T–LOCK, DURA PLATES, OR APPROVED EQUAL.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	STANDARD 4' & 5' DIAMETER PRECAST MANHOLE	STANDARD PLAN N0. SV 40-100 SHEET 3 OF 3



PLAN

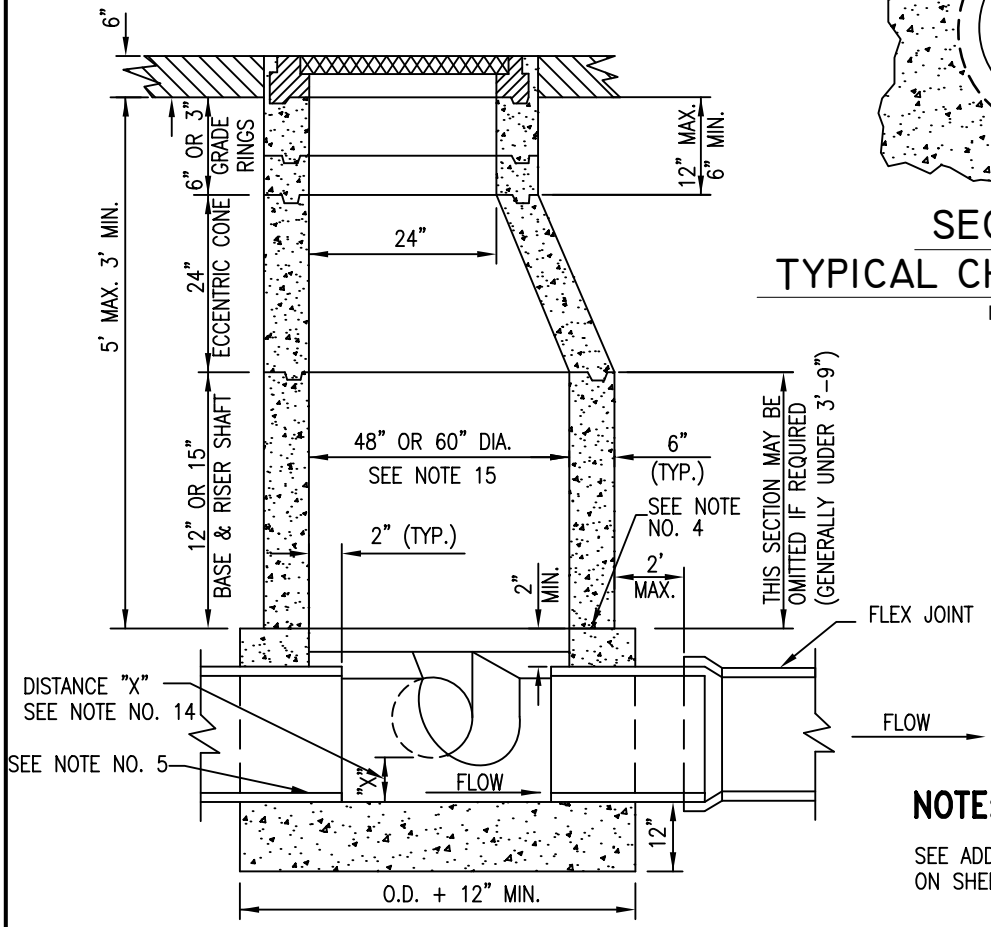
NOT TO SCALE



SECTION B-B

TYPICAL CHANNEL SECTION

NOT TO SCALE



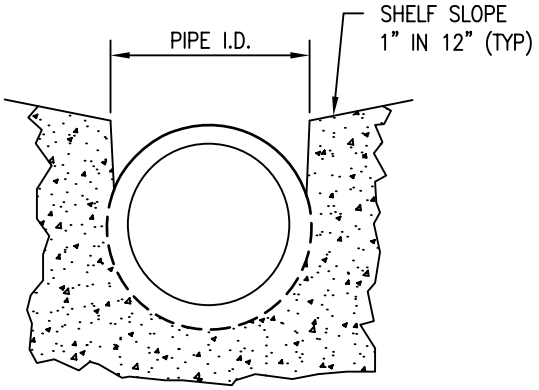
NOTE:

SEE ADDITIONAL REQUIREMENTS ON SHEETS 3 AND 4 OF 4.

3 FEET TO 5 FEET, DEPTH TO TOP OF BASE

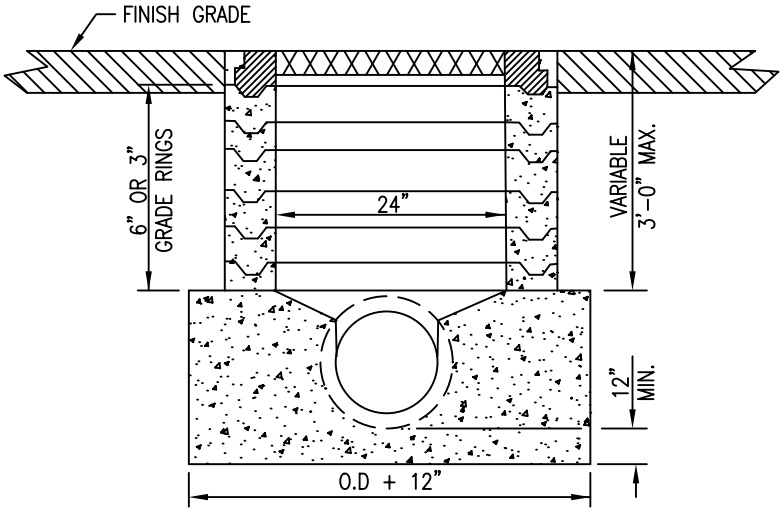
NOT TO SCALE

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	SHALLOW MANHOLES	STANDARD PLAN NO. SV 40-110 SHEET 1 OF 4



SECTION B-B
TYPICAL CHANNEL SECTION

NOT TO SCALE



3 FEET AND UNDER, DEPTH TO TOP OF BASE

NOT TO SCALE

NOTE:

SEE ADDITIONAL REQUIREMENTS ON SHEETS 3 AND 4 OF 4.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	SHALLOW MANHOLES	STANDARD PLAN N0. SV 40-110 SHEET 2 OF 4

NOTES:

1. EXCEPT AS NOTED HEREON, THE PRECAST UNITS SHALL BE REINFORCED CONCRETE UNITS MANUFACTURED AND TESTED IN ACCORDANCE WITH ASTM C-478 HAVING A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 4000 PSI.

2. RISER SECTIONS SHALL BE REINFORCED CONCRETE UNITS IN ACCORDANCE ASTM C-478. MINIMUM THICKNESS SHALL BE 6 INCHES.

3. PRECAST COMPONENTS SHALL HAVE A MINIMUM OF 2 INCHES OF COVER OVER THE REINFORCING STEEL ON THE INSIDE FACE.

4. CONCRETE FOR THE MANHOLE BASE SHALL BE CLASS 560-C-3250 PER SECTION 201-1.1.2 OF THE SSPWC. BASE SHALL BE POURED IN ONE OPERATION TO A POINT 2 INCHES ABOVE THE INLET AND OUTLET PIPES. USE A METAL FORMING RING AT THE TOP OF THE VASE TO CREATE A TONGUE AND GROOVE JOINT THAT WILL ACCOMMODATE THE FIRST PRECAST SECTION.

5. INSTALL AN APPROVED TIGHT FITTING RUBBER RING AROUND PIPE FOR USE AS A WATERSTOP (TYPICAL).

6. JOINTS SHALL BE TONGUE AND GROOVE CONFORMING TO ASTM C-478 SECTION 14.

7. MANHOLE RISER AND GRADERING JOINTS SHALL BE SEALED WITH A BUTYL RUBBER TYPE SEALANT AS MANUFACTURED BY PRECON PRODUCTS, QUICKSET, INC., OR APPROVED EQUAL.

8. THE CONTRACTOR SHALL COORDINATE AND VERIFY WITH A MANHOLE MANUFACTURER THE DISTANCE BETWEEN THE MANHOLE BASE AND THE FINISHED GRADE OF THE MANHOLE RING TO ENSURE THAT THE SELECTED LINER WILL ACCOMMODATE THE LENGTH OF THE PROPOSED GRADERINGS.

9. ENTIRE EXTERIOR SURFACES OF THE MANHOLE STRUCTURE SHALL BE COATED WITH AN APPROVED BITUMINOUS ASPHALTIC MATERIAL. SEE SECTION 3.9 AND NOTE NO.3 ON CITY OF SIMI VALLEY STANDARD PLAN SV 40-120.

10. WHERE PIPES EXCEED 18 INCHES IN DIAMETER OR DEEPER THAN 18 FEET, USE 60 INCHES DIAMETER MANHOLE. (ALSO SEE NOTE 15 FOR USE OF 60" MANHOLE.)

11. IN UNDEVELOPED AREAS, THE TOP OF THE CONE SHALL BE 6 INCHES ABOVE THE SURROUNDING FINAL GROUND SURFACE AND THE MANHOLE COVER AND FRAME SHALL BE SECURE PER CITY OF SIMI VALLEY STANDARD PLAN SV 40-140.

12. SEE CITY OF SIMI VALLEY STANDARD PLAN SV 40-120 FOR ADDITIONAL MANHOLE BASE AND JOINT REQUIREMENTS.

13. SEE CITY OF SIMI VALLEY STANDARD PLAN SV 40-130 FOR MANHOLE FRAME AND COVER REQUIREMENTS.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28,2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	SHALLOW MANHOLES	STANDARD PLAN N0. SV 40-110 SHEET 3 OF 4

NOTES:

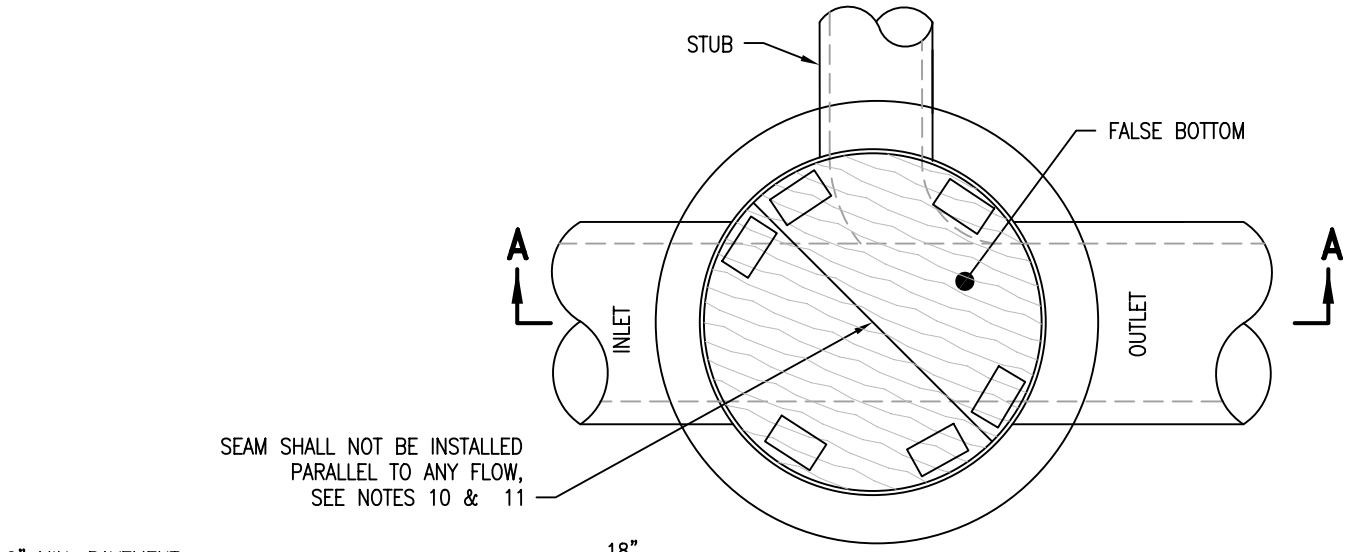
14. WHEN MAIN SEWER LINE IS 15 INCHES OR LARGER IN DIAMETER, AND LATERAL SEWER IS 10–INCHES IN DIAMETER OR LESS, DISTANCE "X" = ONE HALF (1/2) THE INSIDE DIAMETER OF THE LARGER MAIN SEWER LINE.

15. USE 60 INCH MANHOLE IF MANHOLE HAS MORE THAN ONE MAIN LINE GOING INTO MANHOLE. (ALSO SEE NOTE 10 FOR USE OF 60" MANHOLE.)

16. FOR MANHOLES LESS THAN 5 FOOT DEEP, USE CITY OF SIMI VALLEY STANDARD PLAN SV 40–110.

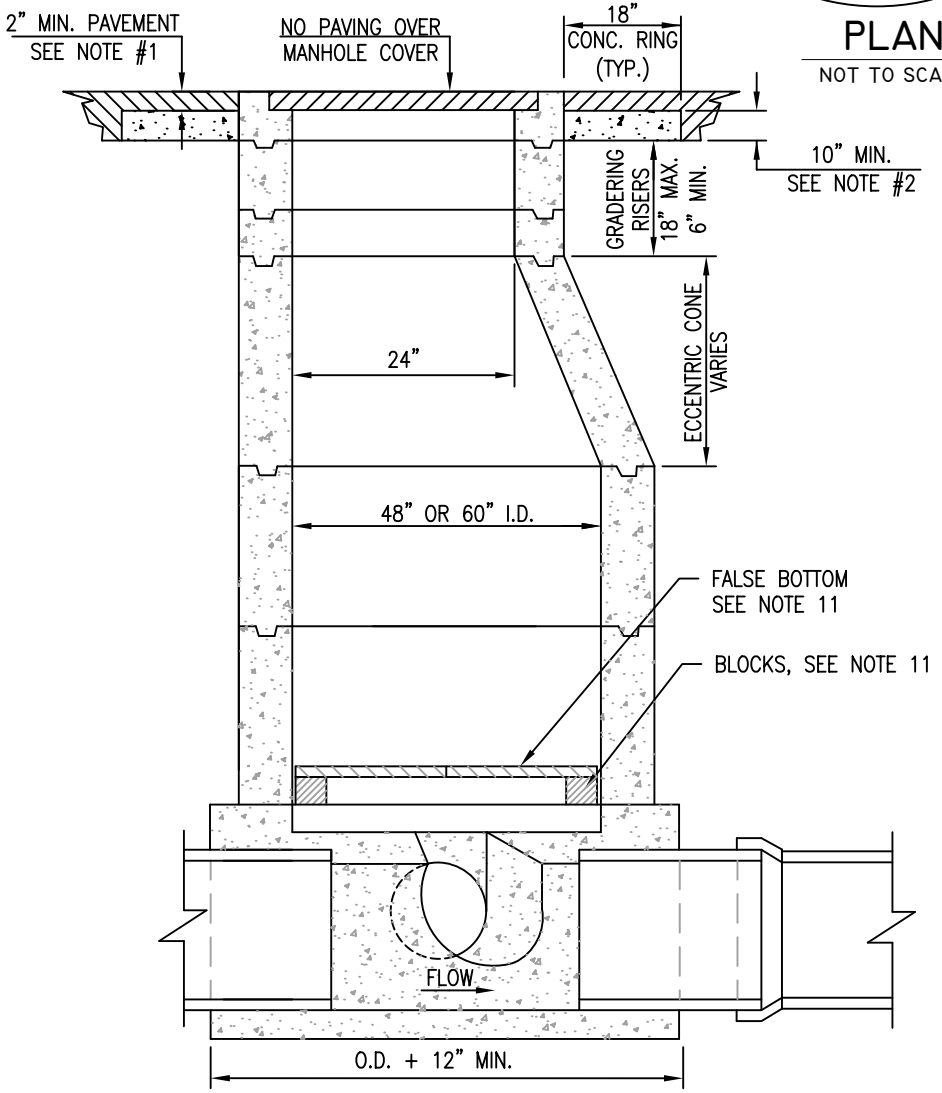
17. MANHOLES LOCATED IN GROUNDWATER SHALL BE INSTALLED WITH A CURED–IN–PLACE FIBERGLASS MANHOLE LINING SYSTEM PER SSPWC SECTION 500–2.5, MANUFACTURED BY POLY–TRIPLEX TECHNOLOGIES INC., OR APPROVED EQUAL. MANHOLES NOT EXPOSED TO GROUNDWATER SHALL BE INSTALLED WITH A PVC LINER TO PROTECT CONCRETE FROM SULFIDE CORROSION, T–LOCK, DURA PLATES, OR APPROVED EQUAL.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	SHALLOW MANHOLES	STANDARD PLAN N0. SV 40-110 SHEET 4 OF 4



