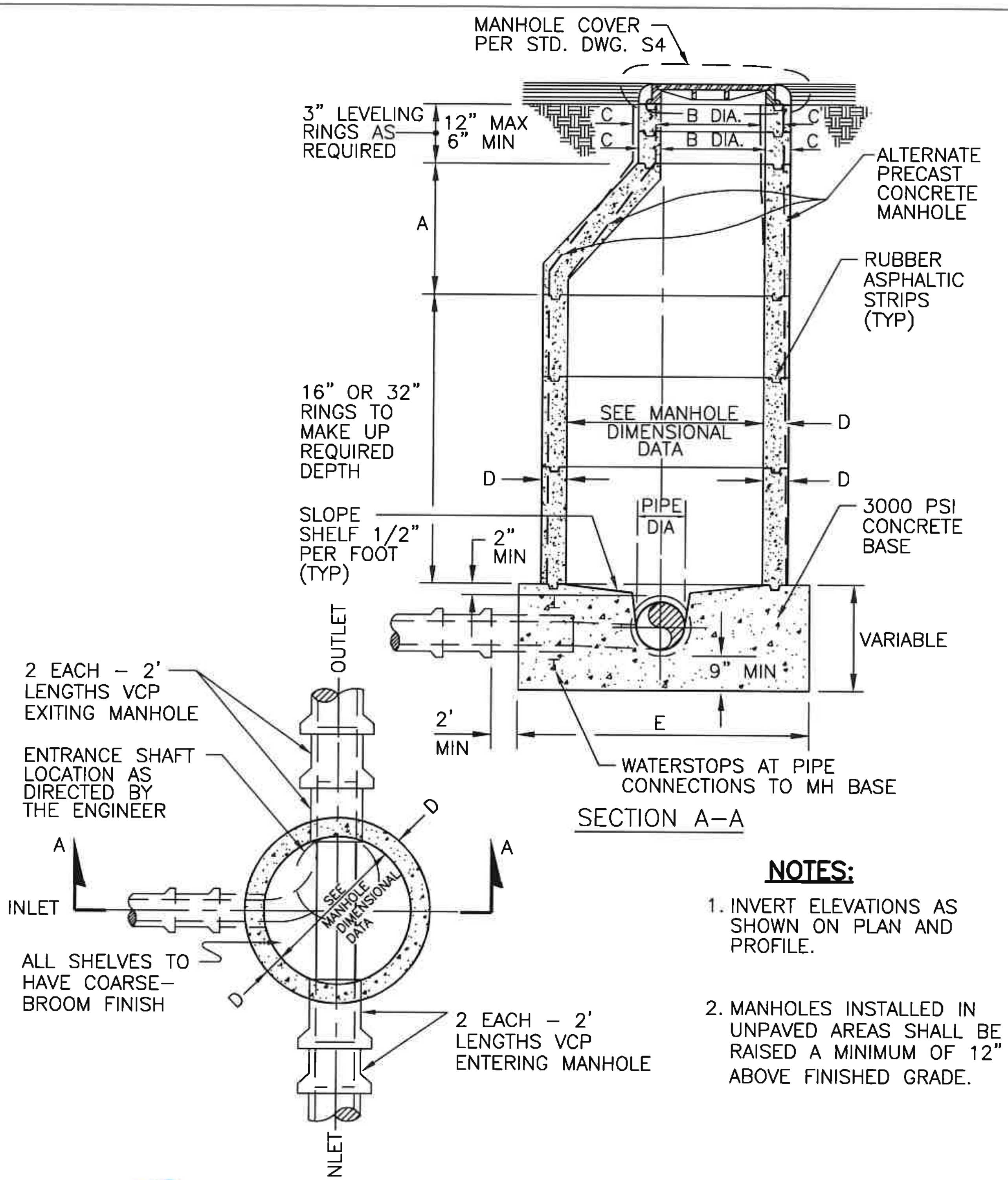
Sewer Standard Drawings



NOTES:

1. INVERT ELEVATIONS AS SHOWN ON PLAN AND PROFILE.
2. MANHOLES INSTALLED IN UNPAVED AREAS SHALL BE RAISED A MINIMUM OF 12" ABOVE FINISHED GRADE.

RENE GUERRERO, CITY ENGINEER RCE NO. 66263 — 8/28/17 DATE	CITY OF POMONA PUBLIC WORKS DEPARTMENT
REVISIONS / DATE / INITIAL	STANDARD 48" MANHOLE MAIN 15" DIAMETER OR LESS
DRAWN BY: DC CHECKED BY: NB, IL APPROVED BY: DP	STANDARD — S1 — 1 OF 2

MANHOLE DIMENSIONAL DATA							
MANHOLE DIAMETER	TYPE	A	B **	C	D	E	PIPE DIAMETER
48"	REINFORCED	36"	30"	5"	4 1/8"	6'-0"+	UP TO 21"
48"	REINFORCED	36"	30"	6"	6"	6'-0"+	* 24"

* IF CONNECTIONS AND TEES ARE REQUIRED, USE NEXT HIGHER DIAMETER MANHOLE.

** WHERE 30" OPENING IS NOT POSSIBLE, USE CONCENTRIC COVER, ALHAMBRA FOUNDRY TYPE A-1325 OR EQUIVALENT.

NOTES

1. PRECAST MANHOLE SHALL CONFORM TO THE REQUIREMENTS OF ASTM C478 AND BE DESIGNED FOR AASHTO H20 LOADING.

2. MATERIALS, EMBEDMENT, PLACEMENT, AND COMPACTION OF GRANULAR EMBEDMENT AND COMPACTED BACKFILL SHALL CONFORM TO THE CITY'S STANDARD DETAILS FOR PIPE BEDDING AND TRENCH BACKFILL.

Rene

RENE GUERRERO, CITY ENGINEER
RCE NO. 66263

8/28/17
DATE

△	REVISIONS	DATE	INITIAL

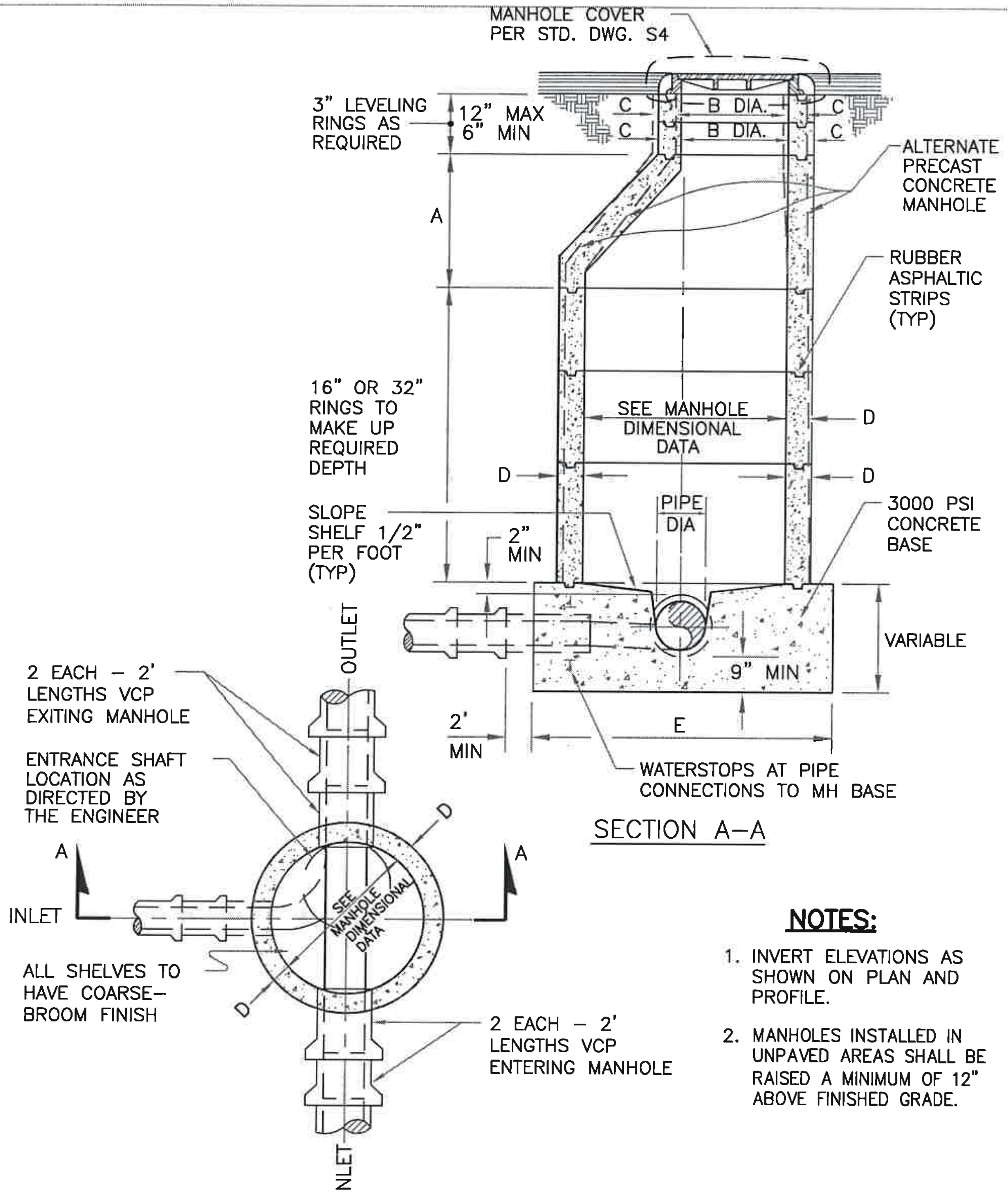
CITY OF POMONA
PUBLIC WORKS DEPARTMENT

MANHOLE 4 FT BY 3 FT
MAIN 15" DIAMETER OR LESS

DRAWN BY: DC
CHECKED BY: NB, IL
APPROVED BY: DP

STANDARD

S1



NOTES:

1. INVERT ELEVATIONS AS SHOWN ON PLAN AND PROFILE.
2. MANHOLES INSTALLED IN UNPAVED AREAS SHALL BE RAISED A MINIMUM OF 12" ABOVE FINISHED GRADE.

RENE GUERRERO, CITY ENGINEER RCE NO. 66263	8/28/17 DATE	CITY OF POMONA PUBLIC WORKS DEPARTMENT	
		MANHOLE 5 FT BY 3 FT 18" DIA. AND LARGER	
		DRAWN BY: DC CHECKED BY: NB, IL APPROVED BY: DP	STANDARD
△ REVISIONS	DATE / INITIAL		S2 1 OF 2

MANHOLE DIMENSIONAL DATA							
MANHOLE DIAMETER	TYPE	A	B **	C	D	E	PIPE DIAMETER
60"	REINFORCED	36"	30"	6"	6"	7'-0"+	27" TO 39"
60"	REINFORCED	36"	30"	6"	6"	7'-0"+	* 42"

* IF CONNECTIONS AND TEES ARE REQUIRED, USE NEXT HIGHER DIAMETER MANHOLE.