PLAN

NOT TO SCALE



SECTION A-A

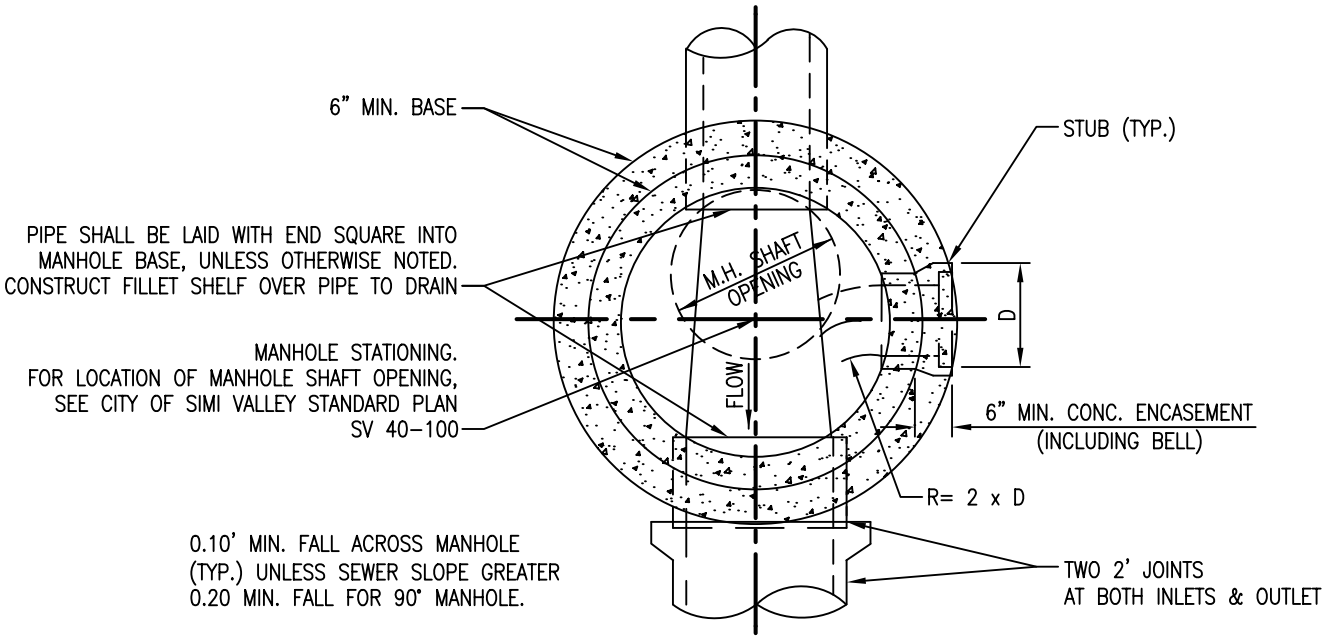
NOT TO SCALE

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Apr 04, 2012 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	STANDARD FOR MANHOLE RAISING WITH FALSE BOTTOM	STANDARD PLAN N0. SV 40-115 SHEET 1 OF 2

NOTES:

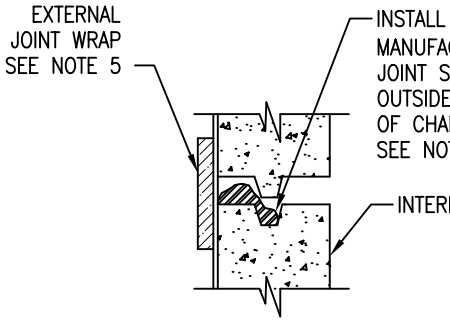
1. PAVEMENT MIX DESIGN FOR MANHOLE RINGS SHALL BE 3/8 INCH.
2. MIX DESIGN FOR CONCRETE RING SHALL BE 520-C-2500.
3. EDGES OF THE PAVING SHALL BE SEALED.
4. MANHOLES SHALL BE SET TO GRADE PER GREENBOOK SECTION 302-5.6.2
5. THE FINISH SURFACE OF THE MANHOLE SHALL NOT VARY MORE THAN 1/8 INCH IN 10 FEET.
6. ALL MANHOLES SHALL BE LOWERED PRIOR TO PAVING.
7. MANHOLES SHALL BE PAVED WITHIN 72 HOURS OF PLACING CONCRETE.
8. NO VERTICAL JOINTS WILL BE ALLOWED AT THE END OF THE WORK DAY. ALL SURFACES WILL BE COLD MIXED, FINAL PAVED, OR PLATED.
9. THE CONTRACTOR SHALL PLACE A FALSE BOTTOM IN PRIOR TO STARTING ANY MANHOLE WORK. THE CONTRACTOR IS TO CLEAN AND REMOVE THE FALSE BOTTOM AFTER PAVING.
10. FALSE BOTTOM IS TO BE CONSTRUCTED OF 1" MARINE GRADE MOISTURE-RESISTANT PLYWOOD OR CITY APPROVED EQUAL. THE PLYWOOD IS CUT TO A 4' OR 5' DIAMETER CIRCLE TO FIT THE BOTTOM AND THEN CUT IN HALF. THE FALSE BOTTOM IS THEN PLACED IN THE MANHOLE WITH THE SEAM CROSSING THE FLOW OR IN SUCH A MANNER TO PROTECT THE SEWER SYSTEM FROM ANY DEBRIS.
11. FALSE BOTTOM IS TO BE PLACED ON BLOCKS AT A MINIMUM OF 1" ABOVE ALL SEWAGE INLETS TO THE MANHOLE. FALSE BOTTOM SHALL BE CONNECTED TO THE BLOCKS VIA NAILS OR STAPLES TO PREVENT THE BLOCKS FROM FALLING INTO THE SEWAGE FLOW. BLOCKS SHALL NOT OBSTRUCT ANY PART OF THE SEWAGE FLOW.
12. ALL DEBRIS SHALL BE REMOVED FROM MANHOLE PRIOR TO CONSTRUCTING FALSE BOTTOM. ALL DEBRIS SHALL BE REMOVED FROM MANHOLE EACH TIME THE MANHOLE IS WORKED ON.
13. FALSE BOTTOMS MUST BE APPROVED BY THE CITY PRIOR TO INSTALLATIONS.
14. ANY DAMAGE TO THE SEWER PIPE, OVERFLOWS, BLOCKAGES, OR FAILURES OF FALSE BOTTOMS SHALL BE THE FULL RESPONSIBILITY OF THE CONTRACTOR.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Apr 04, 2012 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	STANDARD FOR MANHOLE RAISING WITH FALSE BOTTOM	STANDARD PLAN N0. SV 40-115 SHEET 2 OF 2



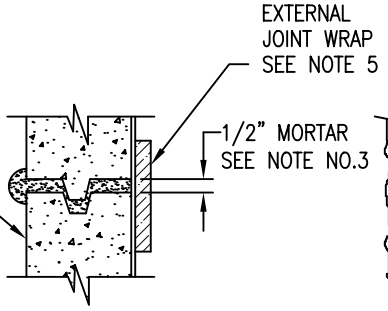
PLAN

NOT TO SCALE



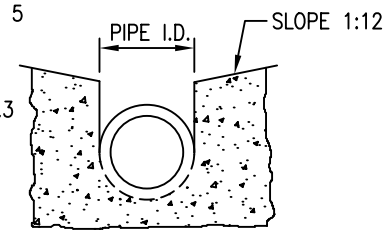
PLASTIC JOINT

NOT TO SCALE



MORTAR JOINT

NOT TO SCALE



TYPICAL CHANNEL SECTION

NOT TO SCALE

NOTES:

1. MORTAR JOINTS: SUFFICIENT MORTAR SHALL BE APPLIED ACROSS ENTIRE FACE OF JOINT SO WHEN PRECAST UNITS ARE PLACED ON TOP OF ONE ANOTHER, THE MORTAR WILL SQUEEZE OUT BOTH THE INSIDE AND OUTSIDE WALL FACES. JOINTS TO BE "POINTED" AFTER SETTING PRECAST UNITS EXCLUDING GRADE RINGS. MORTAR SHALL BE CLASS C.

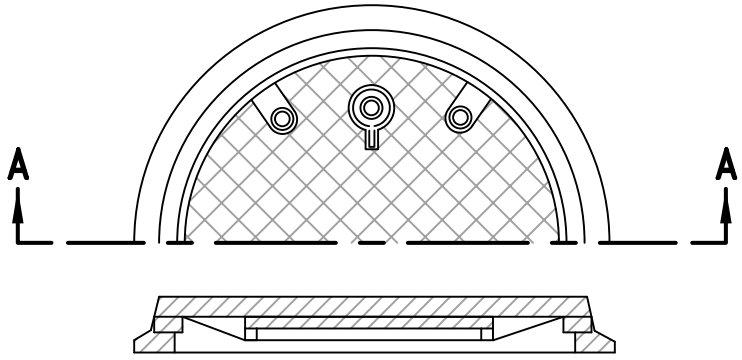
2. PLASTIC JOINTS: PREFORMED READY TO USE PLASTIC JOINT SEALING COMPOUND SHALL BE A BUTYL RUBBER TYPE SEALANT BY PRECON PRODUCTS, INC., QUICK-SEAL BY QUIKSET INC., OR APPROVED EQUAL.

3. WATERPROOFING: ALL EXTERIOR JOINTS OF THE MANHOLE STRUCTURE, INCLUDING BUT NOT LIMITED TO RING AND SHAFT JOINTS, PIPE PENETRATION JOINTS, AND ALL COMPONENT INTERFACE JOINTS, SHALL BE FILLED AND/OR APPLIED WITH A PASTE GRADE BITUMINOUS ASPHALT SEALANT. THE REMAINING EXTERIOR CONCRETE SURFACE OF THE MANHOLE STRUCTURE SHALL THEN BE COATED WITH A POURABLE GRADE OF BITUMINOUS ASPHALT SEALANT. SEALANT SHALL BE "BITUMASTIC" BY KOPPERS, OR APPROVED EQUAL. FINISHED THICKNESS SHALL BE MINIMUM OF 50 MILS.

4. CONCRETE BASE: CONCRETE FOR THE MANHOLE BASES SHALL CONTAIN POLYETHYLENE FIBER REINFORCEMENT FIBERS. THE QUANTITY OF FIBERMESH FIBERS PER UNIT YARD OF CONCRETE SHALL BE IN ACCORDANCE WITH THE FIBERMESH MANUFACTURER'S RECOMMENDATION.

5. INSTALL 9 INCH WIDE SLEEVE MADE BY CRETEX WRAP EXTERNAL JOINT SEAL OR APPROVED EQUAL PROR TO BACKFILLING. MATERIAL FOR EXTERNAL JOINT SEAL SHALL CONFORM TO ASTMC-923 TEST, AS MODIFIED, WITH A MIN. 3/16 INCH THICKNESS FOR DURABILITY AND RESISTANCE TO TEARING OR PUNCTURING.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	TYPICAL CONCRETE BASE AND JOINT DETAIL	STANDARD PLAN N0. SV 40-120 SHEET 1 OF 1

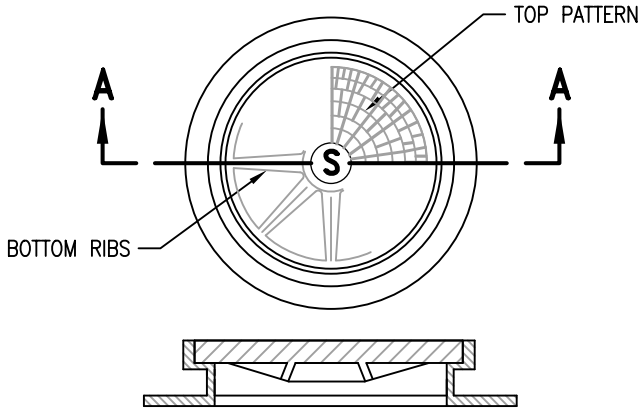


SECTION A-A
WATERTIGHT MANHOLE FRAME AND COVER

NOT TO SCALE

NOTE:

USE 24" DIAMETER ALHAMBRA FOUNDRY CO. PLATE NO. A-1254B OR APPROVED EQUAL.



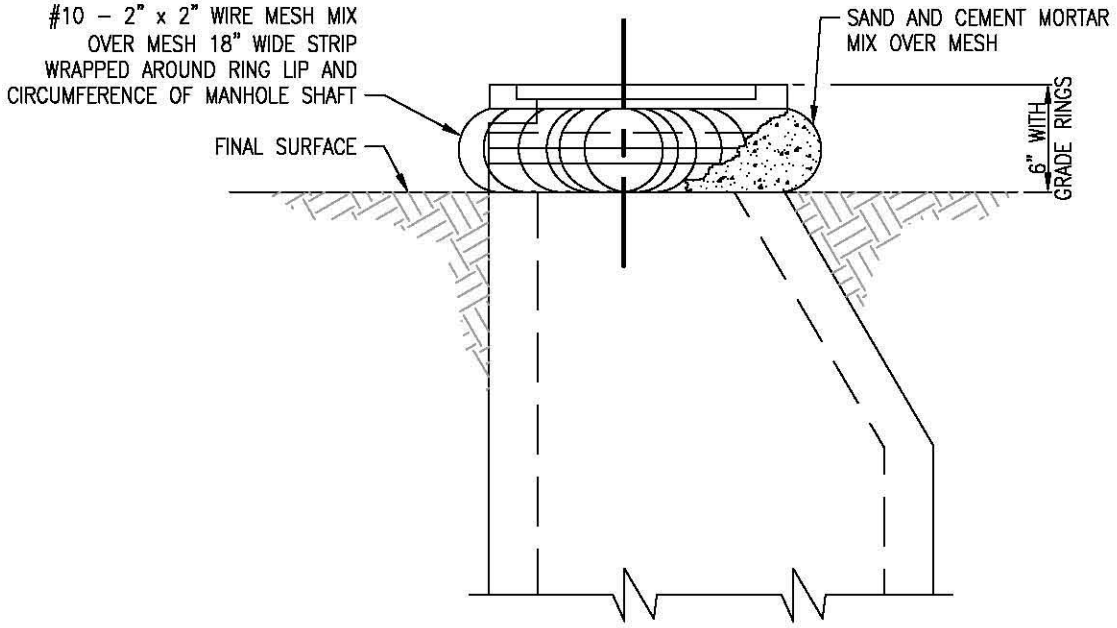
SECTION A-A
STANDARD MANHOLE FRAME AND COVER

NOT TO SCALE

NOTE:

USE 24" DIAMETER ALHAMBRA FOUNDRY CO. PLATE NO. A-1176 OR APPROVED EQUAL.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28,2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	WATERTIGHT & STANDARD MANHOLE FRAME & COVER	STANDARD PLAN N0. SV 40-130 SHEET 1 OF 1

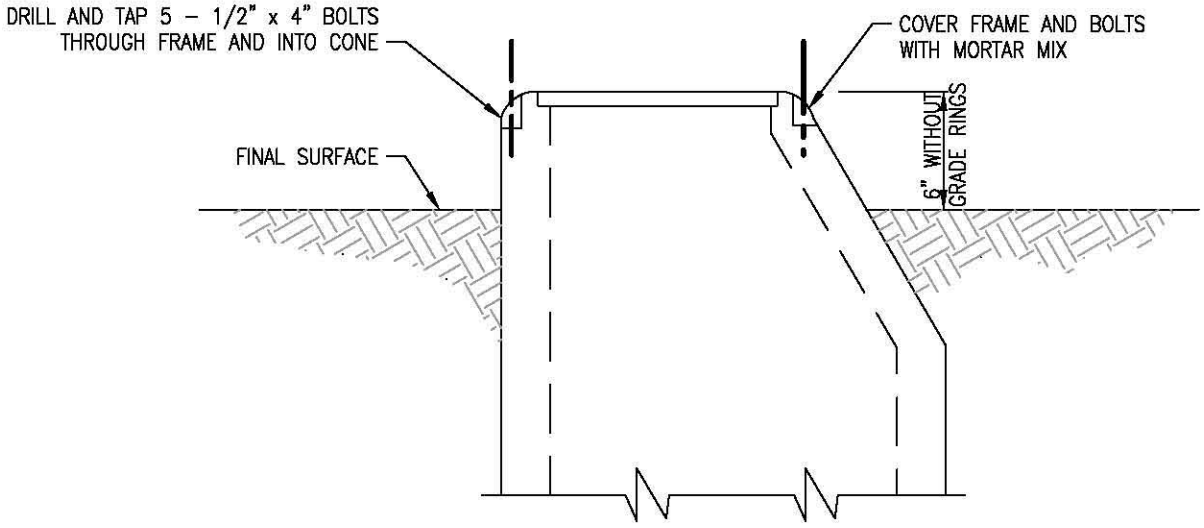


CASE I CONSTRUCTION WITH GRADE RINGS

NOT TO SCALE

NOTE:

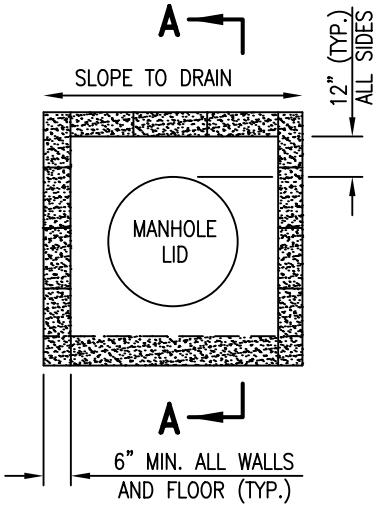
FOR APPLICABLE NOTES AND DESIGNATIONS, SEE
CITY OF SIMI VALLEY STANDARD PLAN SV 40–100.