** WHERE 30" OPENING IS NOT POSSIBLE, USE CONCENTRIC COVER, ALHAMBRA FOUNDRY TYPE A-1325 OR EQUIVALENT.

NOTES

1. PRECAST MANHOLE SHALL CONFORM TO THE REQUIREMENTS OF ASTM C478 AND BE DESIGNED FOR AASHTO H20 LOADING.

2. MATERIALS, EMBEDMENT, PLACEMENT, AND COMPACTION OF GRANULAR EMBEDMENT AND COMPACTED BACKFILL SHALL CONFORM TO THE CITY'S STANDARD DETAILS FOR PIPE BEDDING AND TRENCH BACKFILL.

Rene

RENE GUERRERO, CITY ENGINEER
RCE NO. 66263

8/28/17
DATE

△	REVISIONS	DATE	INITIAL

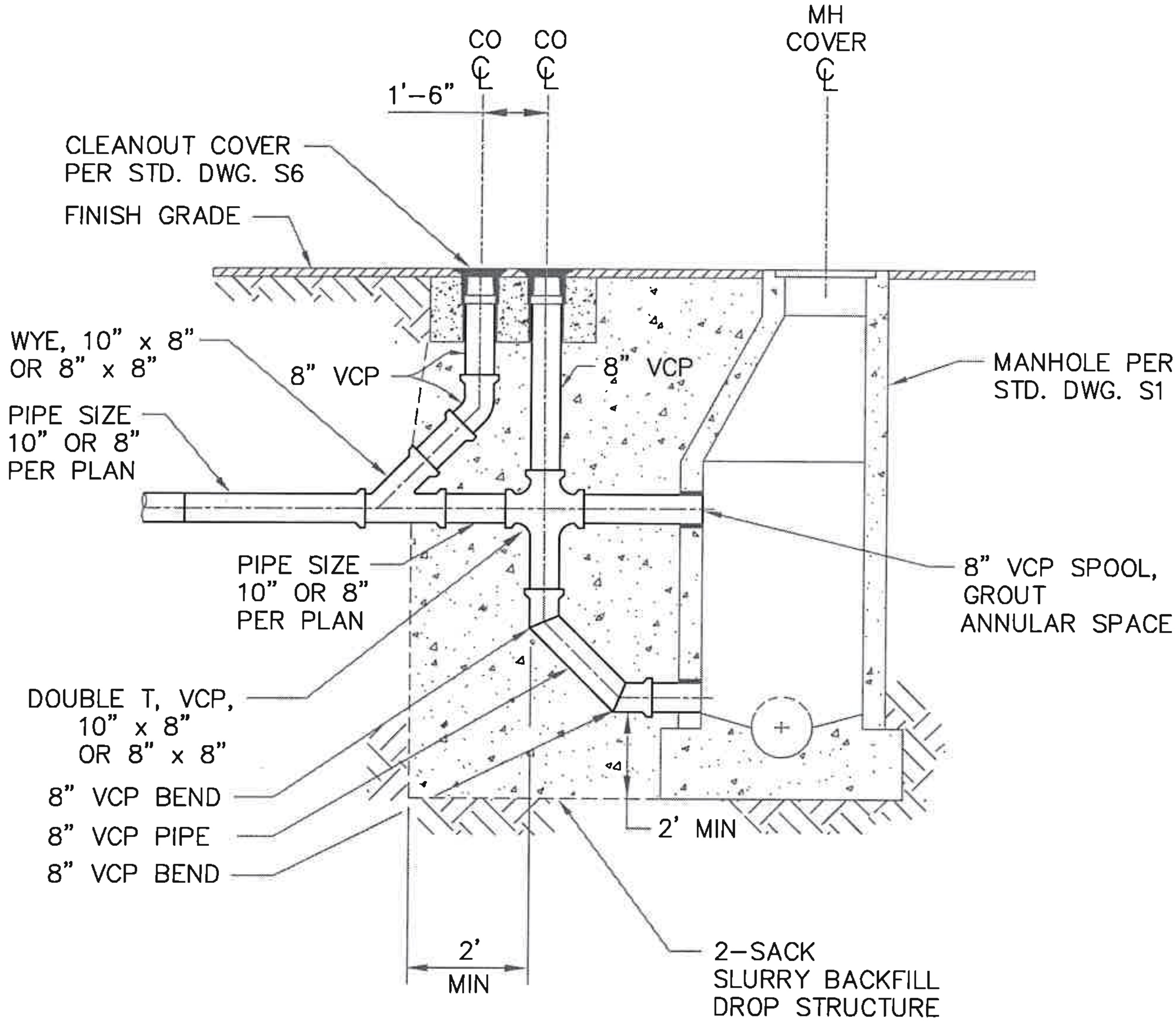
CITY OF POMONA
PUBLIC WORKS DEPARTMENT

MANHOLE 5 FT BY 3 FT
STANDARD 48" MANHOLE

DRAWN BY: DC
CHECKED BY: NB, IL
APPROVED BY: DP

STANDARD

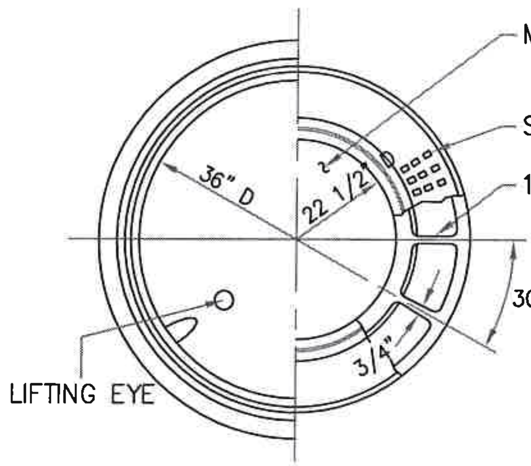
S2



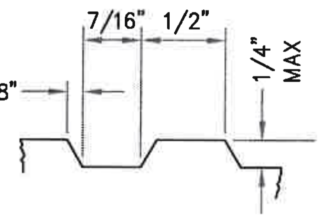
NOTES:

1. MANHOLES INSTALLED IN UNPAVED AREAS SHALL BE RAISED MINIMUM 12" ABOVE FINISH GRADE.
2. CLEANOUTS MAY BE INSTALLED AT FINISH GRADE.

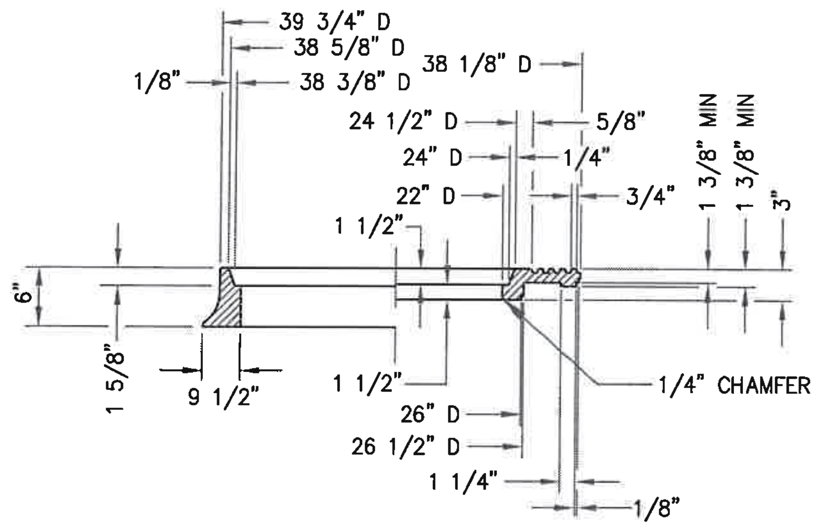
RENE GUERRERO, CITY ENGINEER RCE NO. 66263	8/28/17 DATE		CITY OF POMONA PUBLIC WORKS DEPARTMENT
			DROP MANHOLE
			DRAWN BY: DC CHECKED BY: NB, IL APPROVED BY: DP
REVISIONS	DATE	INITIAL	STANDARD S3



HALF PLAN FRAME AND COVER



"DETAIL A"



HALF SECTION FRAME AND COVER

NOTES:

1. FRAME AND COVER SHALL BE CAST IRON. CAST IRON SHALL CONFORM TO ASTM 48, CLASS 35B.
2. WEIGHTS: FRAME 314 – 363 LBS
   OUTER COVER 285 – 330 LBS
   INNER COVER 147 – 171 LBS
3. MACHINE ALL MATCHING SURFACES AND SEATS OF FRAME AND COVER
4. IMPORTED FRAME AND COVERS SHALL HAVE THE COUNTRY OF ORIGIN MARKED IN COMPLIANCE WITH FEDERAL REGULATIONS.

Rene G

RENE GUERRERO, CITY ENGINEER
RCE NO. 66263

8/28/17
DATE

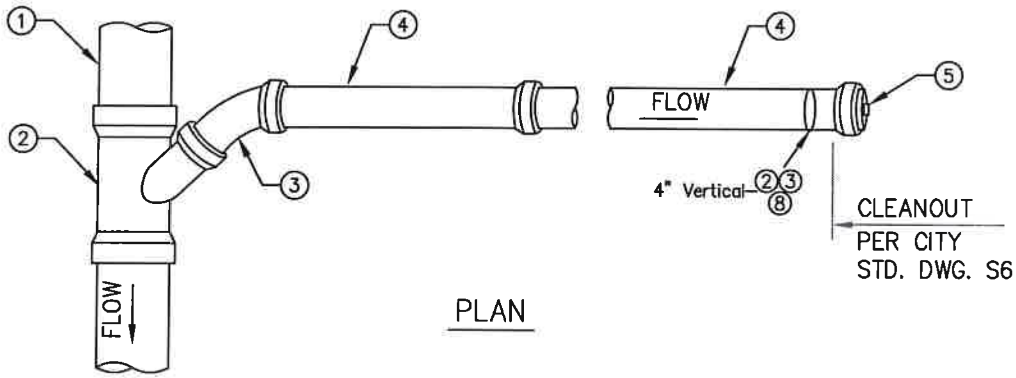
△	REVISIONS	DATE	INITIAL

CITY OF POMONA
PUBLIC WORKS DEPARTMENT

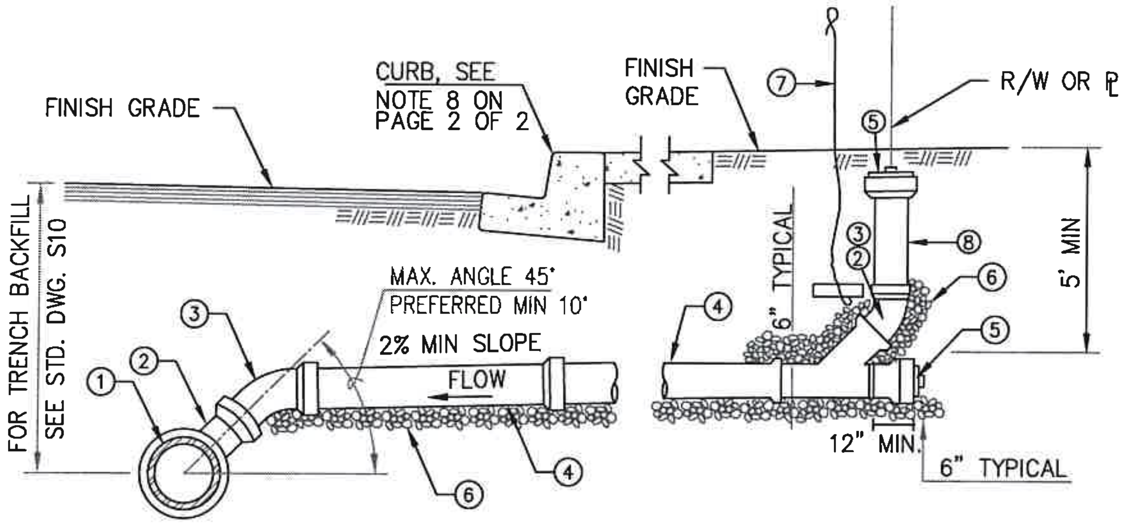
MANHOLE COVER

DRAWN BY: DC
CHECKED BY: NB, IL
APPROVED BY: DP

STANDARD S4



PLAN



ELEVATION

FOR SEWER LATERAL NOTES, SEE PAGE 2 OF 2

ITEM NO.	SIZE AND DESCRIPTION	ITEM NO.	SIZE AND DESCRIPTION
1	SEWER MAIN	5	PLUG OR CAP
2	45° WYE	6	3/4" MAXIMUM CRUSHED ROCK
3	45° ELBOW	7	9 WIRE ATTACHED TO A BRICK; WIRE TO BE LAID ON TOP OF PIPE
4	PIPE LATERAL, SEE NOTES 3 & 5 ON PAGE 2 OF 2	8	CLEANOUT PER STD. DWG. S6

Rene G. 8/28/17
RENE GUERRERO, CITY ENGINEER DATE
RCE NO. 66263

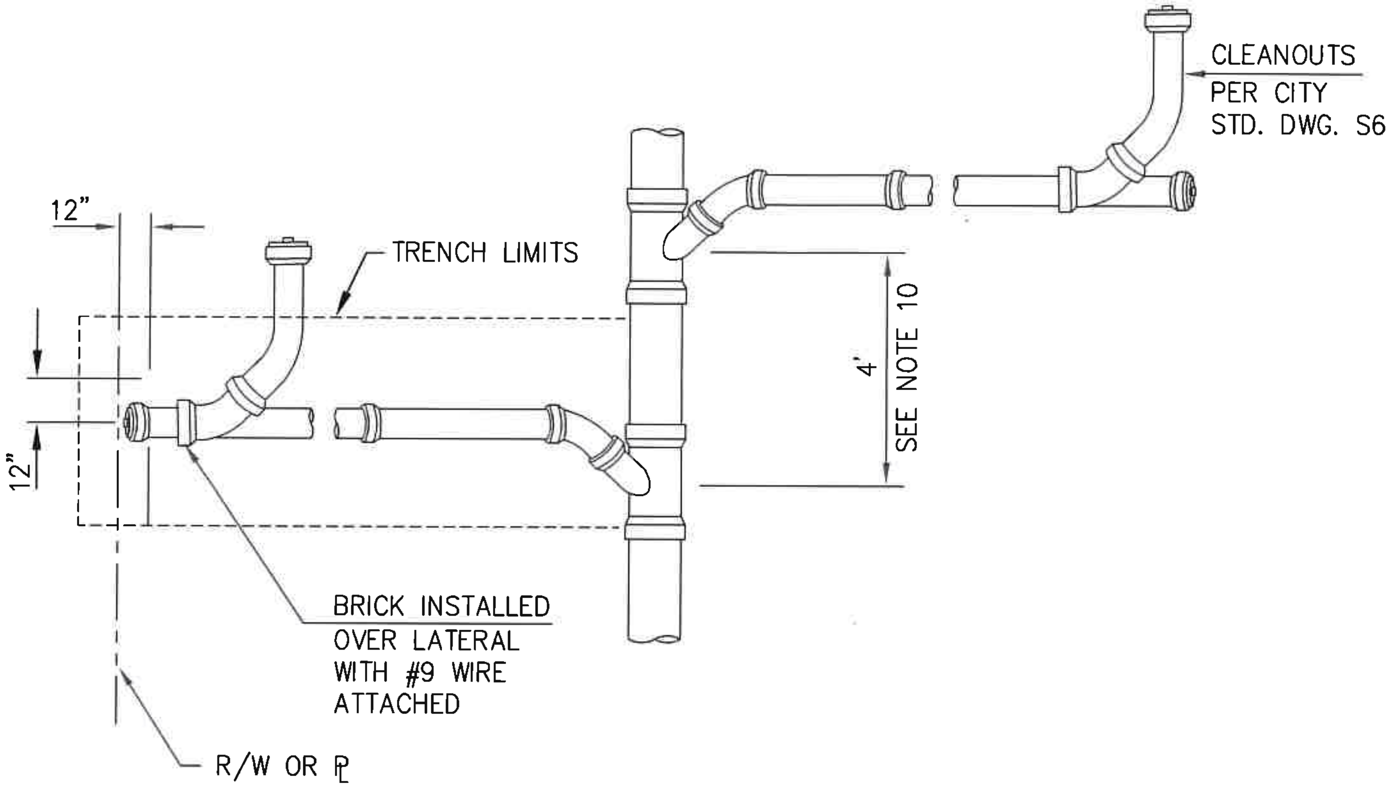
△	REVISIONS	DATE	INITIAL

CITY OF POMONA
PUBLIC WORKS DEPARTMENT

HOUSE LATERAL CONNECTION

DRAWN BY: DC
CHECKED BY: NP, IL
APPROVED BY: DP

STANDARD S5



SANITARY SEWER LATERAL DETAIL

SEE NOTE 10 BELOW

NOTES:

1. REFER TO PROJECT SPECIFICATIONS WHERE APPLICABLE.
2. IN NO CASE SHALL LATERAL CONNECT DIRECTLY TO TOP OF SEWER MAIN.
3. LATERAL SHALL BE INSTALLED TO PROPERTY LINE UNLESS SPECIFIED ON PLANS.
4. MINIMUM 5' COVER ABOVE LATERAL AT PROPERTY LINE.
5. LATERAL TO HAVE A MINIMUM SLOPE OF 2%; APPROVAL REQUIRED FOR SLOPE LESS THAN 2%. INSTALL WITH "SEWER" IDENTIFICATION TAPE.
6. VERTICAL PIPE SHALL BE BRACED WHILE BACKFILLING TRENCH.
7. IDENTIFY SANITARY SEWER LATERAL LOCATION ON CURB.
8. MATERIALS SHALL BE SELECTED FROM THE CITY'S APPROVED MATERIALS LIST.
9. FOR SANITARY SEWER LATERAL INSTALLATIONS, SEE PAGE 1 OF 2.
10. FOR SEWERS SPECIFIED AS VCP PIPE, A MINIMUM 3' SECTION OF PIPE IS REQUIRED BETWEEN FITTINGS.
11. SEWER CLEANOUT, SEE STD. DWG. S6

Rene Guerrero 9/18/17

RENE GUERRERO, CITY ENGINEER
RCE NO. 66263

DATE

CITY OF POMONA
PUBLIC WORKS DEPARTMENT

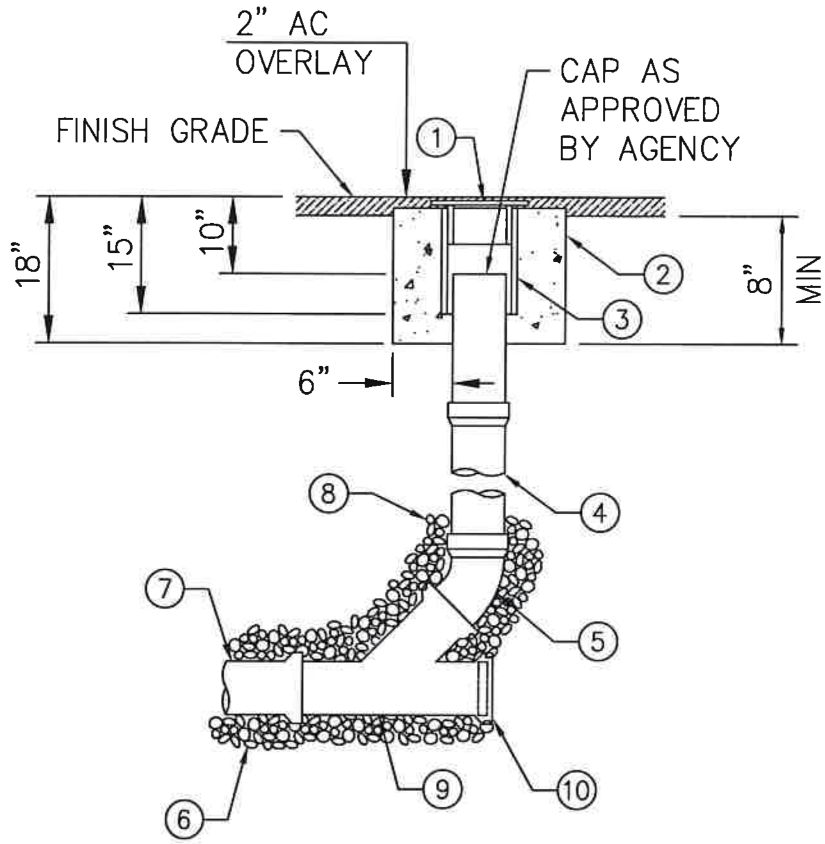
HOUSE LATERAL CONNECTION

△	REVISIONS	DATE	INITIAL

DRAWN BY: DC
CHECKED BY: NP, IL
APPROVED BY: DP

STANDARD

S5
2 OF 2



NOTES:

1. REFER TO CITY'S STANDARD SPECIFICATIONS WHERE APPLICABLE.
2. CLEANOUTS TO BE INSTALLED AT THE END OF MAINS WHERE INDICATED ON THE PLANS.
3. CLEANOUT PIPE TO BE SAME SIZE AND MATERIAL AS SEWER PIPE UP TO 8".
4. BACKFILL TO TOP OF 45° BEND WITH 3/4" CRUSHED ROCK.
5. MATERIALS SHALL BE SELECTED FROM THE CITY'S APPROVED MATERIALS LIST.
6. ITEM NO. 10 TO BE OMITTED IF CONNECTED TO A NEW OR EXISTING LATERAL.