CASE II CONSTRUCTION WITHOUT GRADE RINGS

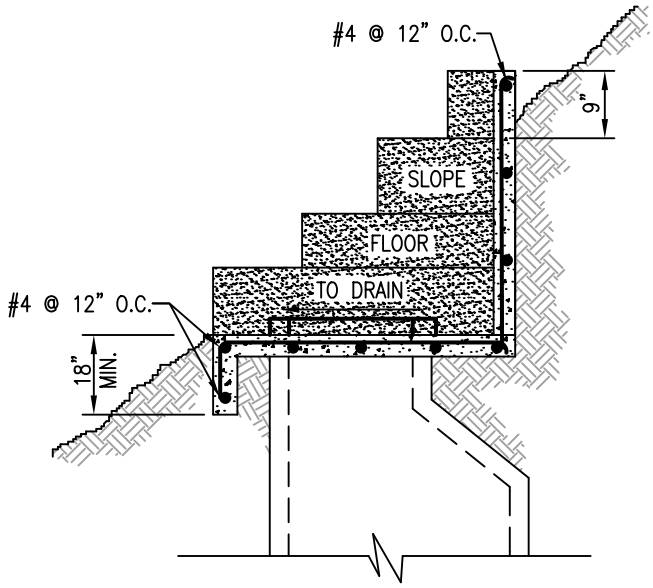
NOT TO SCALE

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	MANHOLE SECURING DETAILS FOR UNDEVELOPED AREAS	STANDARD PLAN N0. SV 40-140 SHEET 1 OF 1



PLAN

NOT TO SCALE



SECTION A-A

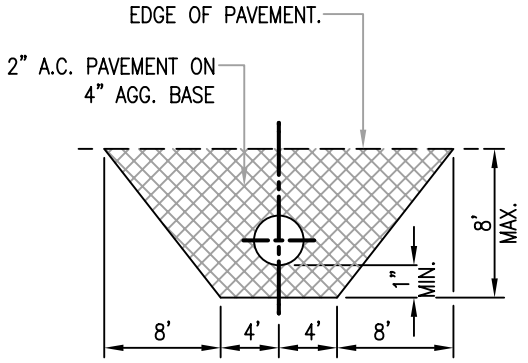
NOT TO SCALE

NOTES:

1. ALL REBAR #4 @ 12".
2. CONCRETE BLOCK CONCRETE 565-C-3250.
3. GRADE 40 REBAR.

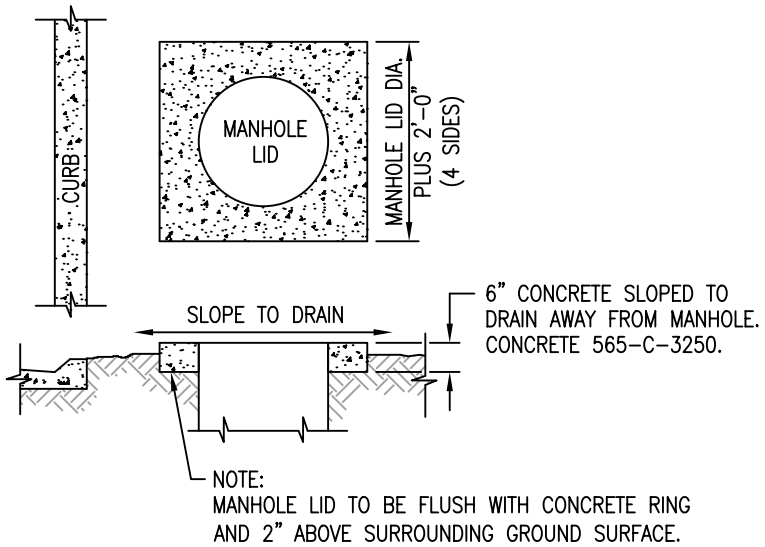
CONCRETE BLOCK - RETAINING WALL

NOT TO SCALE



MANHOLE IN STREET SHOULDER

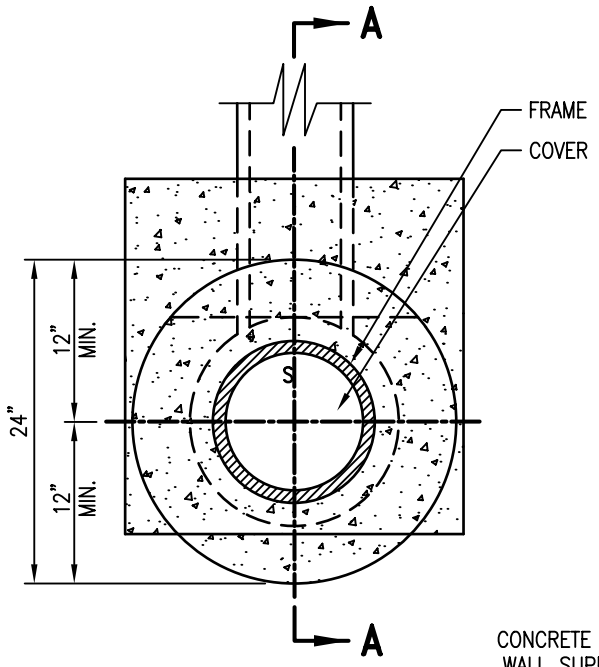
NOT TO SCALE



MANHOLE IN PARKWAY

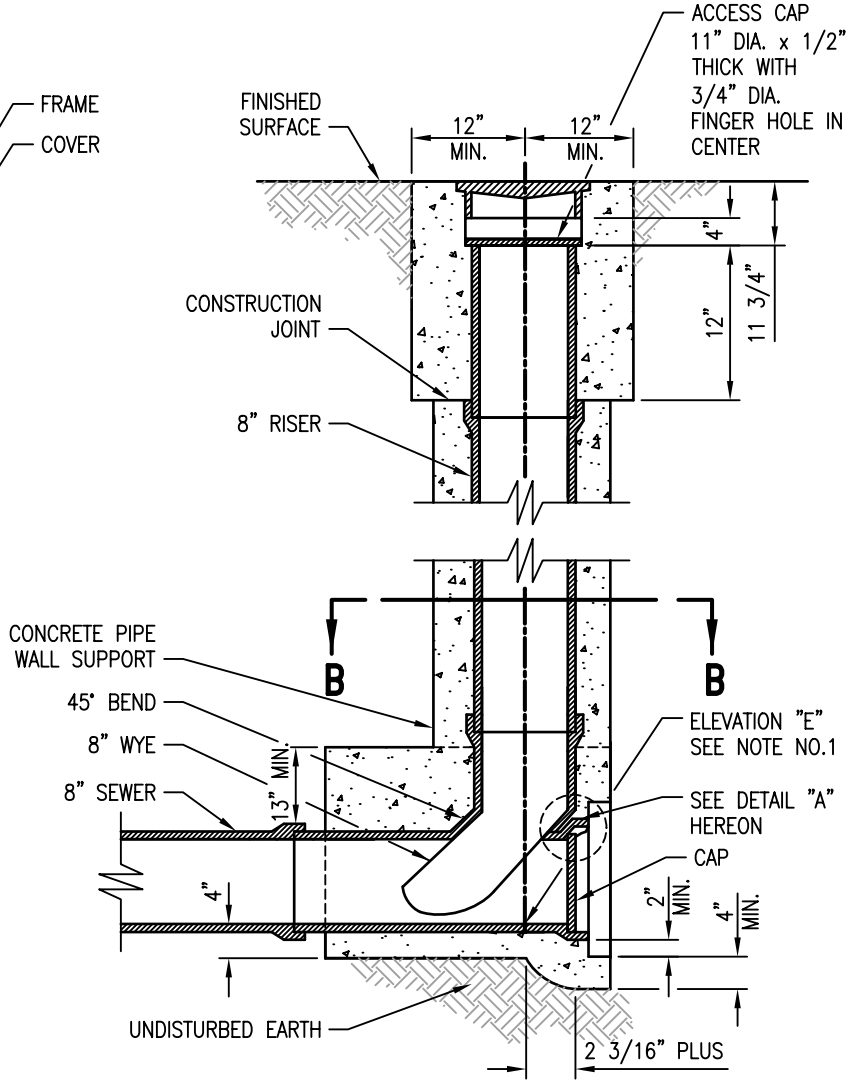
NOT TO SCALE

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	MISCELLANEOUS MANHOLE DETAILS	STANDARD PLAN NO. SV 40-150 SHEET 1 OF 1



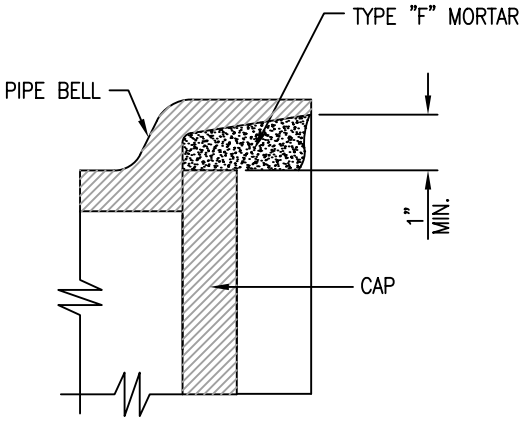
PLAN

NOT TO SCALE



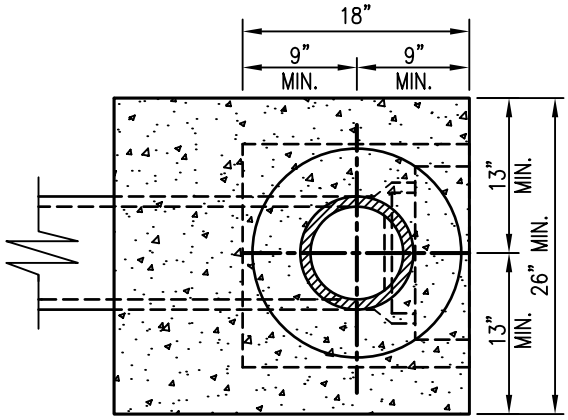
SECTION A-A

NOT TO SCALE



DETAIL "A"

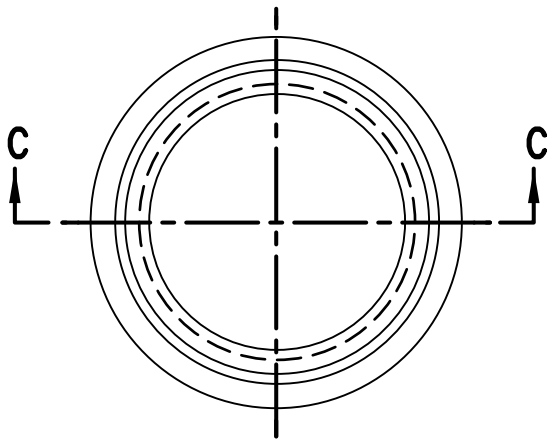
NOT TO SCALE



SECTION B-B

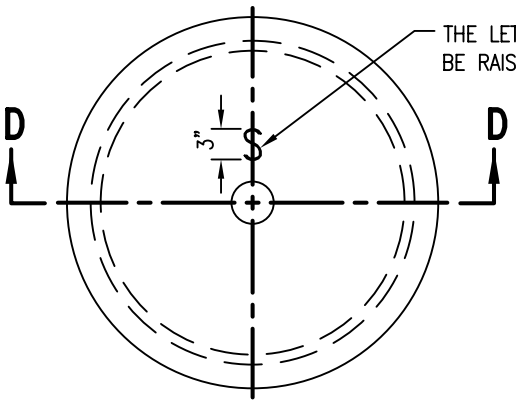
NOT TO SCALE

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28,2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	TERMINAL CLEANOUT STRUCTURE TYPE 'A''	STANDARD PLAN N0. SV 40-160 SHEET 1 OF 3



ACCESS FRAME

NOT TO SCALE



ACCESS COVER

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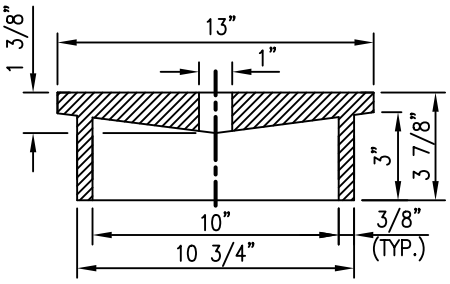
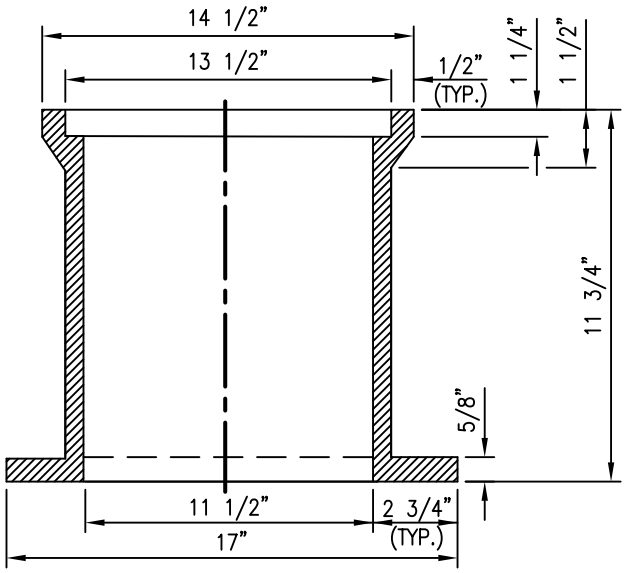


SECTION D-D

NOT TO SCALE



SECTION C-C

NOT TO SCALE

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28,2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	TERMINAL CLEANOUT STRUCTURE TYPE 'A''	STANDARD PLAN N0. SV 40-160 SHEET 2 OF 3

NOTES:

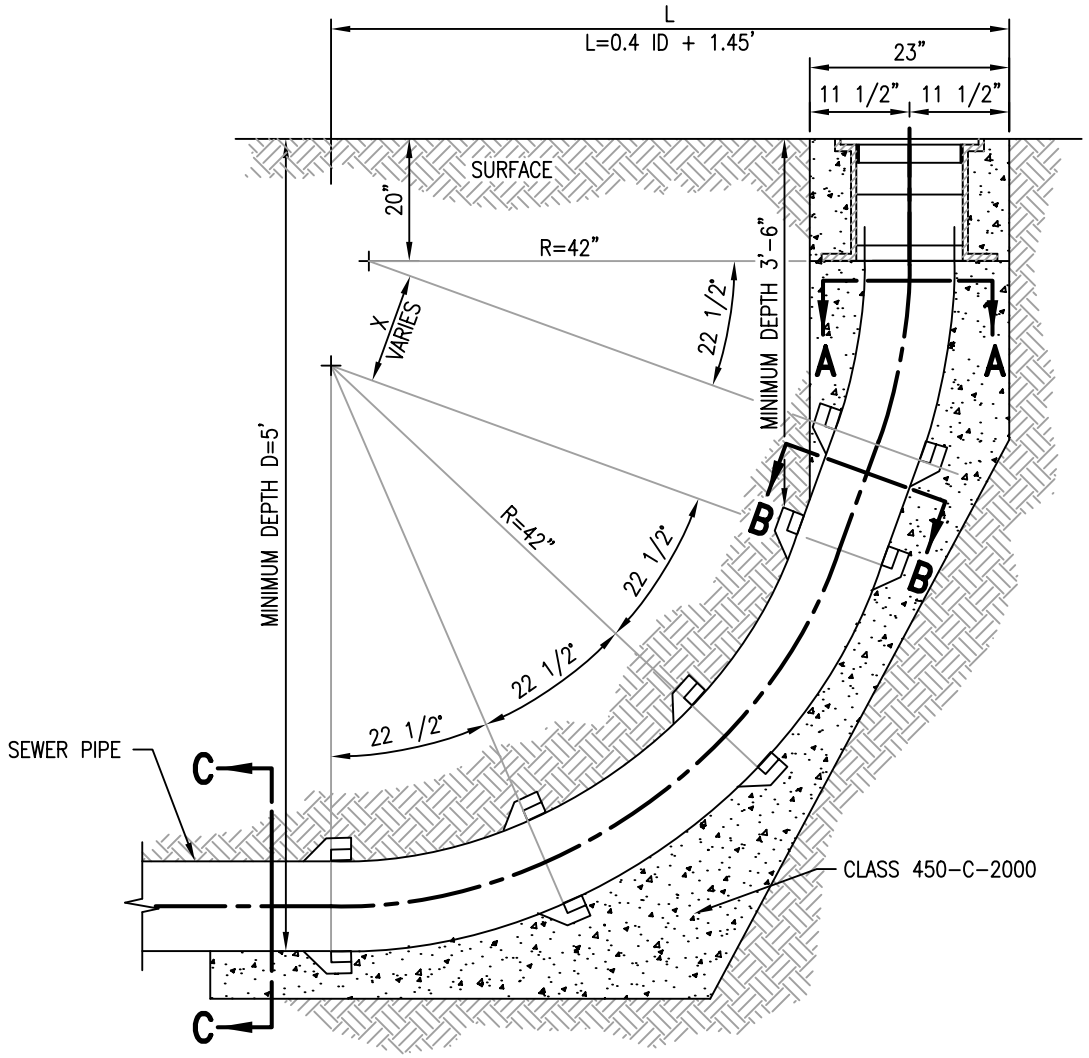
1. PIPE AND FITTINGS, EXCEPT AS OTHERWISE SHOWN HEREON, SHALL BE OF THE SAME MATERIAL AS THE SEWER, UNLESS APPROVED ADAPTERS ARE UTILIZED. PIPE MAY BE ANY OF THE FOLLOWING:
   - DUCTILE IRON
   - P.E. PIPE
   - P.V.C. PLASTIC PIPE.

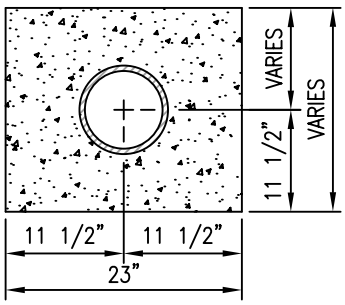
2. PIPE AND FITTINGS SHALL BE PROPERLY ALIGNED AND MAINTAINED WHILE CONCRETE IS BEING PLACED AND CURED. JOINTS FOR PIPES AND FITTINGS SHALL BE MADE PRIOR TO PLACING CONCRETE. CONCRETE FOR BEDDING, ENCASEMENT, AND WALL SUPPORT FOR PIPES AND FITTINGS SHALL BE PLACED UNIFORMLY AROUND THE PIPE AND FITTINGS AS SHOWN HEREON TO MAINTAIN PROPER ALIGNMENT, AND SHALL BE CLASS 450-C-2000.

3. THE ACCESS FRAME, COVER AND CAP SHALL NOT BE PUNCHED OUT.

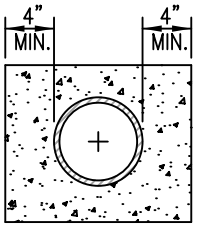
4. THE CONTRACTOR, MAY PLACE EITHER CIRCULAR OR SQUARE CONCRETE PIPE WALL SUPPORTS AS SHOWN.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	TERMINAL CLEANOUT STRUCTURE TYPE "A"	STANDARD PLAN NO. SV 40-160 SHEET 3 OF 3

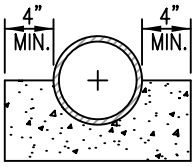




SECTION A-A
NOT TO SCALE

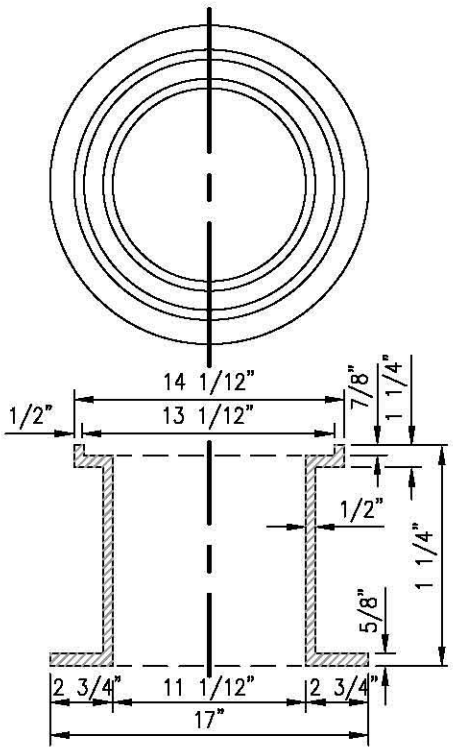


SECTION B-B
NOT TO SCALE



SECTION C-C
NOT TO SCALE

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28,2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	TERMINAL CLEANOUT STRUCTURE TYPE "B"	STANDARD PLAN N0. SV 40-170 SHEET 1 OF 2



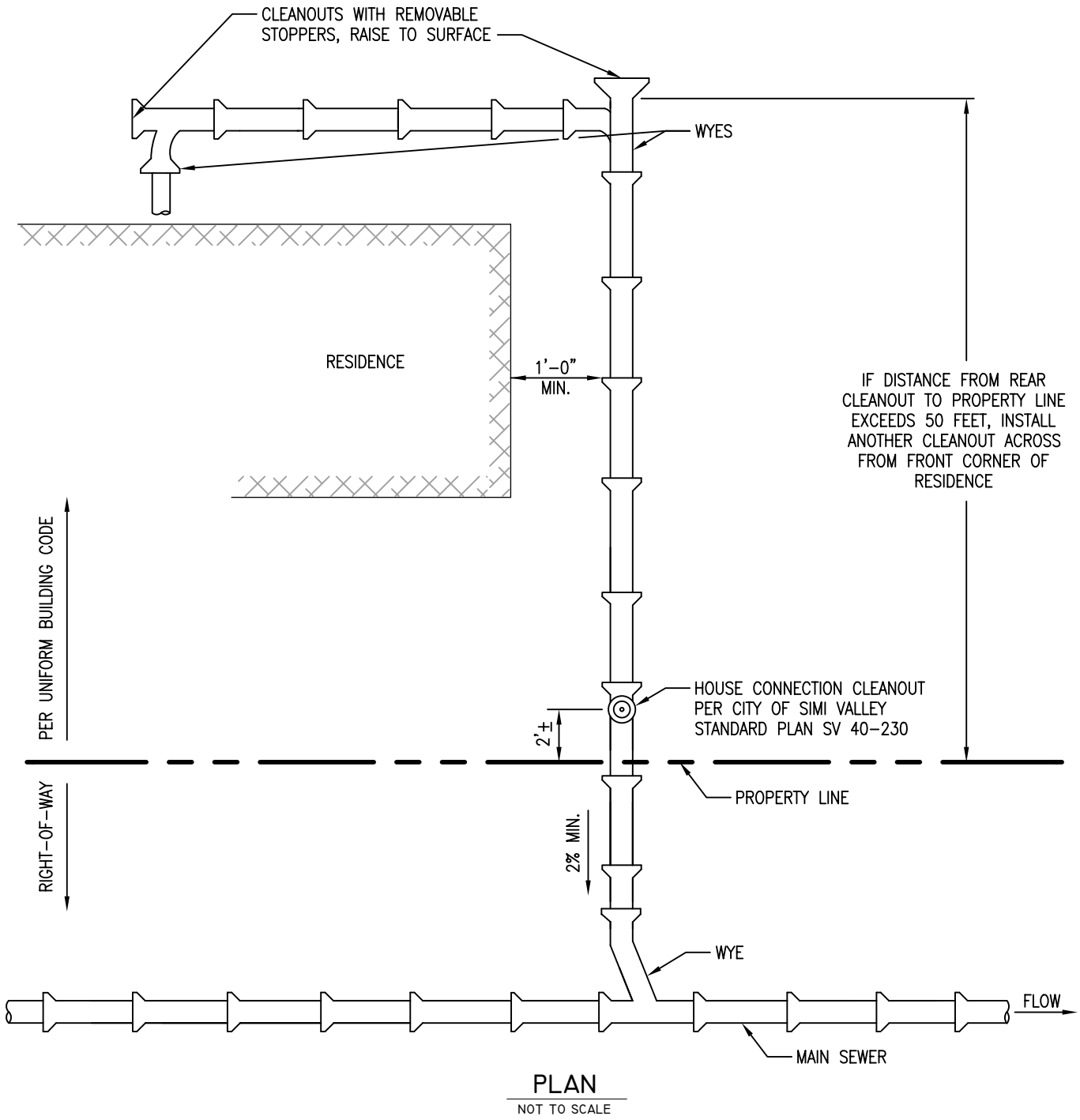
SECTION ON CENTER OF FRAME

NOT TO SCALE

NOTES:

1. PROPER ALIGNMENT OF THE PIPE SHALL BE MAINTAINED WHILE PLACING THE CONCRETE.
2. THE FRAME AND COVER SHALL BE MADE OF GRAY IRON AS MANUFACTURED BY ALHAMBRA FOUNDRY A-1241 OR APPROVED EQUAL. COVER SHALL BE MARKED SEWER.
3. THIS STRUCTURE MAY BE USED WHEN ALLOWED BY THE ENGINEER UNDER THE FOLLOWING CONDITIONS:
   A. THE SEWER WILL NEVER BE EXTENDED.
   B. THE DISTANCE TO THE DOWNSTREAM MANHOLE IS LESS THAN 100 FEET.
   C. THE RATE OF GRADE TO THE DOWNSTREAM MANHOLE IS 0.44% OR GREATER.
4. BACKFILL SHALL COMMENCE WHEN THE CONCRETE STRENGTH IS 75% OF THE SPECIFIED STRENGTH.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	TERMINAL CLEANOUT STRUCTURE TYPE "B"	STANDARD PLAN NO. SV 40-170 SHEET 2 OF 2



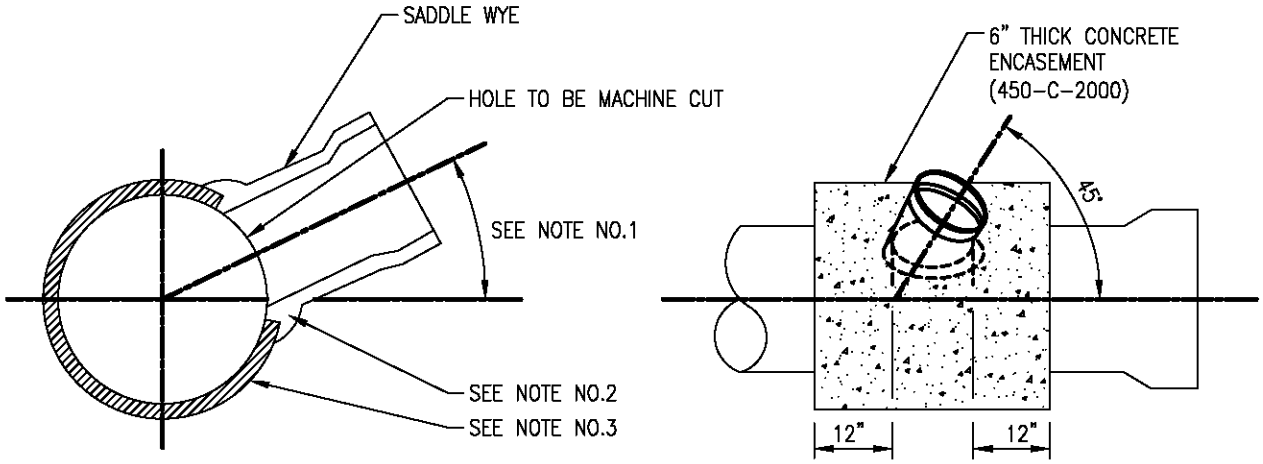
PLAN

NOT TO SCALE

NOTE:

FOR HOUSE LATERAL CONNECTION SEE CITY OF SIMI VALLEY STANDARD PLANS SV 40-200, SV 40-210 AND SV 40-230.

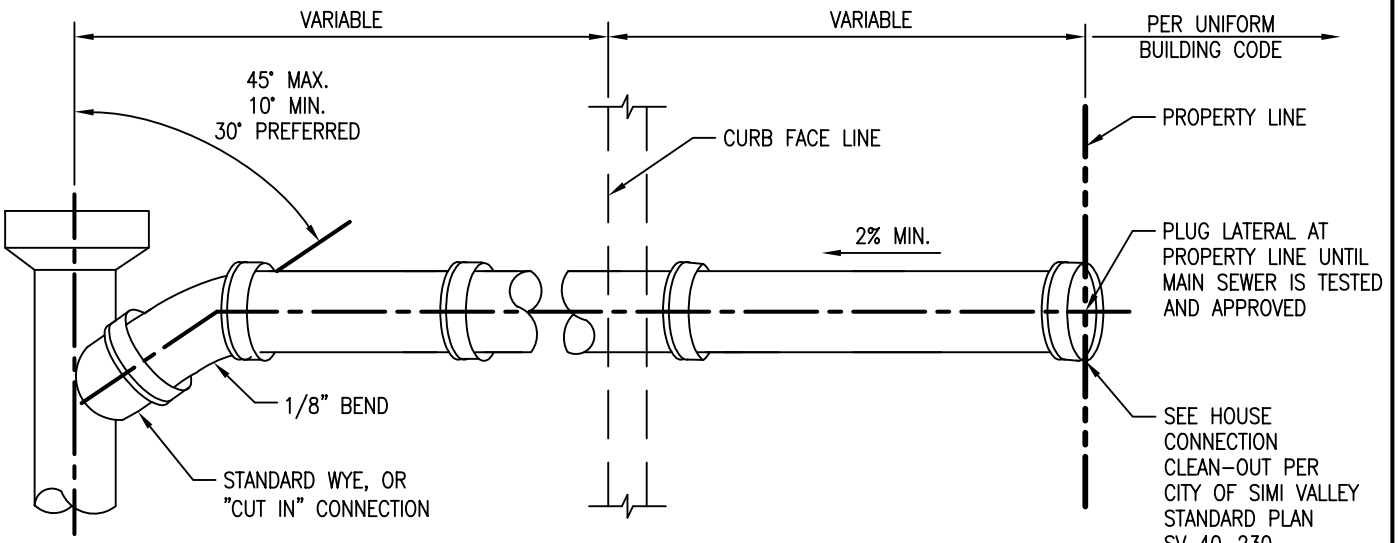
APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	TYPICAL HOUSE CONNECTION	STANDARD PLAN N0. SV 40-180 SHEET 1 OF 1



NOTES:

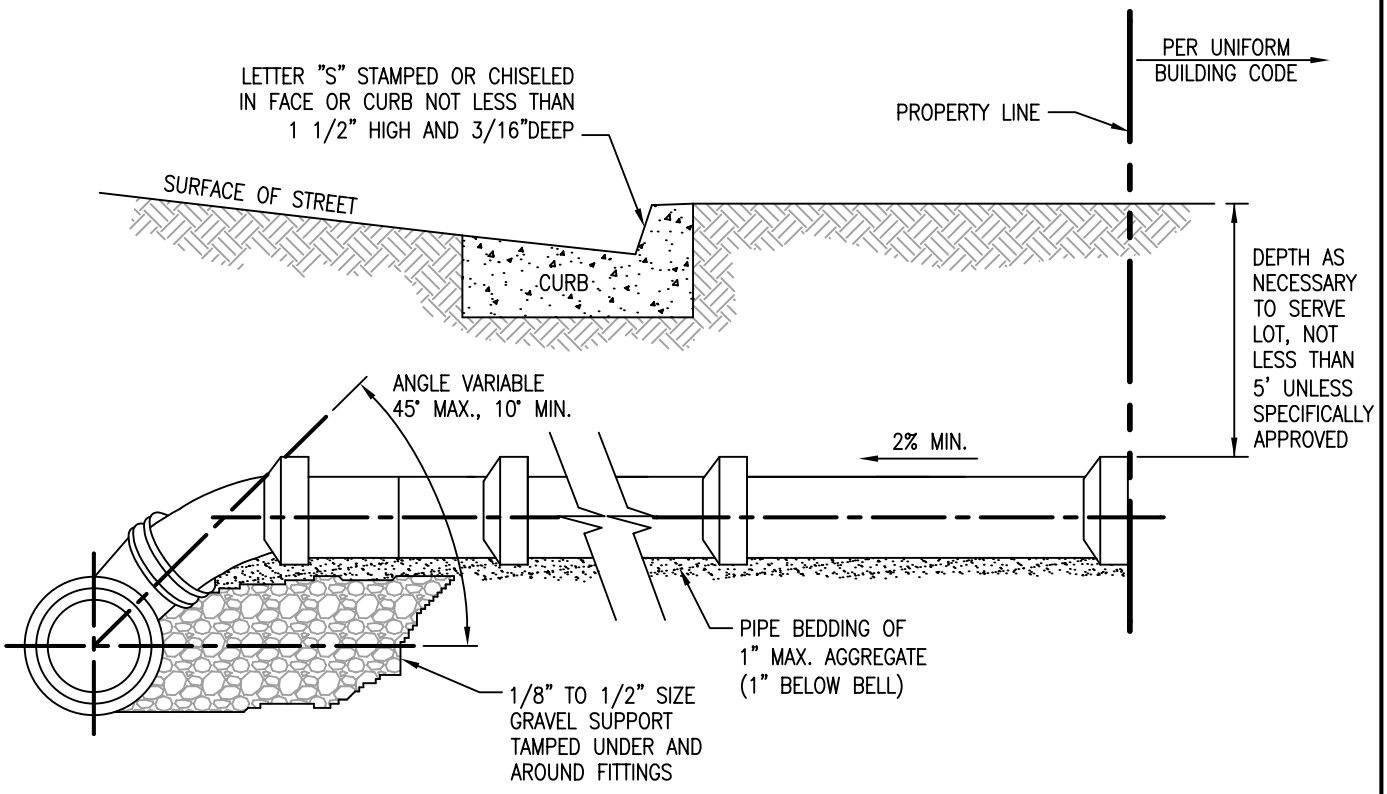
1. ANGLE: 10-DEGREE MINIMUM, 45-DEGREE MAXIMUM. 30-DEGREE IS PREFERRED AND TYPICAL FOR ALL CONNECTIONS.
2. INSTALL RUBBER GASKET PER MANUFACTURER'S RECOMMENDATION.
3. PROVIDE STAINLESS STEEL CLAMPS ON BOTH SIDES OF LATERAL.
4. SADDLE WYE SHALL BE SEALTITE, OR APPROVED EQUAL.
5. CONNECTIONS SHOWN ARE ONLY TO BE USED WHEN CONNECTING TO EXISTING LINES. NEW LINES SHALL HAVE WYES.
6. ALL TIE-INS TO SEWER MAINS MUST BE PERFORMED IN THE PRESENCE OF A DEPARTMENT OF PUBLIC WORKS INSPECTOR. CONTRACTOR SHALL COORDINATE INSPECTION.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	SADDLE CONNECTION TO MAIN	STANDARD PLAN N0. SV 40-190 SHEET 1 OF 1



PLAN

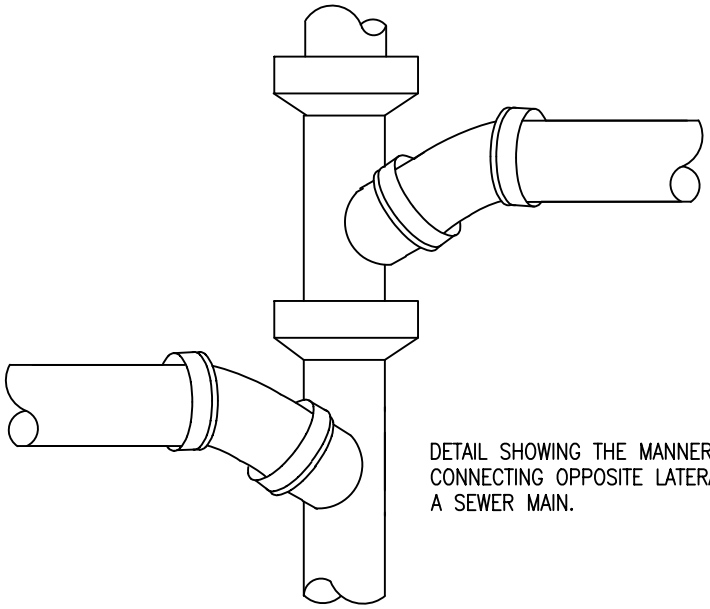
NOT TO SCALE



ELEVATION

NOT TO SCALE

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	STANDARD HOUSE CONNECTION (SEWER LATERAL) FOR SLOPES LESS THAN 30%	STANDARD PLAN N0. SV 40-200 SHEET 1 OF 2



DETAIL SHOWING THE MANNER OF CONNECTING OPPOSITE LATERALS TO A SEWER MAIN.

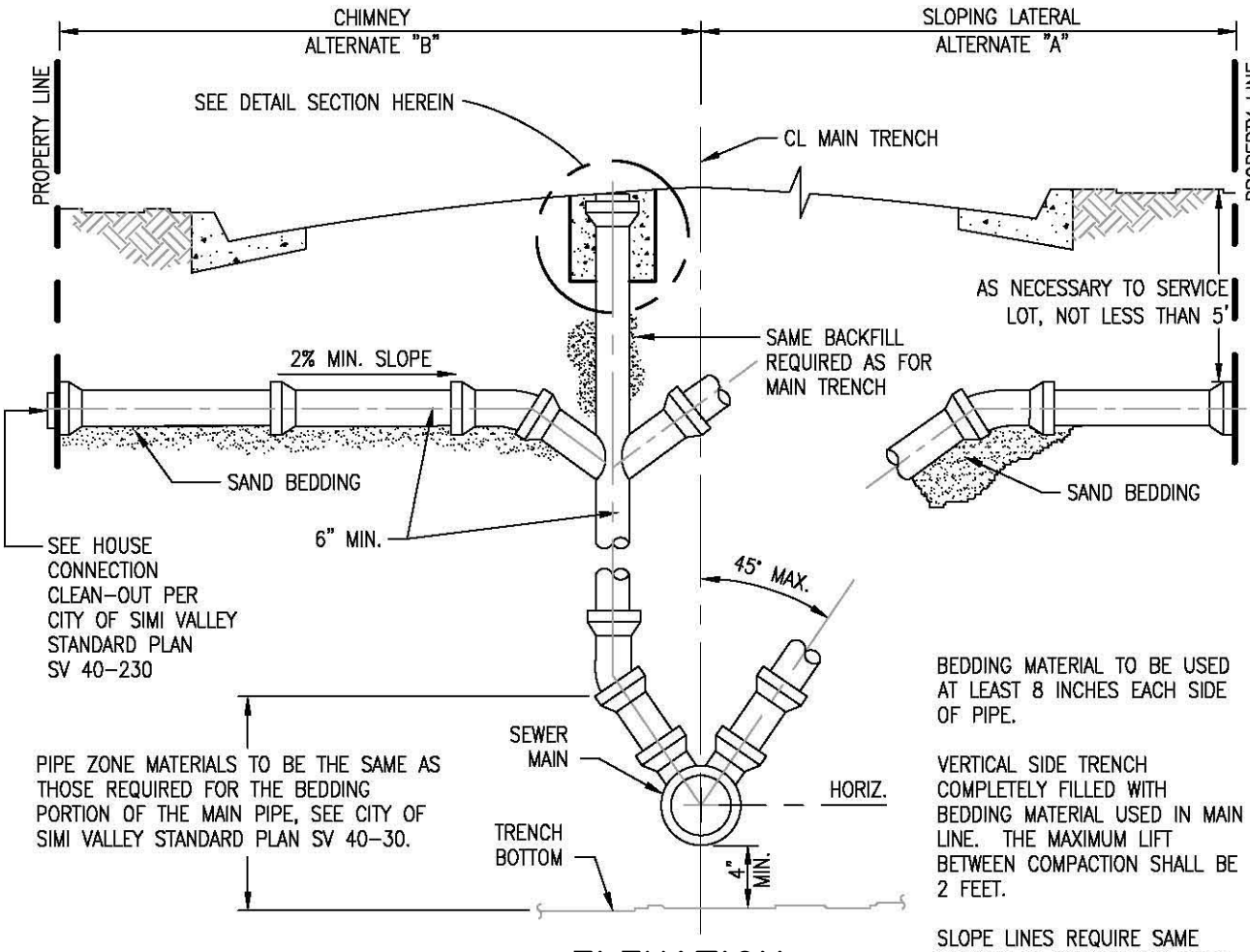
DETAIL

NOT TO SCALE

NOTES:

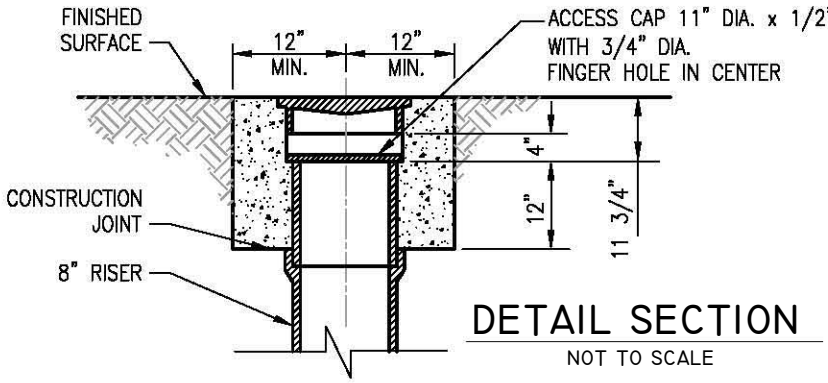
1. WHERE V.C.P. WYE IS INSTALLED WITHOUT HOUSE LATERAL A V.C. PLUG OR NEOPRENE STOPPER SHALL BE INSTALLED.
2. LATERAL SIZE TO BE DETERMINED ON THE BASIS OF TOTAL NUMBER OF FIXTURE UNITS DRAINED, BUT IN NO CASE SHALL THE LATERAL BE LESS THAN 6 INCHES DIAMETER.
3. IN NO CASE SHALL A LATERAL CONNECT TO THE SEWER MAIN DIRECTLY ON TOP OF THE PIPE.
4. SEWER LATERALS SHALL HAVE A MINIMUM SLOPE OF 1/4 INCH PER FOOT.
5. ALL JOINTS ON SEWER LATERAL PIPE SHALL BE COMPRESSION TYPE OR APPROVED SOLVENT WELD.
6. LATERAL SHALL EXTEND TO PROPERTY LINE UNLESS OTHERWISE SHOWN ON PLANS.
7. LOCATE LATERAL IN ACCORDANCE WITH WATER–WASTERWATER SEPARATION ORDINANCE. SEE CITY OF SIMI VALLEY STANDARD PLAN SV 40–10.
8. LOCATION OF ALL LATERALS SHALL BE SHOWN ON AS–BUILT DRAWINGS.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28,2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	STANDARD HOUSE CONNECTION (SEWER LATERAL) FOR SLOPES LESS THAN 30%	STANDARD PLAN N0. SV 40-200 SHEET 2 OF 2



ELEVATION

NOT TO SCALE



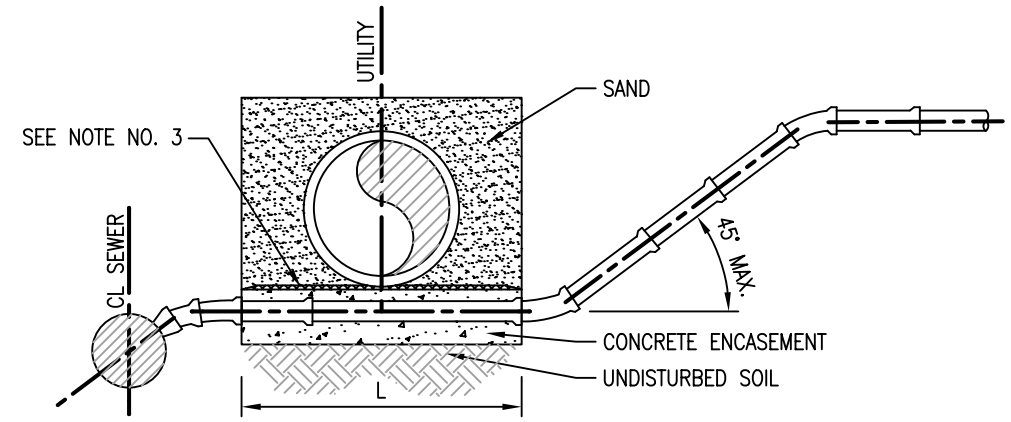
DETAIL SECTION

NOT TO SCALE

NOTES:

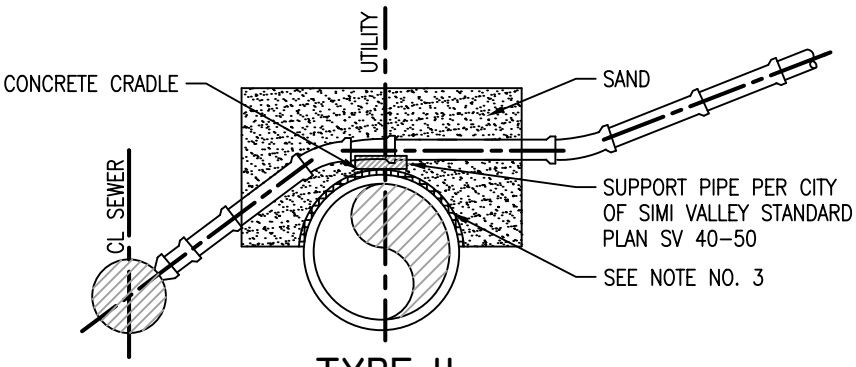
1. THE USE OF CHIMNEYS SHOULD BE RESTRICTED TO CASES WHERE CONFLICTS OR EXCESSIVE DEPTHS ARE PRESENT SUBJECT TO APPROVAL OF SANITATION ENGINEER.
2. UP TO 2 LATERALS MAY FEED ONE CHIMNEY THROUGH STANDARD WYE.
3. IF OPPOSITE SIDE OF STREET IS UNSEWERED, PROVIDE PLUGGED INLETS FOR FUTURE USE.
4. WATER AND WASTEWATER SEPARATION OF LINES PER CITY OF SIMI VALLEY STANDARD PLAN SV 40-10.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	DEEP CUT HOUSE CONNECTION (SEWER LATERAL CHIMNEY) FOR SLOPES GREATER THAN 30%	STANDARD PLAN NO. SV 40-210 SHEET 1 OF 1