ITEM NO.	SIZE AND DESCRIPTION	ITEM NO.	SIZE AND DESCRIPTION
1	12" CAST IRON CLEANOUT BOX COVER, LID TO BE LABELED "SEWER"	7	SEWER LATERAL
2	CONCRETE RING	8	3/4" CRUSHED ROCK, SEE NOTE 4
3	12" PVC, C-900 X 15" LONG (CLEANOUT BOX)	9	STANDARD WYE BRANCH
4	VCP PIPE AT REQUIRED LENGTH AND DIAMETER	10	INSTALL PLUG OR CAP
5	45° ELBOW		
6	3/4" CRUSHED ROCK PIPE BEDDING		

Rene G[signature] 8/28/17

RENE GUERRERO, CITY ENGINEER DATE
RCE NO. 66263

REVISIONS	DATE	INITIAL

CITY OF POMONA
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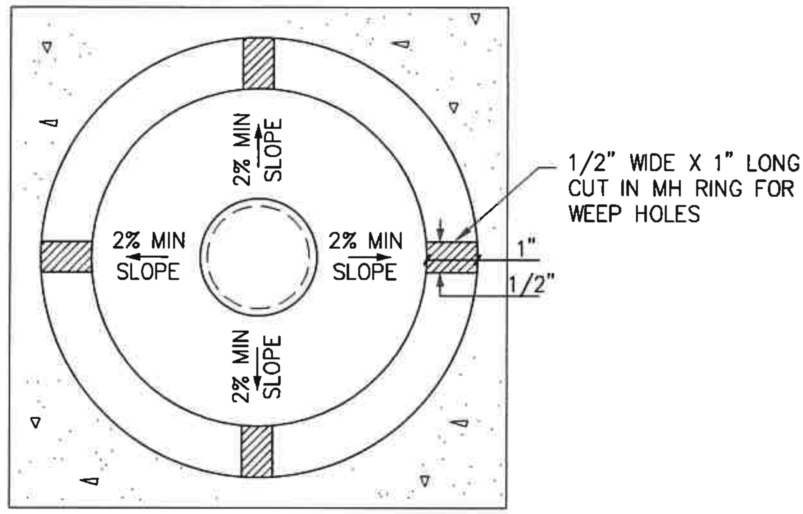
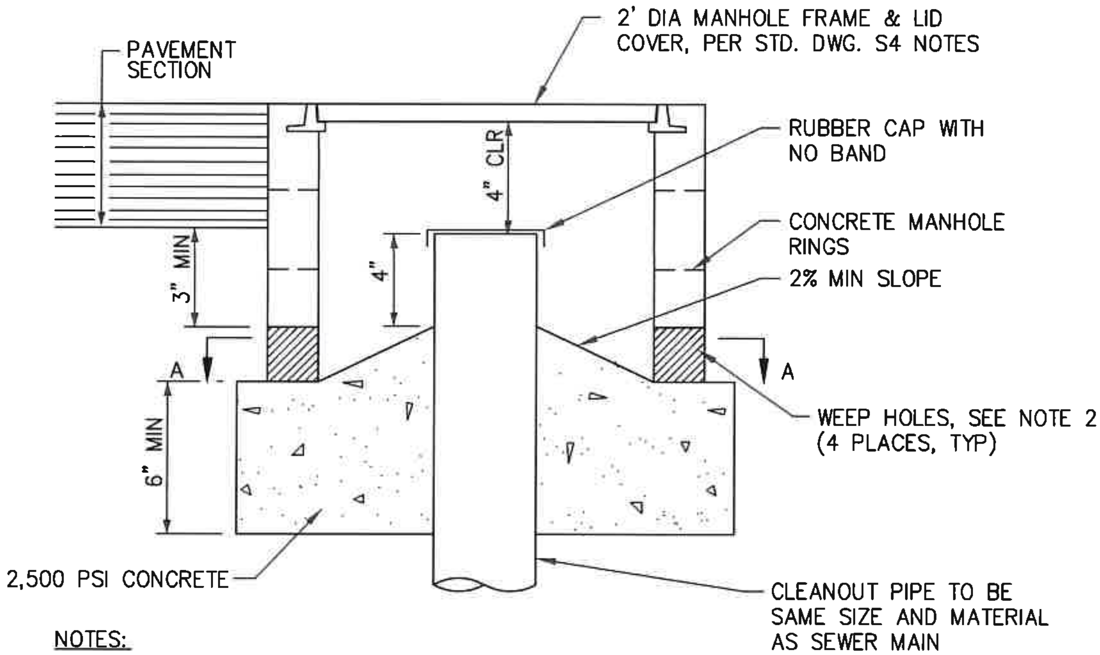
SEWER LATERAL CLEANOUT

DRAWN BY: AA
CHECKED BY: IL, RG, NH
APPROVED BY: DP

STANDARD S6



SECTION A-A



NOTES:

1. CLEANOUTS INSTALLED IN LANDSCAPED EASEMENTS SHALL BE RAISED MINIMUM 2" ABOVE FINISH GRADE.
2. WEEP HOLES SHALL NOT BE COVERED WITH AC OR CONCRETE LAYER OF PAVEMENT SECTION.

Rene [signature] 9/18/17

RENE GUERRERO, CITY ENGINEER
RCE NO. 66263
DATE

△	REVISIONS	DATE	INITIAL

CITY OF POMONA
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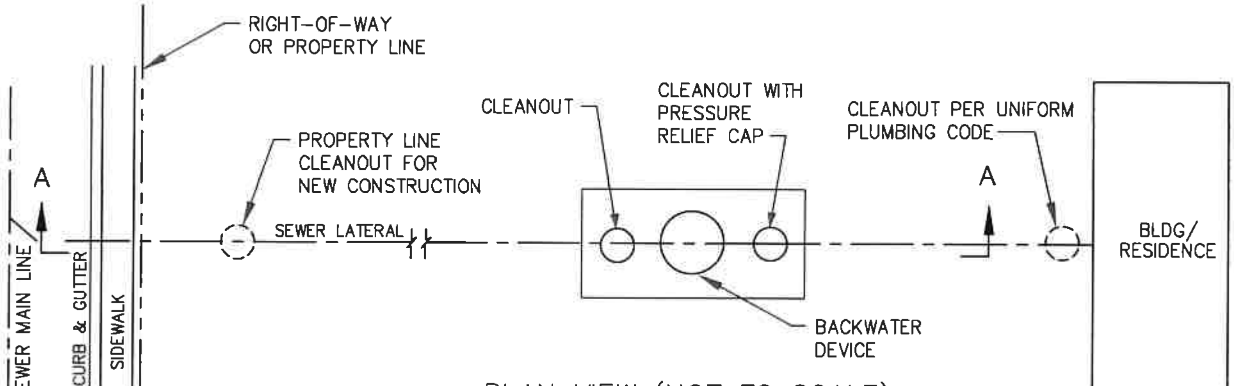
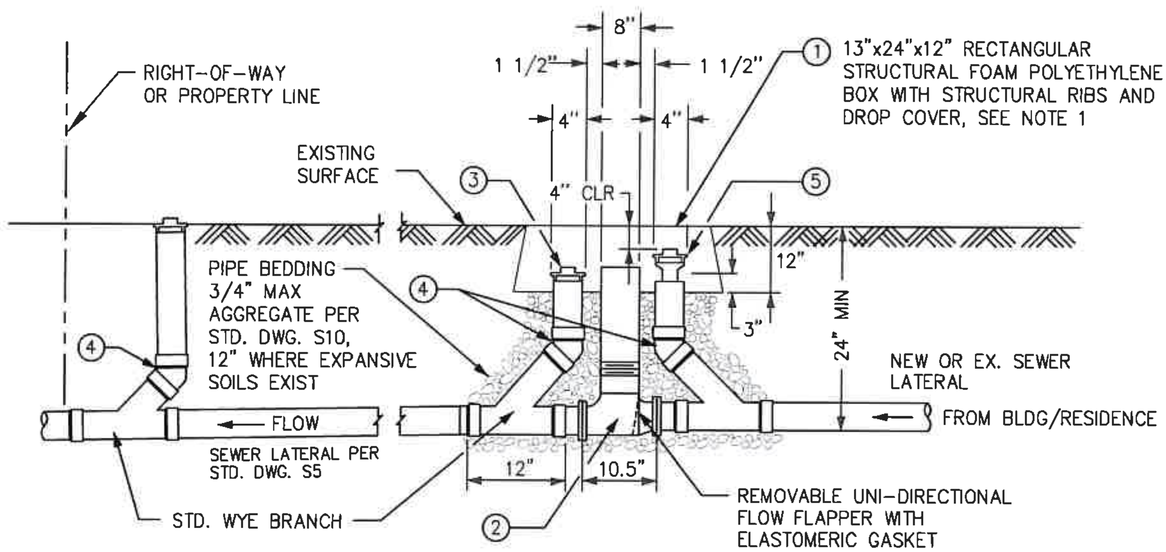
SEWER MAIN CLEANOUT ACCESS

DRAWN BY: AA
CHECKED BY: IL, RG, NH
APPROVED BY: DP

STANDARD S7



PLAN VIEW (NOT TO SCALE)



SECTION A-A (NOT TO SCALE)

NOTES:

1. WHEN BACKWATER DEVICE IS INSTALLED IN THE DRIVEWAY, ALLEY OR STREET, A TRAFFIC RATED BOX AND LID IS REQUIRED.
2. ALL PIPING SHALL BE SPECIFIED AS VCP PIPE.

ITEM NO.	SIZE AND DESCRIPTION
1	INSTALL VALVE BOX SO THAT IT IS FLUSH WITH EXISTING PAVEMENT OR SIDEWALK SURFACE, AND 1" ABOVE GRADE WHEN INSTALLED IN LANDSCAPE AREA.
2	BACKWATER DEVICE AND ATTACHED PARTS SHALL BE PER UNIFORM PLUMBING CODE (U.P.C) AND APPROVED BY THE BUILDING DIVISION.
3	CLEANOUT PLUG (ABS) THREADED.
4	STANDARD 45° BEND.
5	CLEANOUT WITH AN APPROVED PRESSURE RELIEF CAP. CAP SHALL NOT PROJECT INTO THE SEWER LATERAL CROSS SECTIONAL AREA.

Rene G
RENE GUERRERO, CITY ENGINEER
RCE NO. 66263

9/18/17
DATE

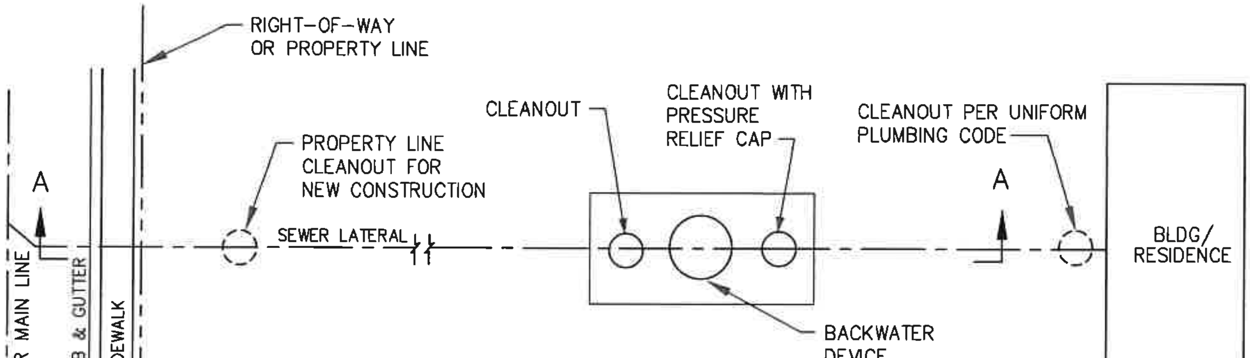
	REVISIONS	DATE	INITIAL
△	REVISIONS	DATE	INITIAL

CITY OF POMONA
PUBLIC WORKS DEPARTMENT

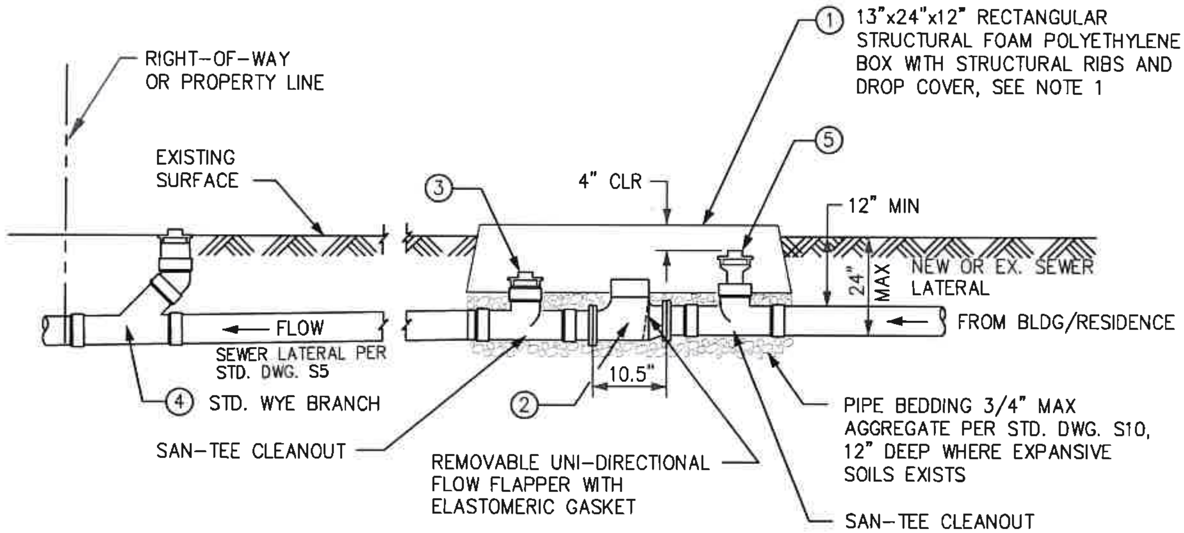
4" BACKWATER DEVICE
(FOR LATERALS 2' OR DEEPER)

DRAWN BY: AA
CHECKED BY: IL, RG, NH
APPROVED BY: DP

STANDARD S8



PLAN VIEW
(NOT TO SCALE)



SECTION A-A
(NOT TO SCALE)

NOTES:

1. WHEN BACKWATER DEVICE IS INSTALLED IN THE DRIVEWAY, ALLEY OR STREET, A TRAFFIC RATED BOX AND LID IS REQUIRED.
2. ALL PIPING SHALL BE SPECIFIED AS VCP PIPE.

ITEM NO.	SIZE AND DESCRIPTION
1	INSTALL VALVE BOX SO THAT IT IS FLUSH WITH EXISTING PAVEMENT OR SIDEWALK SURFACE, AND 1" ABOVE GRADE WHEN INSTALLED IN LANDSCAPE AREA.
2	BACKWATER DEVICE AND ATTACHED PARTS SHALL BE PER UNIFORM PLUMBING CODE (U.P.C) AND APPROVED BY THE BUILDING DIVISION.
3	CLEANOUT PLUG (ABS) THREADED.
4	SAN-TEES ARE ALLOWED WHERE ID IS LESS THAN 24" DEEP.
5	CLEANOUT WITH AN APPROVED PRESSURE RELIEF CAP. CAP SHALL NOT PROJECT INTO THE SEWER LATERAL CROSS SECTIONAL AREA.

Rene G

RENE GUERRERO, CITY ENGINEER
RCE NO. 66263

9/18/17
DATE

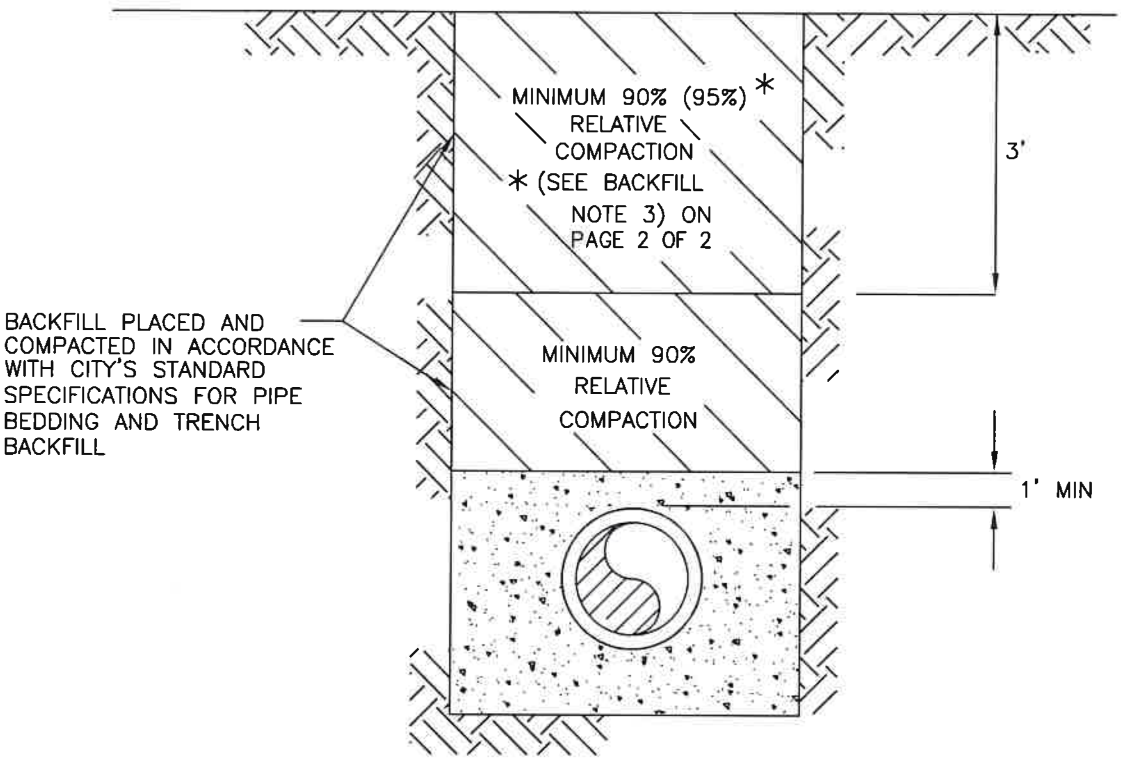
CITY OF POMONA
PUBLIC WORKS DEPARTMENT

4" BACKWATER DEVICE – SHALLOW (FOR LATERALS)

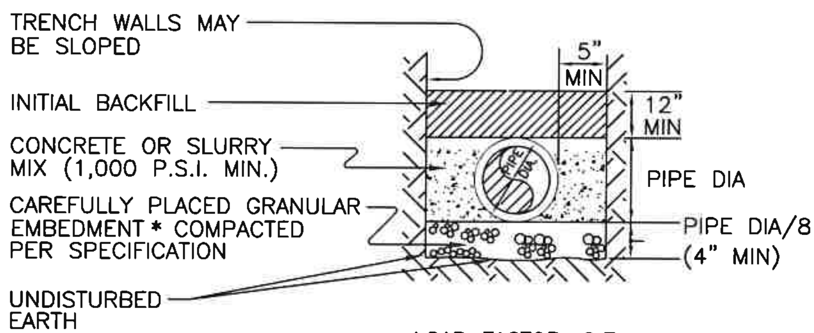
	REVISIONS	DATE	INITIAL

DRAWN BY: AA
CHECKED BY: IL, RG, NH
APPROVED BY: DP

STANDARD S9



BACKFILL DETAIL
NO SCALE



LOAD FACTOR: 2.7

NOTE: THIS TYPE OF CONSTRUCTION REQUIRES THE CONCRETE TO EXTEND FROM THE PIPE TO THE TRENCH WALL. CAUTION: NOT RECOMMENDED WHERE NATIVE SOILS ARE EXPANSIVE.

SLURRY BACKFILL DETAIL

Rene G. 8/28/17
RENE GUERRERO, CITY ENGINEER
RCE NO. 66263
DATE

CITY OF POMONA
PUBLIC WORKS DEPARTMENT

PIPE BEDDING AND
TRENCH BACKFILL NOTES

△	REVISIONS	DATE	INITIAL

DRAWN BY: AA
CHECKED BY: IL, RG, NH
APPROVED BY: DP

STANDARD

S10
1 OF 2

BACKFILL NOTES

1. MATERIAL FOR COMPACTED BACKFILL WILL CONSIST OF SUITABLE NATIVE EXCAVATED MATERIALS, IMPORTED SOILS, OR GRADED GRAVEL AS DEFINED IN THE PROJECT'S STANDARD SPECIFICATIONS FOR PIPE BEDDING.

2. TRENCH BACKFILL SLAG, PEA GRAVEL, CRUSHED ROCK, OR OTHER ALTERNATIVE MATERIALS ARE NOT ACCEPTABLE.

3. COMPACTION UNDER THE STREET SHALL BE 95% TO 6" BELOW PAVEMENT.

BEDDING DETAIL NOTES

1. SLAG, PEA GRAVEL, OR OTHER ALTERNATIVE MATERIALS ARE NOT ACCEPTABLE IN LIEU OF GRANULAR EMBEDMENT. GRANULAR EMBEDMENT IS COARSE GRAINED NATIVE SOIL OR IMPORTED SAND WITH A MINIMUM SAND EQUIVALENCE OF 30, AND OF SUCH SIZE THAT 90 TO 100 PERCENT WILL PASS A NO. 4 SIEVE AND NO MORE THAN 5 PERCENT WILL PASS A NO. 200 SIEVE.