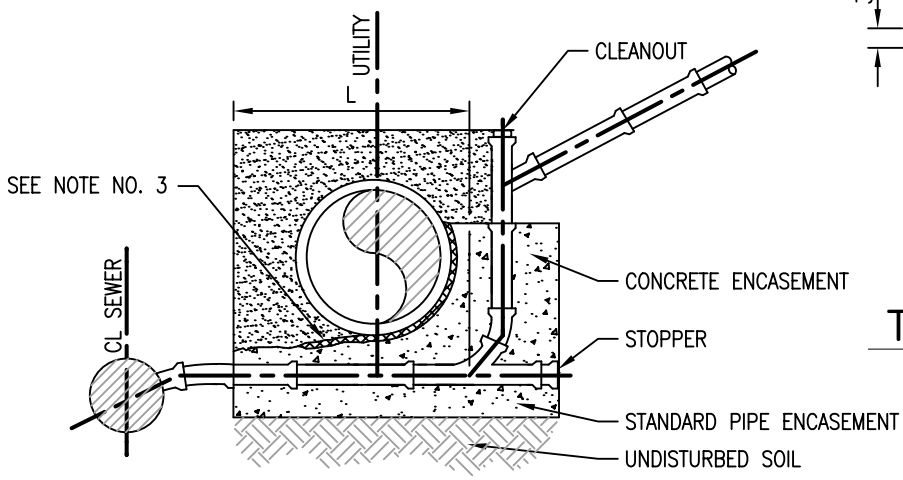
TYPE I

NOT TO SCALE



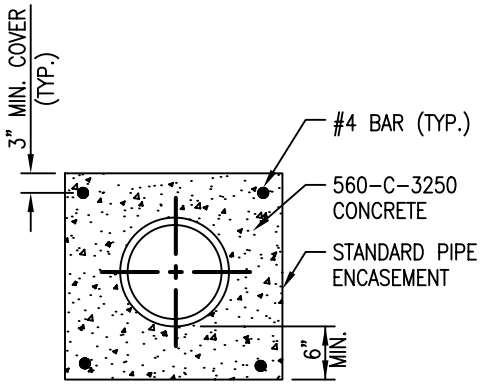
TYPE II

NOT TO SCALE



TYPE III

NOT TO SCALE



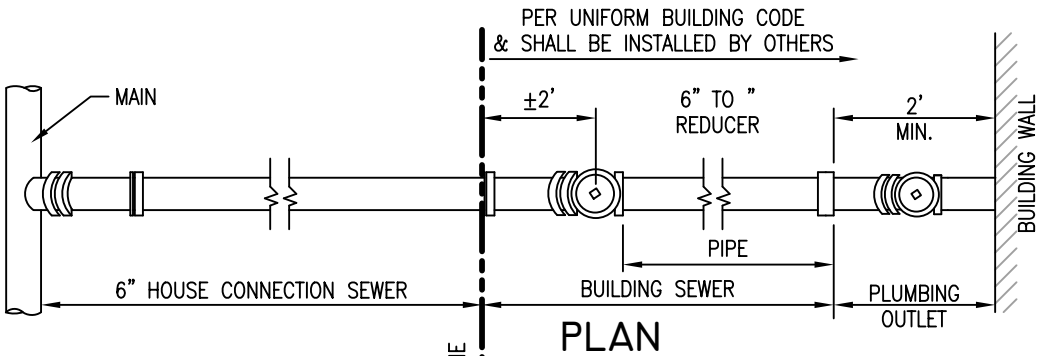
TYPE I AND
TYPE II DETAIL

NOT TO SCALE

NOTES:

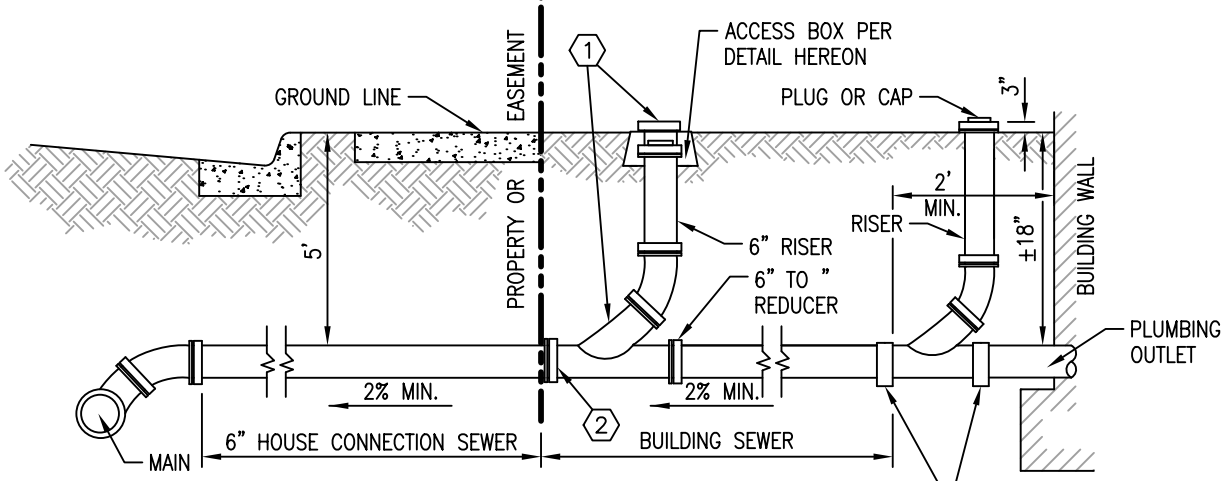
1. MINIMUM SLOPE FOR SEWER LATERALS SHALL BE ¼ INCH PER FOOT CONTINUOUSLY.
2. L= WIDTH OF UTILITY PLUS EXTENSION AT BOTH SIDES TO FIRST PIPE JOINT AT OR BEYOND TRENCH.
3. PROVIDE 15# ROOFING FELT PAPER AROUND PIPE PRIOR TO CONCRETE POUR.
4. TYPE II CROSSING NOT PERMITTED OVER WATERLINES. SEE CITY OF SIMI VALLEY STANDARD PLAN SV 40-10.
5. TYPE II CROSSING NOT PERMITTED WHEN OTHER METHODS ARE WORKABLE.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	SEWER HOUSE LATERAL AT UTILITY INTERSECTION	STANDARD PLAN NO. SV 40-220 SHEET 1 OF 1



PLAN

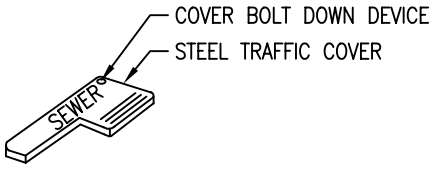
NOT TO SCALE



1. SHALL BE INSTALLED AFTER COMPLETION OF AIR TEST.
2. PROVIDE PLUGS AND METAL ROD FOR LOCATION PURPOSES.

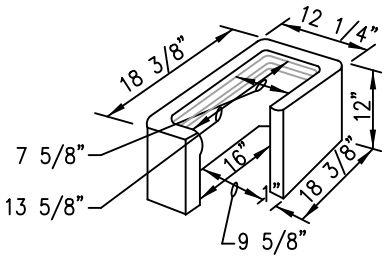
PROFILE

NOT TO SCALE



PULL BOX COVER

NOT TO SCALE

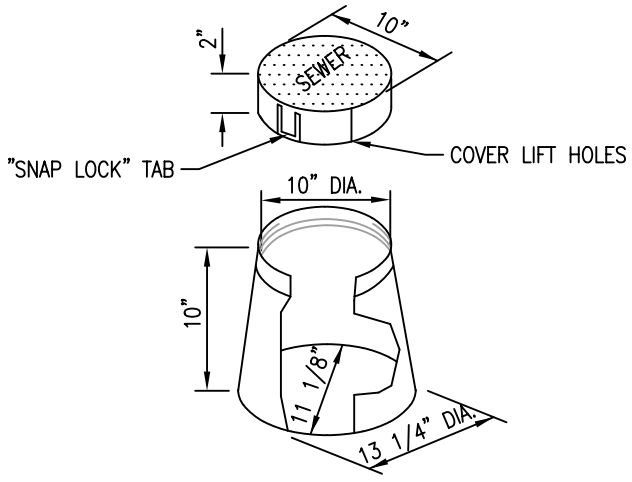


ACCESS BOX

NOT TO SCALE

NOTE:

USE BROOKS (9-5/8"x16"X12" DEEP OR APPROVED EQUAL) WITH TRAFFIC COVER IN DRIVEWAYS (CONSULT INSPECTOR FOR LATERAL IN DRIVEWAY).



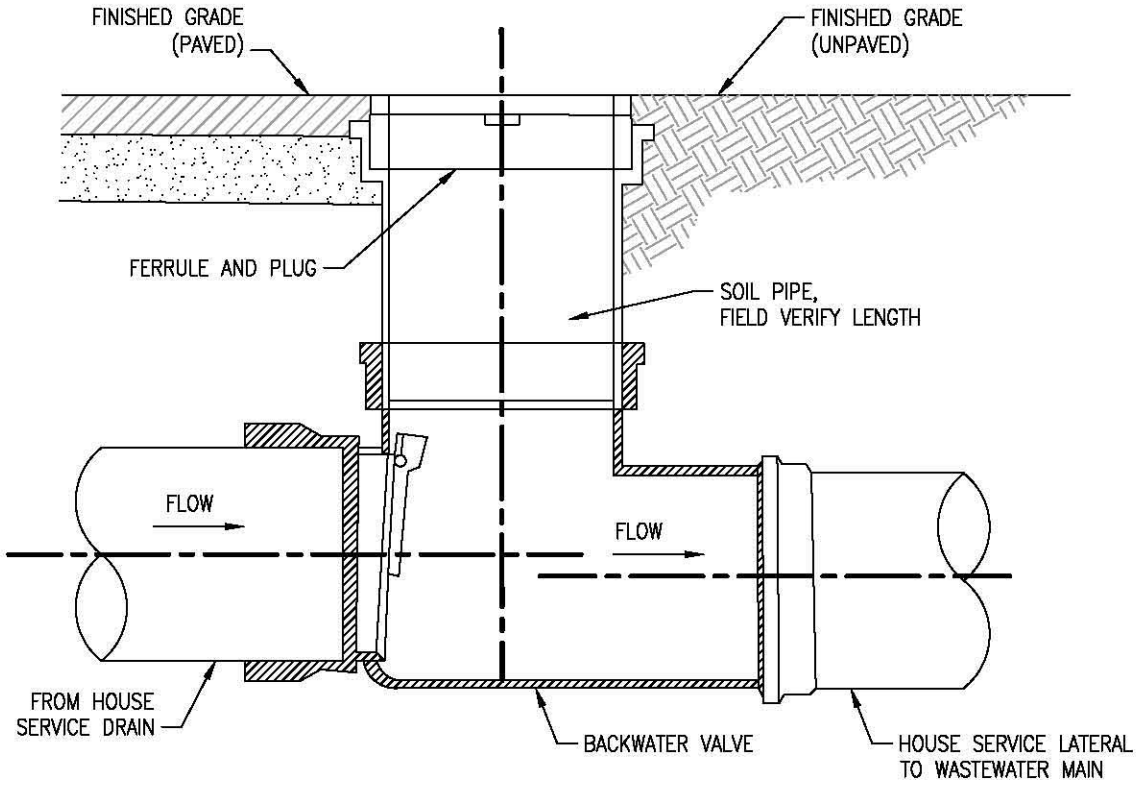
ACCESS BOX

NOT TO SCALE

NOTE:

USE BROOKS 1100 SERIES OR APPROVED EQUAL IN NON-TRAFFIC, LANDSCAPED AREAS ONLY. ACCESS BOX TO HAVE SNAP LOCK COVER, BOLT DOWN COVER. BOLT SHALL BE STAINLESS STEEL (TYP).

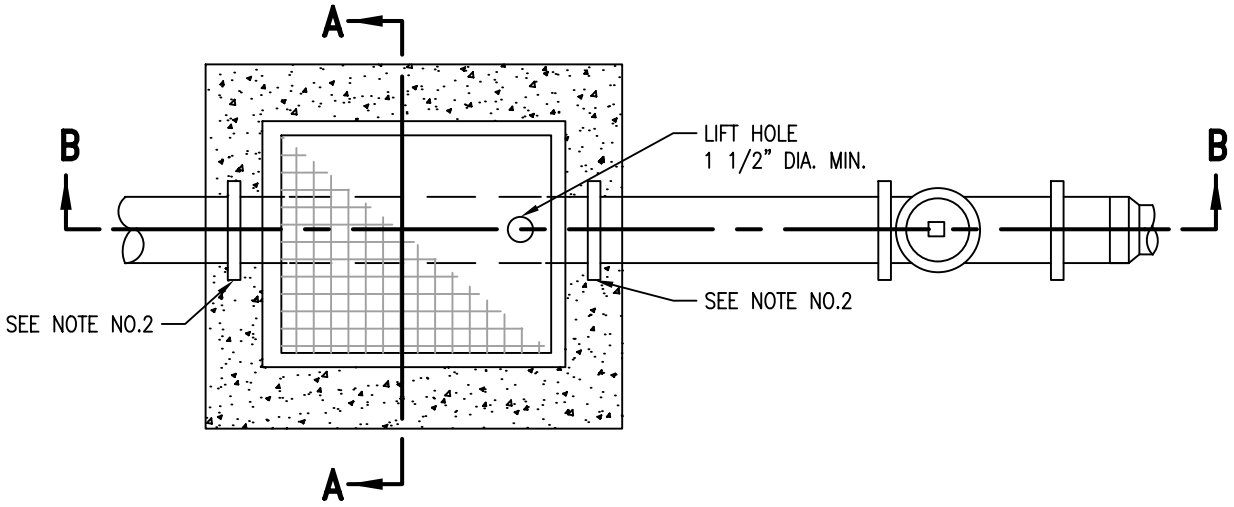
APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	HOUSE CONNECTION CLEANOUT	STANDARD PLAN N0. SV 40-230 SHEET 1 OF 1



NOTES:

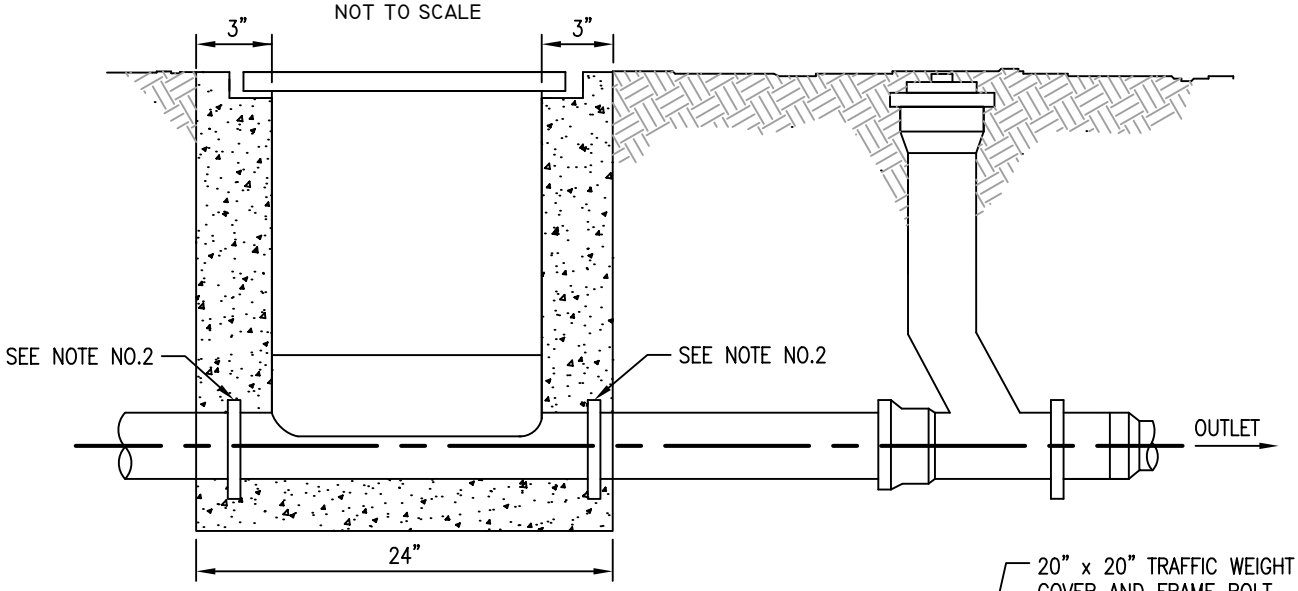
1. A BACKWATER VALVE IS REQUIRED WHEN THERE IS A POSSIBILITY OF REVERSE FLOW IN SERVICE LATERALS SERVING LOW LOTS IN HILLY AREAS OR IN BUILDINGS WHERE THE RIM OF THE UPSTREAM MANHOLE IS LESS THAN 6 INCHES BELOW THE FINISHED FLOOR ELEVATION OF THE LOT. WHEN AN EXISTING LATERAL IS BEING REPAIRED OR ALTERED AND THE ABOVE CONDITION EXISTS, A BACKWATER VALVE SHALL BE INSTALLED.
2. BACKWATER VALVE SHALL BE INSTALLED ON THE SERVICE/HOUSE LATERAL IN A LEVEL MANNER FOR PROPER OPERATION AND POSITIONED AT LEAST 2 FEET FROM THE STRUCTURE FOR EASY ACCESSIBILITY.
3. BACKWATER VALVE TYPE MODEL SHALL BE APPROVED BY THE ENGINEER PRIOR TO INSTALLATION.
4. EXCEPT AS MODIFIED HEREON, BACKWATER VALVE SHALL BE INSTALLED IN ACCORDANCE WITH THE CALIFORNIA PLUMBING CODE.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	BACKWATER VALVE	STANDARD PLAN N0. SV 40-240 SHEET 1 OF 1