2. TRENCH SHORING AND TRENCH WALL SLOPING SHALL BE IN CONFORMANCE WITH STATE OF CALIFORNIA DEPARTMENT OF INDUSTRIAL SAFETY REQUIREMENTS AND THE REQUIREMENTS OF THE PROJECT SPECIFICATIONS.

3. MATERIALS, EMBEDMENT, PLACEMENT AND COMPACTION OF GRANULAR EMBEDMENT AND COMPACTED BACKFILL WILL CONFORM TO THE CITY'S STANDARD SPECIFICATIONS FOR PIPE BEDDING AND TRENCH BACKFILL.

Rene G

RENE GUERRERO, CITY ENGINEER
RCE NO. 66263

8/28/17
DATE

CITY OF POMONA
PUBLIC WORKS DEPARTMENT

△	REVISIONS	DATE	INITIAL

PIPE BEDDING AND
TRENCH BACKFILL NOTES

DRAWN BY: AA
CHECKED BY: IL, RG, NH
APPROVED BY: DP

STANDARD

S10

CITY OF POMONA
SEWER DESIGN POLICY AND STANDARD DRAWINGS

May 2008
Updated October 2013

The City of Pomona
Public Works Department
Pomona, California

Table of Contents

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Attachments

Introduction

These Sewer Design Guidelines are for planning and design of wastewater collection facilities within the City of Pomona. This guide summarizes and outlines relevant City policies, applicable codes, engineering and operational practices, and procedures that have been developed to establish a cost-effective, reliable, and safe wastewater collection system. In conjunction with this design guide are all applicable current standard drawings, specifications, and industry requirements for the planning and design of wastewater infrastructures.

This guide is not a substitute for professional experience, nor is it meant to relieve the design engineer from his/her responsibility to use good engineering judgment. The engineer shall be responsible for providing a design that follows industry standards and allows crews to safely repair and maintain the facilities, provides good service, achieves useful life spans, and will not create a public nuisance or hazard. Under most conditions, this guide should serve as a minimum standard. However, it is not meant to preclude alternative designs when the standards cannot be met, or when special or emergency conditions warrant, as long as proper City authorization is obtained.

This guideline includes minimum design standards for sewer mains, sewer manholes, sewer laterals, and general guidelines for common sewer rehabilitation options.

This guideline does not include non-standard design considerations for wastewater facilities including pump or lift stations, force mains, inverted siphons, internal sealing of existing sewers, treatment plants, outfall sewers, energy dissipaters, regulating devices, and/or flow measurement devices.

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Chapter 1
Sewer Mains

1.1 Horizontal Alignment

The street centerline is the preferred horizontal alignment for a proposed sewer collection system. The alignment should minimize costs and conflicts with other substructures. The minimum distance from a sewer main centerline or manhole shall be ten (10) feet from the edge of a street pavement or face of curb, and 15 feet from buildings. Maintaining these distances will minimize access constraints during construction and future repair activities, and reduce the possibility of root intrusion. In exceptional cases where the sewer must be located less than these minimum distances, a request for design deviation must be submitted and approved by the Water/Wastewater Operations Manager. If a deviation is allowed, design elements to mitigate the reduced distances will be required, and may include, but be limited to, pipe upgrades, pipe sleeves, deep foundations on adjacent structures, root barrier wraps or coatings, and underground root barrier walls.

1.1.1 Straight Alignments Required

Sewer mains shall be designed and constructed in straight alignments between manholes. Straight sewers are easier to inspect, less vulnerable to damage from cleaning equipment, and easier to approximate its location in the field by inferring a straight line between manholes. Manholes may be located off of the centerline of residential streets and around curves, if all portions of the sewer main and manholes are a minimum of ten (10) feet from the edge of pavement or face of curb.

1.1.2 Curves

Practical and economical situations may warrant the construction of horizontal curves in sewer mains between manholes. These situations may include, but are not limited to, avoiding existing substructures, reducing excessive manholes in curved and hillside streets, or avoiding short manhole to manhole runs where high velocity flow may overtop the manhole trough and shelf.

Whenever possible the sewer horizontal curve should be concentric with the street horizontal curve. The minimum radius of curvature attainable is governed by the proposed material constraints, the type of joint specified or permitted, the pipe segment lengths, the maximum bevel permitted, and the maximum separation of the abutting pipe ends permitted on the convex side of the curved sewer.

1.1.3 Proximity to Medians

If the sewer will serve the property on one side of a street only, it may be located on that side of the street if no potential conflict with other utilities exists. If there will be or could be a raised median, the sewer line should be located on the south or west side of the street and a minimum of five (5) feet from the median curb, but it should be a minimum horizontal distance of ten (10) feet from any trees or shrubs that are three (3) feet or higher at maturity. In such cases, the sewer shall be located in the center of the number one traffic lane or directly between the number one and number two lanes, under the lane striping. Sewer lines shall not be located below a public sidewalk.

1.1.4 Minimum Separation

The minimum distance between the outside edges of proposed sewer mains and parallel existing or proposed potable and non-potable water mains shall be at least ten (10) feet. Deviations, if allowed, shall be approved by the Water/Wastewater Operations Manager. Review and written approval shall be required from the Department of Public Health for separation deviations between water, reclaimed water, and sewer pipelines. A copy of sepraration guidelines from DPH is located in Attachment B – California Department of Health Services Guidance Memo No. 2003-02: Guidance Criteria for the Separation of Water Mains and Non-Potable Pipelines.

1.1.5 Stationing

Proposed sewer centerlines shall be tied by dimensions and stations to the street centerline and other similar features with appropriate field book references. All begin curves, end curves, and point of intersections of the horizontal curves shall be tied to these same references.

1.2 Vertical Alignment and Depth

The vertical alignment of sewer mains shall accommodate gravity flows from buildings, substructures, basement elevations, and other sources of wastewater generation, low ground elevations, and general terrain of the area being served. Generally, the shallowest vertical alignment will be the most economical. The minimum depth of sewer main inverts shall be seven (7) feet of cover over top of pipe except for at terminal reaches, which will be a minimum of six (6) feet

New sewers shall be designed with minimum depths to provide a sewer lateral depth of at least five (5) feet at the property line measured from the top of curb. Mains with a depth of 15 feet or greater (distance between invert and finished grade) shall require design approval from the Water/Wastewater Operations Manager.

Lateral depth requirements shall be considered in sewer replacement projects. No lateral connections will be allowed on mains that exceed 20 feet in depth. In those cases where mains are permitted to exceed 20 feet in depth, and lateral connections are necessary, a parallel collector sewer shall be required at standard depths. The design and installation of house lateral connections shall conform to the City of Pomona Standard Drawing S-5. Any deviation from the standard detail will require approval by the Water/Wastewater Operations Manager.

At a minimum, the profiles for sewer mains shall show elevations at the invert of manholes, invert at beginning and end of vertical curves, and at the top of manholes. At utility crossings, top and bottom elevations of the outside of pipes shall be shown as well as the top of ground surface.

1.3 Change in Direction

Sewer mains with a 15-inch diameter and smaller shall not have a change of horizontal direction greater than 90 degrees. Changes in direction shall occur in a manhole.

Sewer mains with an 18-inch diameter and larger shall not have a change of horizontal direction greater than 45 degrees. Changes in direction shall occur in a manhole, vault, or junction structure. Special attention should be given to assure laminar flow and avoid build-up of flow or debris on the manhole shelf.

1.4 Size

The size of a sewer main is defined as the inside diameter of the pipe. Sewer mains shall be a minimum of eight (8) inches in diameter in residential and multi-residential areas, and a minimum of ten (10) inches in diameter in commercial, industrial, and high-rise building areas. Sewer mains located in areas that include a combination of residential and/or commercial, industrial, or high rise buildings shall be a minimum of ten (10) inches in diameter.

If a new development that creates flows larger than the existing mainline can handle, then that development must pay for the upgrade in main size to accommodate existing and new flows.

1.5 Material

A variety of options are available for eliminating or minimizing possible problems arising from corrosive environments. Selection of appropriate materials for a given service is the most important consideration. It is also possible, in some cases, to modify the environment to which the materials will be exposed. The use of coatings or linings can also be effective in controlling corrosion of materials exposed to corrosive environments.

All proposed public sewer facility installations shall be constructed with materials currently listed in the latest edition of the City of Pomona Approved Materials List for Municipal Sewers (see Attachment A).

1. All VCP pipe and plastic gasket joints shall be made in strict conformance with all requirements of the latest revision of ASTM C700, ASTM C425, and to the requirements of these specifications. All pipe shall be high strength vitrified clay pipe conforming to the requirements of Section 207-8 of the Standard Specifications For Public Works Construction (“Greenbook”), latest edition.
2. All pipe shall be manufactured and tested in the United States. Testing shall conform to SSPWC Section 207-8.5.
3. All pipe and joints manufactured pursuant to these specifications shall be suitable for the conveyance of sewage. All joint materials shall have a strong, permanent bond to the pipe. All pipe and joints shall meet minimum requirements set forth in the most recent edition of the Standard Specifications For Public Works Construction (“Greenbook”).
4. The actual cross-sectional area of the inside diameter of the pipe shall be not less than the computed cross-sectional area, based on the stated nominal diameter of the pipe.
5. Use plain end pipes with shear rings Per 306-1.2.3 (Type D Joint) for all point repairs and facility replacements.

Sewer mains within 50 feet of a domestic water supply (such as a spring or well) shall be constructed of polyurethane lined ductile iron with restraining joints. All sewers serving commercial or industrial facilities shall be polyurethane lined ductile iron pipe.

1.6 Capacity

For a new development and/or redevelopment, the planning study (inclusive of a sewer hydraulic model) shall address the capacity of all sewer collection and trunk sewer systems that will be impacted downstream of the new development and/or redevelopment, and shall demonstrate that sewer capacity is available in those systems to accommodate the new development and/or redevelopment. Authorization and approval to impact any downstream sewer system in excess of design criteria maximum capacity must be obtained from the City Water/Wastewater Operations Manager. If such downstream sewer system has already been identified as critical or sub-critical in a monitoring report, the City Water/Wastewater Operations Manager may require additional field monitoring of such downstream sewer systems to determine if adequate capacity is available.

For an existing development and/or redevelopment, the planning study shall address the existing capacity within the existing sewer collection system, and identify all existing facilities for which capacity will be exceeded by projected sewage flows.

In the absence of flow data or other reliable information, the Unit Generation Rates included in Table 1-1 may be utilized. Appropriate peaking ratios should be applied to determine flows, where specified by the City Water/Wastewater Operations Manager.

Table 1-1
Unit Generation Rates

Land Use	Unit Generation Rate
Residential	70 gallons per day per capita
Light Industrial & Institutional	0.04 gallons per day/square feet
Other Non-Residential	0.08 gallons per day/square feet

Design calculations shall include calculations of average day, maximum day, and peak hour flows. The submission of design calculations will be required and engineers should be prepared to substantiate pipe sizes, layout, population estimates, land uses or other design assumptions used to determine design flow. Also, the define peaking factors in terms of dry or wet-weather peaking factors. Maximum-day factors are typically not used in calculating peak wastewater flows. A range of residential peak dry-weather factors should be provided based on the number of dwelling units in the drainage basins, i.e. 2.0 to 3.0 for 2,000 DUs and less; and 1.5 to 2.0 for over 2,000 DUs.

New sewer mains 12 inches and smaller in diameter shall be sized to carry the projected peak hour wet weather flow at a depth not greater than half of the inside diameter of the pipe (d_n/D not to exceed 0.50, where d_n is the nominal depth of the water in the pipe and D is the diameter of the pipe). New sewer mains 15 inches and larger in diameter shall be sized to carry the projected peak hour wet weather flow at a depth of flow not greater than 3/4 of the inside diameter of the pipe (d_n/D not to exceed 0.75).

1.6.1 Drainage Basin

For all new development and redevelopment projects, the planning study shall address the sewage generating potential of the entire drainage basin in which the new development or redevelopment project is located. It shall also include current topographic maps of the entire drainage basin and any and all adjacent new developments or redevelopment projects for which a planning study has not yet been submitted and/or approved. The maps shall demonstrate that no adjacent development will be precluded from obtaining sewer service, including potential and existing pumped lands outside of the drainage basin and any lands outside of the incorporated boundaries of the City of Pomona with potential to be served, where no current master sewerage plan exists. The planning study shall also show all desired sewer system alignments, superimposed upon planned street alignments.

1.7 Velocity and Slope

In order to minimize the formation of deposits, the minimum grade for sewer mains shall be such as to provide a velocity of not less than two (2) feet per second (fps) when the sewer is flowing half full under peak dry weather flow (PDWF) at the time the pipe is placed into service. Additionally, during periods of low flow an actual velocity of 1½ fps should be achieved. Manning's coefficient of roughness "n" shall be assumed to be 0.013 for all types of sewer pipe. The maximum flow velocity shall not exceed eight (8) fps. The standard minimum slope sewer main is 1.0 percent. Water/Wastewater Operations Manager approval must be obtained to use design velocities outside of the minimum and maximum range stated above, except in the extreme upper reaches of the system with few connections. This section is consistent with Sec. **62-394 Grades** of the Pomona Municipal Code.

1.8 Bedding

Normal bedding is full rock encasement. All sewers, including laterals with normal cover, shall be adequately bedded according to City of Pomona Standard Drawing S-10. The induced trench method of construction in which the trench is excavated in compacted fill and refilled with loose compressible materials shall not be allowed.

1.9 Easements and Encroachments

Public sewer mains outside of the public right-of-way, if it is in the best interest of the City to allow public sewer mains on private property, shall have permanent easements of adequate width for access to maintain, repair, replace, and rehabilitate the facilities. All appurtenances and isolated reaches of sewer main shall have permanent access easements for rehabilitation and maintenance vehicles and necessary equipment. The minimum easement width shall be

15 feet. Sewers 24 inches or larger in diameter or over 12 feet in depth may require wider easements.

1.10 Utility Crossings

Sewer mains shall cross substructures and utilities as close to perpendicular as possible. Sewer mains shall pass under potable, storm, and recycled water lines with a minimum of one (1) foot clear distance between the outside of each pipeline, or as required by the Department of Public Health (DPH). Any deviations shall be approved by the DPH and/or the City's Water/Wastewater Operations Manager as appropriate. In project locations where the minimum sewer and water separation cannot be achieved, a minimum six (6) foot concrete slurry encasement of the sewer main shall be constructed at the crossing. See Attachment B – Guidance Memo No. 2003-02: Guidance Criteria for the Separation of Water Mains and Non-Potable Pipelines, issued on April 14, 2003 from the California Department of Health Services.

1.11 Prohibited Locations

Construction of sewer mains shall be prohibited in the following locations, unless approval of specific written deviations is obtained from the Water/Wastewater Operations Manager and situations are mitigated with engineered solutions:

a. Within wetlands
b. Parallel to major highways and freeways (perpendicular crossings shall be allowed)
c. Under structures
d. Within ten (10) feet of trees or shrubs that mature naturally to a height of over three (3) feet
e. Within medians
f. Under sidewalks
g. Parallel to railroad alignments unless a separate easement with access is acquired
h. Inaccessible areas
i. Within 15 feet of buildings
j. Near the outlet of any storm drain catch basins
k. Within ten (10) feet of a water main

1.12 Approval Requirement for Prohibited Locations

Special approval is required for construction of sewer pipelines in prohibited locations. Special details depicting horizontal and vertical relationship between the proposed sewer facility and existing pipelines, other utilities, and appurtenances are required. Existing utilities involved are to be potholed to verify vertical and horizontal location. A letter requesting special approval is to be submitted to the Public Works Department. The request for special approval is to include a discussion of why special consideration to construct a sewer main in a prohibited location is warranted. The submittal for special approval shall include the written request, pothole information, and special details.

1.13 Abandonment of Mains

Do not begin cut, plug, and abandonment operations until replacement sewer has been constructed and tested, and all service connections have been installed.

Install plug, clamp, and concrete reaction block and make cut at location shown on drawings.

After main to be abandoned has been cut and capped, check for other sources feeding abandoned sewer main. When sources are found, notify the Public Works Engineer or Public Works Inspector immediately. Cut and cap abandoned main at point of other feed as directed by Engineer.

Plug or cap ends or opening in abandoned main in manner approved by Engineer. Install concrete around cap and over pipe to ensure; before backfilling of a capped service line is started, the capping must be observed by the Public Works Engineer or Public Works Inspector.

Mark location of abandoned sewer laterals on drawings.

Cutting and Capping of Sewer Laterals

Do not begin cut, plug, and abandonment operations until replacement lateral, if necessary, has been constructed and tested, and all service connections have been installed.

Sewer laterals shall be cut and capped in two locations. The service line shall be cut and capped as close to the main as practical but no more than 5’ from the main unless obstacles exist to prevent the same (pavement, other utilities, etc). Services shall also be cut and capped 5’ from the building envelope.

Before backfilling of a capped service line is started, the capping must be observed by the Public Works Engineer or Public Works Inspector.

After sewer lateral to be abandoned has been cut and capped, check for any other sources feeding abandoned sewer service. When sources are found, notify the Public Works Engineer or Public Works Inspector immediately. Cut and cap abandoned main at point of other feed as directed by the Public Works Engineer or Public Works Inspector

Plug or cap ends or opening in abandoned service in manner approved by the Engineer.

Remove and dispose of surface identifications such as cleanouts. Clean-outs in improved streets, shall be filled with concrete.

Indicate that sewer laterals have been abandoned and their location on drawings.

Installation of Slurry

Abandon sewer lines by completely filling sewer line with slurry. Abandon manholes and other structures by filling with slurry or other inert material as applicable, within depth of structures left in place.

Temporarily plug sewer lines which are to remain in operation during pouring/pumping to keep lines free of slurry.

1.14 Leakage Test of Mains

Attention is directed to Section 306-1.4.4 of the Standard Specifications. Prior to connecting the sewer laterals to the sewer mains, contractor shall plug and brace all openings, including wyes. Air shall be introduced into the main until a pressure of 4 psi has been reached at which time the pressure shall be maintained at 4 psi for at least 2 minutes. Disconnect the air supply. Allow the pressure to drop to 3.5 psi at which time start a stop watch. Determine the time in seconds that is required for the pressure to drop to 2.5 psi. If the time lapse (in seconds) required for the air pressure to decrease from 3.5 psi to 2.5 psi exceeds that shown below, the pipe shall be presumed to be within acceptable limits for leakage.

Pipe Length (in feet)	Time Lapse (in seconds)
less than 50	40
50 to 100	55
100 to 150	90
150 to 200	125
more than 200	140

Chapter 2
Sewer Manholes

2.1 Location

Manholes shall be required at the following locations:

a. Change of grade of sewer pipe
b. Changes in pipe size
c. Change of flow direction
d. At the beginning point and ending point of vertical curves if the curve is longer than 200 feet, or 25 feet downstream from the end of a vertical curve if the curve is less than 200 feet
e. At the intersection of mains
f. At the terminus of dead-end sewers
g. At the discharge of a private pump station force main, where the designer shall provide a dedicated manhole prior to discharge to the public system
h. Upstream of where industrial waste flows discharge into the sanitary sewer, for the purpose of sampling and measurement of flow of the industrial wastes
i. Per maximum spacing requirements
j. For sampling access and measurement of flow of industrial wastes before their discharge into a sanitary sewer.

To the extent possible, all sewer manholes outside the paved right-of-way shall have adequate access for vehicles, equipment, and crews to maintain or inspect the manhole and the associated pipelines.

All manholes located outside of the public right-of-way shall be equipped with approved locking covers with concrete collars to discourage vandalism.

All manholes located within inaccessible and unpaved areas shall require lock devices. Manhole rims shall be installed at a minimum of one (1) foot to a maximum of two (2) feet above the finished ground surface.

All manhole covers shall conform to the City of Pomona Standard Drawing S-4.

Manholes shall not be placed in the following locations:

a. Inaccessible areas
b. Gutters and other depressions or areas subject to inundation
c. In sidewalks, crosswalks, or pedestrian ramps
d. In driveways
e. In freeway ramps or lanes

f. Closer than ten (10) feet to edge of pavement or face of curb when under pavement
g. Between railroad tracks (manholes within a railroad right-of-way shall be located a minimum of 15 feet from track bed and in accordance with the requirements of the jurisdictional railroad authority)
h. Within 15 feet of any structures, including subterranean or overhead structures

2.2 Spacing

The maximum distance between manholes for sewer mains with diameters between eight (8) inches and larger shall be 400 feet on sewers of constant diameter and having a straight line gradient and alignment. This requirement is consistent with the City's Municipal Code, Section. 62-395. - Manholes.

2.3 Depth

For sewer mains that exceed 25 feet in depth, vaults shall be provided with a minimum of two (2) access manholes for each vault. Calculations shall be provided to show that the vault structures are designed to accommodate the design depths. A separate structural permit is required.

The Plans shall show invert elevations within the manhole of both the inlet and outlet pipes and the rim elevation of each manhole. Manhole rungs or permanent ladders are not allowed.

The design and installation of drop manholes shall conform to the City of Pomona Standard Drawing S-3. Any deviation from the standard detail will require approval by the Water/ Wastewater Operations Manager.