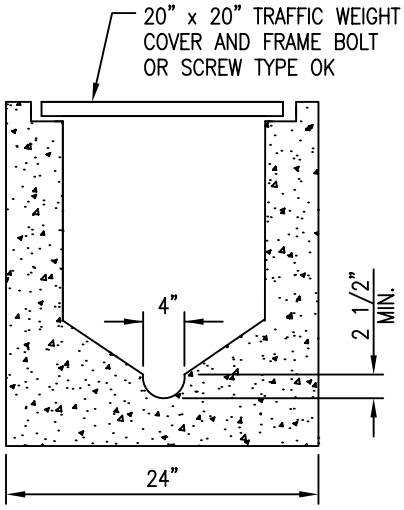
PLAN VIEW

NOT TO SCALE



SECTION B-B

NOT TO SCALE



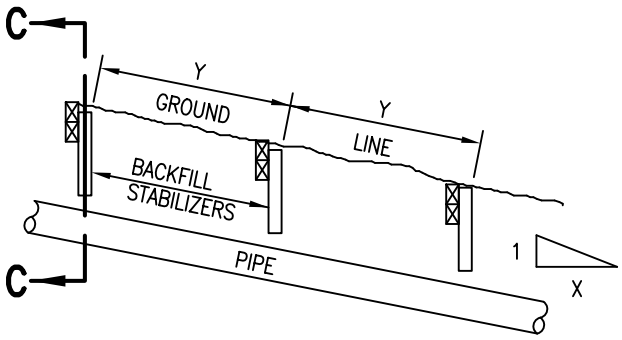
SECTION A-A

NOT TO SCALE

NOTES:

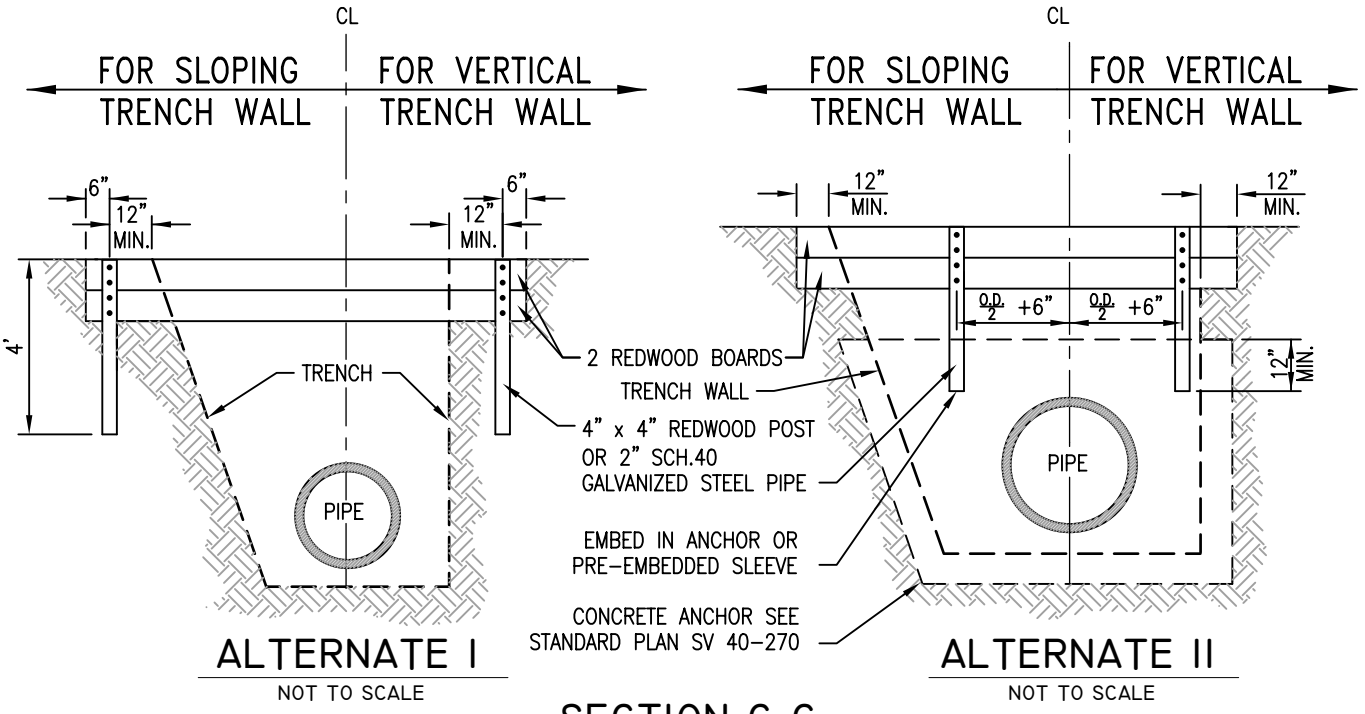
1. APPROVAL FOR THE LOCATION OF THE SAMPLING WELL SHALL BE OBTAINED FROM THE ENVIRONMENTAL COMPLIANCE DIVISION PRIOR TO INSTALLATION.
2. WHEN INSTALLING THE SAMPLING WELL, BE SURE THAT THE INVERT OF THE SAMPLING WELL IS LEVEL WITH THE INVERT OF THE INLET AND OUTLET PIPES.
3. FOR PLASTIC SEWER PIPE, PLACE TIGHT FITTING RUBBER RING OVER PIPE AT MIDPOINT WHERE IT PASSES THROUGH CONCRETE WALL.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	SAMPLING WELL	STANDARD PLAN N0. SV 40-250 SHEET 1 OF 1



BACKFILL STABILIZERS
ELEVATION
NOT TO SCALE

TABLE B	
GROUND SLOPE X:1	SPACING Y (MAX)
1:1	5'
1 1/2:1	9'
2:1	12'
2 1/2:1	18'
3:1	20'



ALTERNATE I
NOT TO SCALE

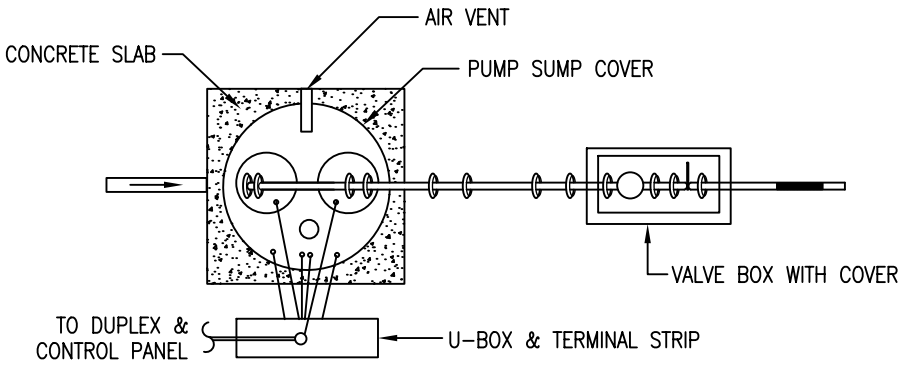
ALTERNATE II
NOT TO SCALE

SECTION C-C
NOT TO SCALE

NOTES:

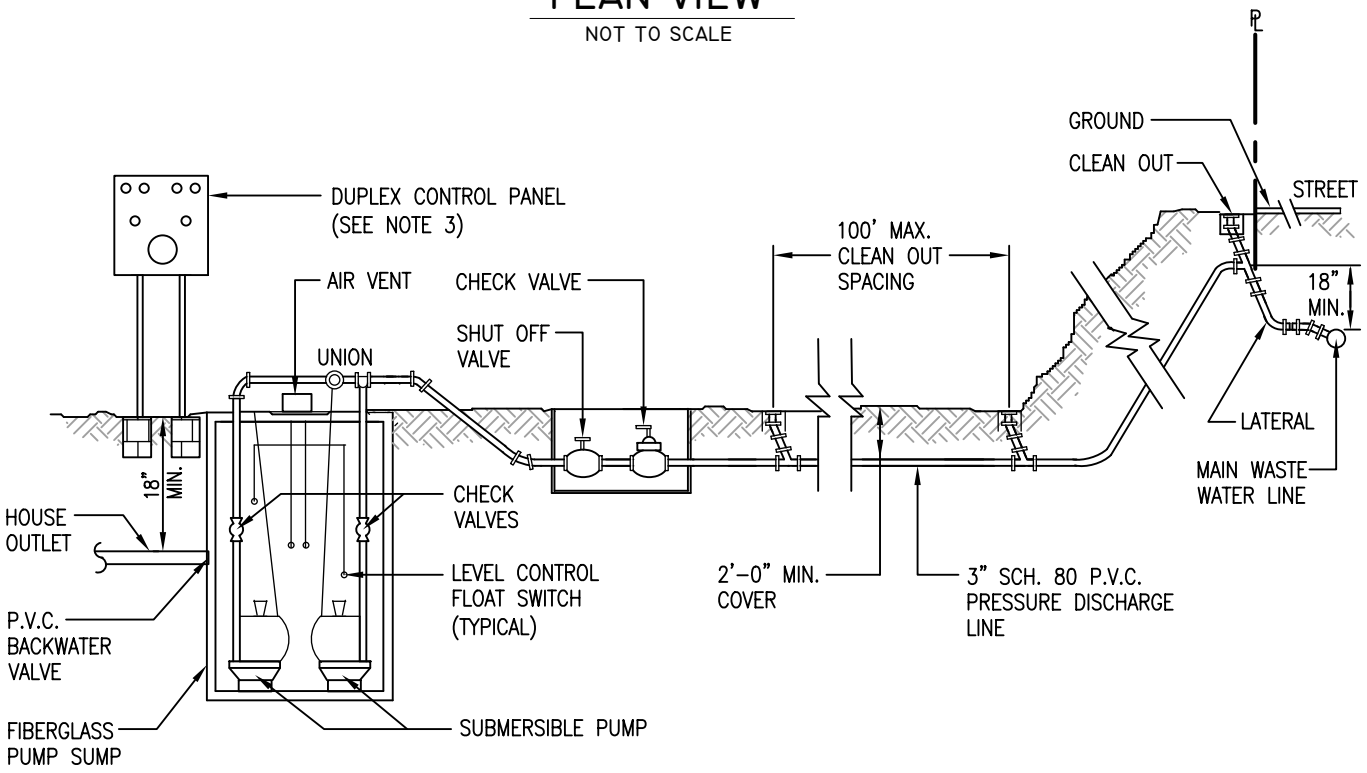
1. REDWOOD BOARDS SHALL BE 2 INCHES x 12 INCHES WHERE DEPTH OF COVER OVER PIPE PERMITS, OTHERWISE USE 2 INCHES x 10 INCHES.
2. REDWOOD BOARDS SHALL BE PLACED ON THE HIGH GROUND SIDE OF THE POSTS.
3. EACH REDWOOD BOARD SHALL BE FASTENED BY USING 2–16d NAIL TO EACH REDWOOD POST OR A 3/8 INCH BOLT AND NUT WITH WASHER TO EACH GALVANIZED PIPE. ALL HARDWARE SHALL BE GALVANIZED STEEL. BE USED IN LIEU OF BACKFILL HOWEVER, THE TOP 12 INCHES SHALL BE NATIVE SOIL COMPACTED TO 90% RELATIVE COMPACTION.
4. TRENCH BACKFILL SHALL BE MECHANICALLY CONSOLIDATED TO 90% RELATIVE COMPACTION. CEMENT SLURRY MAY BE USED.
5. SPACING OF STABILIZERS FOR GROUND SLOPES BETWEEN VALUES SHOWN IN TABLE "B" MAY BE PROPORTIONED.
6. REFER TO THE PROJECT'S SOILS REPORT FOR ADDITIONAL REQUIREMENTS.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	REDWOOD CHECKDAM BACKFILL STABILIZERS	STANDARD PLAN N0. SV 40-260 SHEET 1 OF 1



PLAN VIEW

NOT TO SCALE



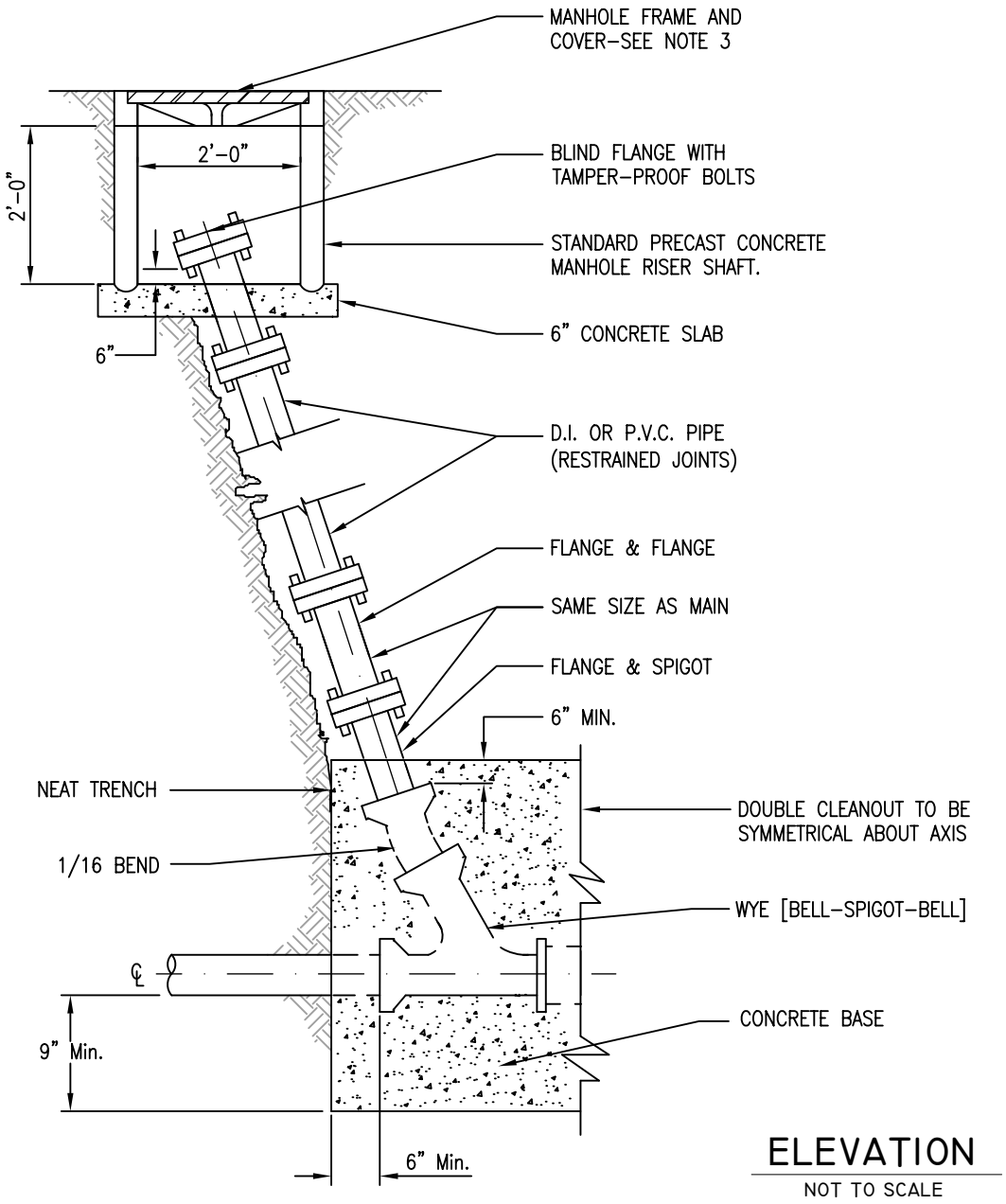
ELEVATION

NOT TO SCALE

NOTES:

1. THE EQUIPMENT SHOWN ON THIS PLATE IS INTENDED FOR SINGLE FAMILY DWELLINGS SUBJECT TO PRIOR APPROVAL & LIMITED USE AS DISCUSSED IN SECTION 2.12.
2. SPECIFIC EQUIPMENT TYPES SHALL BE APPROVED BY THE CITY. INSPECTION OF ON–SITE WORK WILL BE BY THE BUILDING & SAFETY DIVISION.
3. USE NEMA IV ENCLOSURE IF INSTALLED OUTDOORS OR A NEMA I ENCLOSURE IF INSTALLED INDOORS.
4. ALL PLASTIC PIPE EXPOSED TO SUNLIGHT SHALL BE C.P.V.C. SCHEDULE 80.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28,2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	PRIVATE PUMPING SYSTEMS (SCHEMATIC ONLY) (DESIGNED BY DEVELOPER'S ENGINEER)	STANDARD PLAN NO. SV 40-270 SHEET 1 OF 1



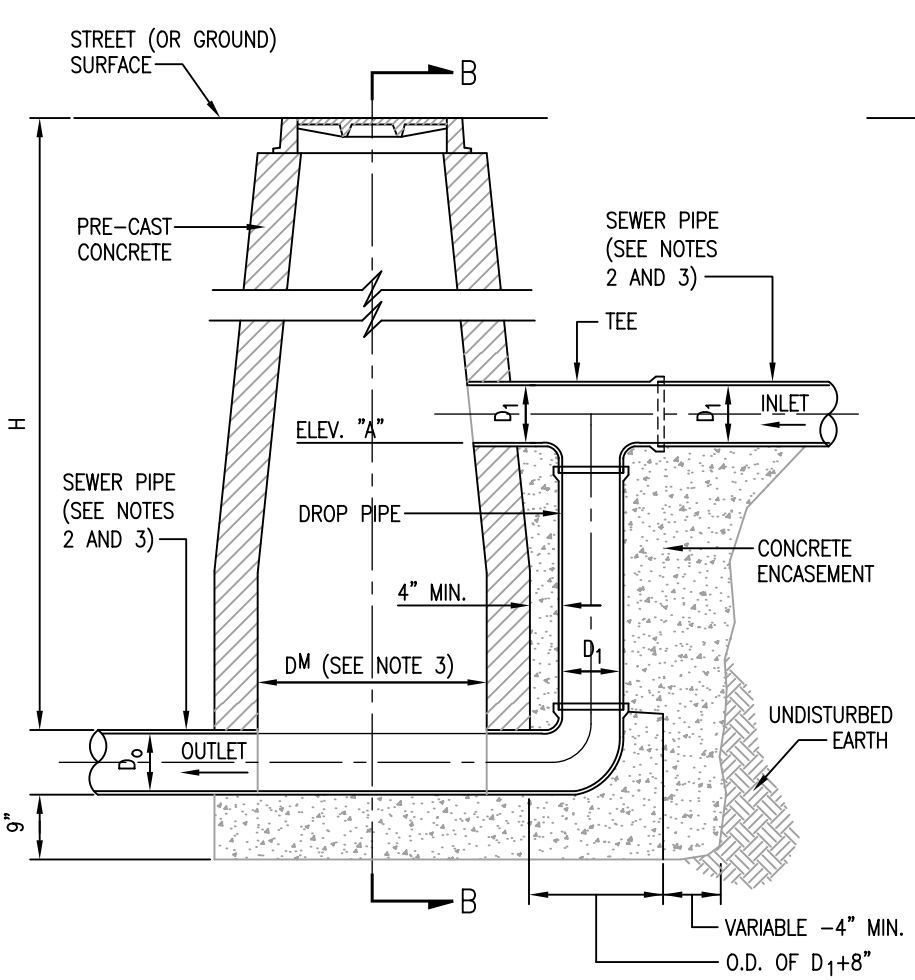
ELEVATION

NOT TO SCALE

NOTES:

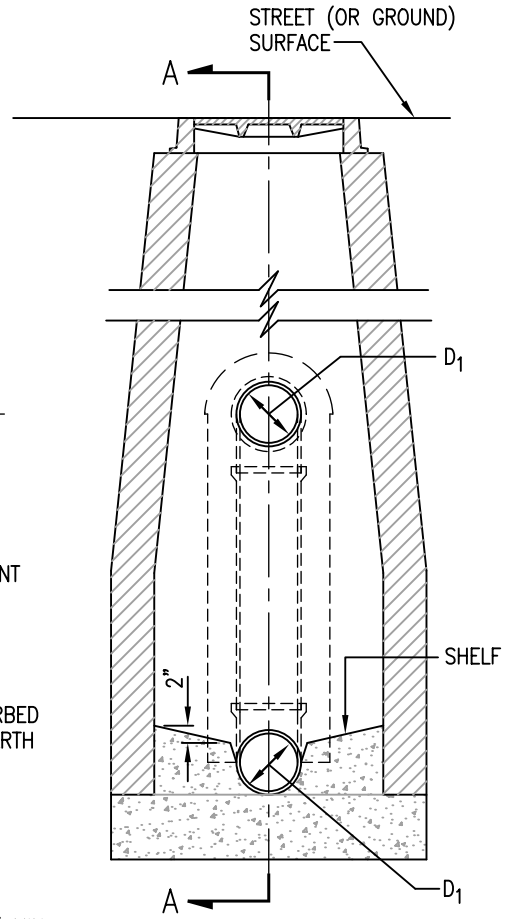
1. SIMILAR POLY VINYL CHLORIDE COMPONENTS MAY BE USED IN ACCORDANCE WITH A.S.T.M. STANDARD SPECIFICATION D–3033.
2. CONCRETE SLAB TO BE 560–C–3250 PSI.
3. USE HEAVY DUTY MANHOLE FRAME AND COVER FOR TRAFFIC IN AREAS SUBJECT TO VEHICULAR TRAFFIC.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28,2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	CLEANOUT SEWER FORCE MAIN	STANDARD PLAN N0. SV 40-280 SHEET 1 OF 1



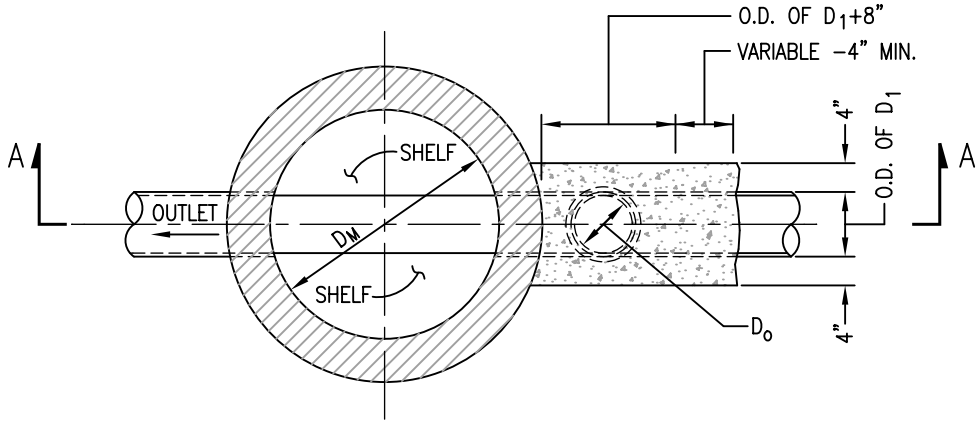
SECTION A-A

NOT TO SCALE



SECTION B-B

NOT TO SCALE



PLAN

NOT TO SCALE

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	DROP SEWER MANHOLE	STANDARD PLAN N0. SV 40-290 SHEET 1 OF 2

NOTES:

1. EXCEPT AS INDICATED HEREON OR ON THE PROJECT PLANS, MANHOLES SHALL CONFORM TO STANDARD PLAN NO. SV 40–100 PRECAST CONCRETE SEWER MANHOLE.

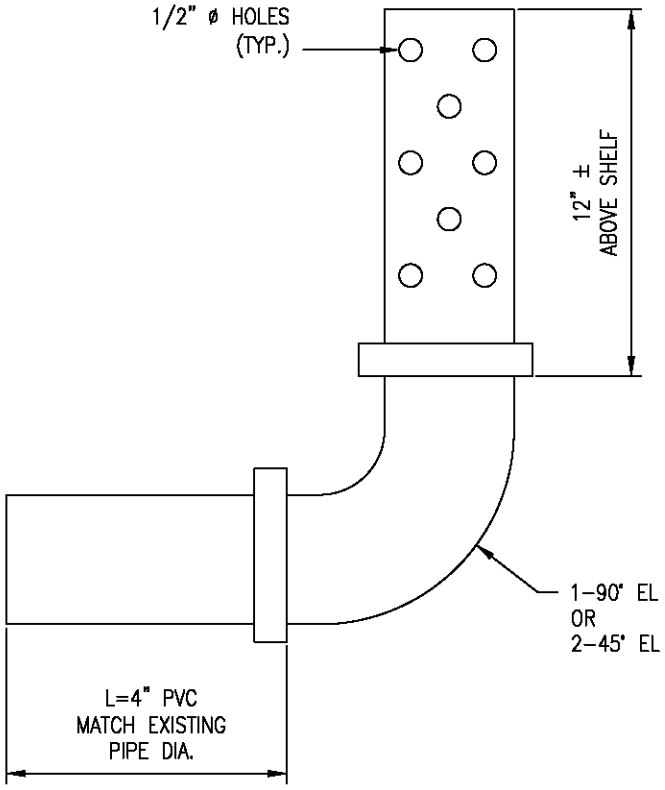
2. ALL PIPE FOR THE SEWER AND THE DROP INLET SHALL BE OF THE SAME MATERIAL AS THE SEWER UNLESS APPROVED ADAPTERS ARE UTILIZED. THEN IT SHALL, UNLESS OTHERWISE INDICATED ON THE PROJECT PLANS, BE ANY OF THE FOLLOWING:
   A. PVC PLASTIC PIPE
   B. PE PIPE
   C. D.I.P.

3. DIMENSIONS:
   H–SEE PROJECT PLANS
   ELEVATION "A" – SEE PROJECT PLANS, UNLESS OTHERWISE INDICATED ON THE PROJECT PLANS,
   D_1 = 8 INCHES
   D_o = 8 INCHES
   D_M = 4'–0" (WHEN THE PROJECT PLANS INDICATE THAT D_M > 4'–0", SEE PROJECT PLAN FOR ADDITIONAL REQUIREMENTS)

4. PRECAST CONCRETE MANHOLES SHALL BE PLUGGED DURING FABRICATION AT REQUIRED LOCATIONS TO PROVIDE FOR SEWER PIPE INLETS AND OUTLETS.

5. WHEN THE PROJECT PLANS INDICATE TWO OR MORE DROP INLETS ARE REQUIRED IN A SINGLE MANHOLE, EACH DROP INLET SHALL BE CONSTRUCTED AS A SEPARATE DROP INLET.

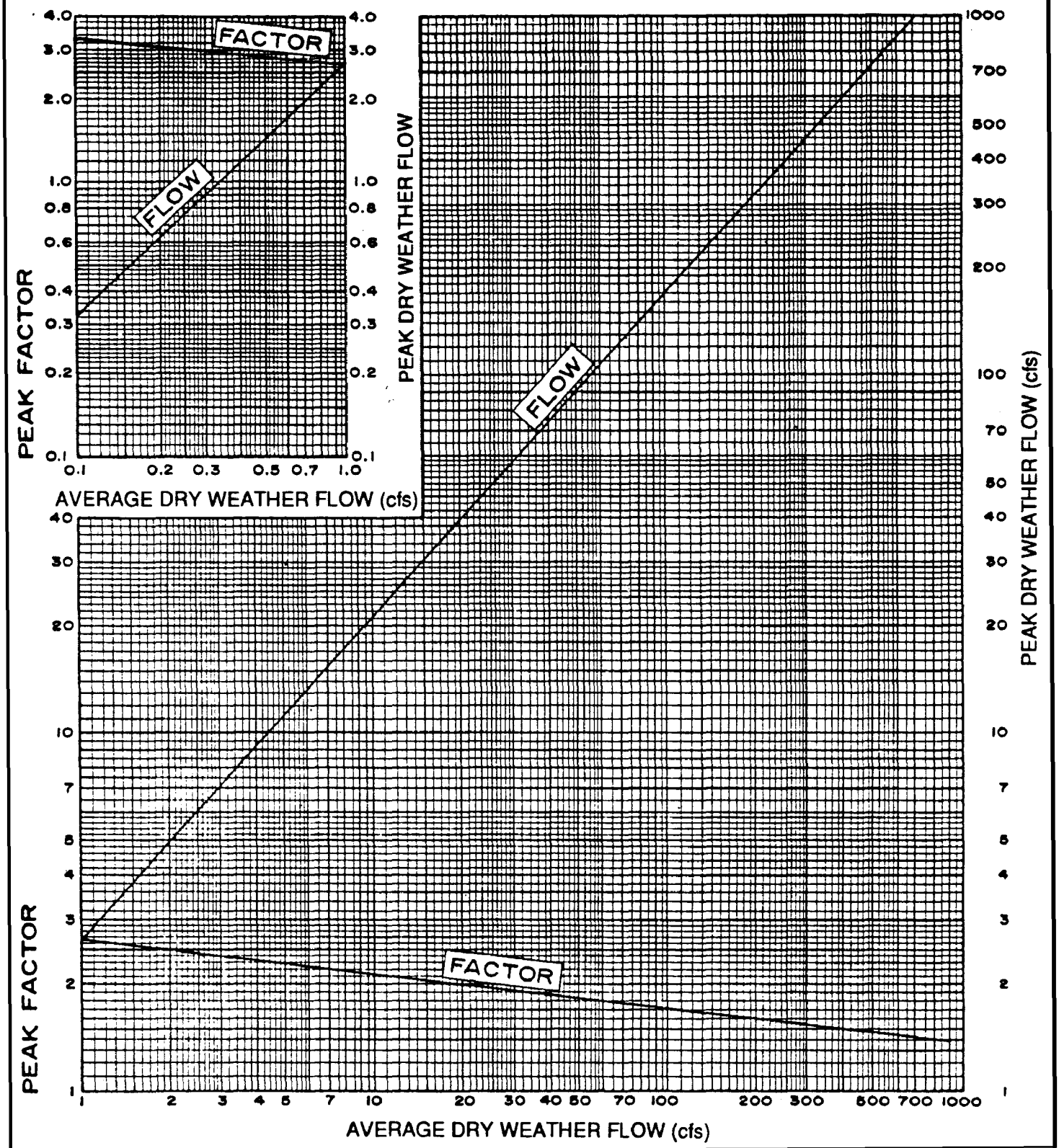
APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	DROP SEWER MANHOLE	STANDARD PLAN N0. SV 40-290 SHEET 2 OF 2



NOTE:

CONTRACTOR SHALL BE REQUIRED TO INSTALL AND MAINTAIN SAND TRAPS IN MANHOLES AT THE DOWN STREAM END OF PROJECT. PRIOR TO REMOVAL OF THE SAND TRAPS, THE LINES AND MANHOLES SHALL BE CLEANED OF ALL DEBRIS. THE SAND TRAPS SHALL NOT BE REMOVED UNLESS AUTHORIZED BY THE CITY AND IN THE PRESENCE OF THE PROJECT'S INSPECTOR.

APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	SAND TRAP	STANDARD PLAN N0. SV 40-300 SHEET 1 OF 1



APPROVED: /S/ DIRECTOR OF PUBLIC WORKS Aug 28, 2006 DATE	CITY OF SIMI VALLEY DEPARTMENT OF PUBLIC WORKS	AVERAGE FLOW-PEAK FLOW GRAPH	STANDARD PLAN NO. SV 40-310 SHEET 1 OF 1