2.4 Size

The minimum manhole diameter shall be four (4) feet per City of Pomona Standard Drawing S-1 for all mains less than or equal to 15 inches in diameter. The minimum manhole diameter shall be five (5) feet per City of Pomona Standard Drawing S-2 for all mains larger than or equal to 18 inches in diameter. For sewer mains greater than 36 inches in diameter, special design and structural details for the manholes or vaults shall be shown on the plans. Vaults shall require a minimum of two (2) access manholes. A separate structural permit is required.

2.5 Shelf

Manhole bases that accommodate a change in direction of flow shall be designed with sufficient freeboard on the "outboard shelf" to keep the entire flow cross-section within the manhole channel without spillage onto the "outboard shelf". Minimum trough depth shall be per City's standard drawings. The area of the shelf in manholes shall be of approximately equal area on either side of the main channel, except in manholes with changes in direction of sewer flow. The shelf elevations shall be shown on the plans and shall be of equal height on both sides of the channel.

2.6 Maximum Invert Drop across Manhole

The maximum difference in invert elevation across a manhole shall be 0.60 feet for straight-through flow, and 1.00 feet for side inlet flow.

2.7 Minimum Invert Drop across Manhole

The minimum difference in invert elevation for straight-through manholes shall be 0.10 feet. For manholes that cause a change in flow direction, the minimum difference in invert elevations shall be 0.20 feet.

2.8 Drop Manhole

Outside drop assemblies shall be provided for pipes 12 inches in diameter and smaller when entering a manhole at a distance of more than 24 inches above invert of the manhole. Larger pipes should be introduced into the manhole at the manhole invert. Inside drop assemblies will be considered only in special cases involving connections to existing manholes. Special approval for all drop assemblies is required from the City Water/Wastewater Operations Manager. The design and installation of drop manholes shall conform to the City of Pomona Standard Drawing S-3, and deviation from the Standard Detail will require approval by the City Water/Wastewater Operations Manager.

2.9 Demolition of Sewer Manholes Prior to Abandonment

Remove manhole frames and covers and castings from other existing pipeline structures. Deliver castings to nearest City Yard. Alternatively, salvaged castings may be used upon approval by the Public Works Engineer or Public Works Inspector, for constructing new manholes on this project.

Demolish and remove precast concrete adjustment rings and corner section, or brick and mortar corbel and chimney, or other pipeline structure, to minimum depth of 4 feet below finished grade. Structure may be removed to greater depth, but not deeper than 18 inches above crown of abandoned sewer.

When adjacent sewer lines are not to be filled, place temporary plugs in each line connecting to manhole, in preparation for filling manhole.

2.10 Leakage Test of Manhole

Water tightness of manholes may be tested at the time the manhole is completed and backfilled.

Any evidence of leakage as a result of testing shall be repaired to the satisfaction of the Inspector.

The manhole shall be filled with water to an elevation one (1) foot below the start of the cone section with minimum depth of four (4) feet and a maximum depth of twenty (20) feet. The Contractor shall plug all inlets and outlets with approved stoppers or plugs and fill the manhole to the limits indicated above.

The water shall stand in the manhole for a minimum of one (1) hour to allow the manhole material to reach maximum absorption. After the one (1) hour period has elapsed, the Contractor shall refill the manhole to the original depth and the drop in water shall be recorded after a period of from fifteen (15) minutes to one (1) hour has elapsed, said time of the test shall be determined by the Inspector to fit the various field conditions.

The maximum allowable drop in water surface shall be one-half inch (½") for each fifteen (15) minute period of testing. Even though the leakage is less than the specified amount, the Contractor shall stop any leaks that may be observed to the satisfaction of the Inspector.

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Chapter 3
Laterals

Service lateral connections allow buildings and facilities to discharge appropriate wastewater flows into the public wastewater collection system. Although installation, maintenance, and repair of the service laterals and connections are the responsibility of the property owner served per Pomona Municipal Code, Section 62-399, service laterals must adhere to the following criteria.

3.1 Location

New sewer laterals shall not be located under driveways or ornate hardscape improvements unless no other alternative exists. If the lateral already exists, or sufficient area is not available to locate the lateral outside of driveways due to cul-de-sacs, trees, etc., the horizontal alignment coordinates and vertical depth of inverts shall be included on the improvement plans.

Laterals shall not be located within five (5) feet of water meters or within ten (10) feet of trees or shrubs that are three (3) feet or higher at maturity. Sewer laterals shall be a minimum of five (5) feet apart (center to center), and at least five (5) feet downhill from the water service.

For large buildings, the project is entitled to two (2) lateral connections to the public system. Additional private laterals are allowed provided it can be shown that the entire project flow cannot be served by two laterals that are sized per the Uniform Plumbing Code. Where the sewer main is located in an easement with no drivable access or in an alley or street, new laterals shall not be connected unless there are no available alternate sewer facilities.

Common sewer laterals serving two (2) or more lots are not allowed unless the lots are under the governance of a maintenance association and a copy of the recorded covenants, conditions, and restrictions (CC&R) is provided to the City's plan reviewer.

Sewer laterals within the public right-of-way shall be perpendicular to the sewer main.

Sewer laterals shall not cross lot lines unless there are no other reasonable options. A private easement shall be dedicated to the lot benefiting from the lateral. A properly executed and recorded easement shall be completed prior to, and submitted with, the initial submittal for engineering plan check.

3.2 Backwater Devices

Sewer laterals shall be equipped with an approved backwater device at all locations where dictated by the currently adopted edition of the Uniform Plumbing Code to prevent public sewage from overflowing into structures if the sewer main should fail. Backwater devices shall be installed at all locations where the finished floor of an adjacent property is less than two (2) feet above the nearest upstream manhole's rim elevation. Backwater devices shall be installed outside of the public right-of-way and shall be maintained by the property owner. Deviations, if allowed, shall be approved by the City Water/Wastewater Operations Manager. See Pomona Standard Drawings S-8 and S-9 as applicable.

3.3 Lateral Connections

Sewer lateral connections shall be made in accordance to Table 3-1 below:

Table 3-1
Sewer Lateral Connections

Size/Type of Lateral	Size of Main	Connection Made At
8" diameter or smaller	15" diameter or smaller	Main or Manhole
	18" diameter or larger	Manhole
10" diameter or larger	Any Size	Manhole
Pressure Lateral	Any Size	Manhole

NOTE: at no time shall the main be smaller than the lateral

Sewer lateral connections in non-paved easements shall not be allowed where the connection can be made into a sewer main in a public right-of-way or paved easement. All laterals which connect to a public sewer main in an easement, rather than the public right-of-way, shall be labeled as "Private" on the improvement plans.

3.4 Slope

The standard minimum slope for a sewer lateral is two (2) percent. The slope shall not exceed one (1) horizontal to one (1) vertical (100 percent). Laterals, which must exceed 100 percent slope within the public right-of-way, shall be considered deep-cut laterals. Deep-cut laterals shall only be permitted with the approval of the Water/Wastewater Operations Manager.

3.5 Depth

Sewer laterals shall be a minimum depth of five (5) at the property line and measured at the top of curb. Single, shallow laterals may be allowed between three (3) feet and five (5) feet in depth with special approval from the Water/Wastewater Operations Manager. When special circumstances dictate that the cover over a lateral must be less than three (3) feet, the lateral should be fully encased in concrete, loading and deflection calculations must be submitted, and approval by the Water/Wastewater Operations Manager shall be required. Polyvinyl chloride (PVC) shall not be used with concrete encasement. Use only extra strength vitrified clay pipe or ductile iron pipe with concrete encasement.

Lateral connections to deep sewers (greater than 15 feet) shall be avoided wherever possible. No lateral connections will be allowed on mains which exceed 20 feet in depth.

3.6 Cleanouts

Omitted

3.7 Connections to Sewer Mains and Trunk Sewers

Lateral connections to new sewer lines must be constructed using a wye fitting. Lateral connections to existing sewer mains may only be made through a wye fitting or saddle type connection. Holes for saddle type connections must be core drilled. Cutting, chipping, or breaking out an opening for a lateral connection and sealing the opening with a concrete lug shall not be allowed.

Sewer lateral connections to trunk sewers 18 inches in diameter and larger shall not be allowed except in certain cases where all of the following criteria are met:

a. A sewer main of 15-inch diameter or less is not accessible within 500 feet
b. An odorless connection is provided such that the lateral at the connection is matched as closely as possible with the invert of the trunk sewer; this type of connection requires approval of the Water/Wastewater Operations Manager
c. Within 20 feet of the connection, the invert of the lateral is above the peak flow for the trunk sewer at the location of the connection
d. The Water/Wastewater Operations Manager grants approval prior to the connection being made

The connection shall be recorded on a public improvement drawing which shall show both plan and profile of the connections, and be labeled as private. In cases where more than one sewer lateral connection to a trunk sewer is proposed in the same area, a smaller diameter collector sewer must be constructed to convey the flow of the laterals to the trunk sewer.

There are fees that must be paid prior to connecting to the City's sewer system pursuant Pomona's Municipal Code Sec. 62-398, Sec. 62-399, and Sec. 62-400. These fees cover sewer construction permit, connection, and inspection fees.

3.8 Size of Connection

Connections of sewer laterals into existing sewer mains shall be at least two (2) inches less than the diameter of the sewer mains into which they discharge. To prevent the introduction, accidental or otherwise, of articles of an injurious nature, all house connections shall be restricted to a minimum inside diameter of four inches. However, 6-inch and 8-inch diameter laterals may connect into a sewer main of the same size. If such a connection is permitted, a hydraulic analysis shall be required to ensure sufficient capacity in the main and the connection shall be made through a wye fitting. The wye branch of the sewer main is to be inclined upward at a maximum angle of 45 degrees from the horizontal and connected to the lateral through a 1/8 bend.

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Chapter 4
Sewer Rehabilitation

Renewal of sewer pipelines and manholes is a viable alternative to replacing aging and deteriorated infrastructure. This section describes the inspection and assessment process and provides some acceptable renewal options.

4.1 Sewer Inspection and Assessment

Inspection and assessment is used to evaluate existing system conditions and identify potential defects that could contribute to overflows. Such conditions include root intrusion at misaligned joints or cracks, and inflow and infiltration entering into the system through cracks in pipes, manholes, or via illegal storm drain connections. Acceptable inspection methods include, but are not limited to, external and internal visual observations, closed circuit television (CCTV) inspections, and line lamping.

The collected inspection data is then evaluated by a knowledgeable engineer using objective criteria to rank the defects and prioritize needed improvements. The results of a sewer assessment are then used to determine the funding required to repair, rehabilitate, and/or replace an aging collection system and to prioritize how the funds should be allocated.

4.2 Sewer Pipeline Rehabilitation Options

General approach to selecting appropriate rehabilitation alternatives are summarized below in Table 4-1. The rehabilitation selection method based on the guidelines provided below is not a substitute for the experience and knowledge of the staff and engineers performing the assessment. The unique situation and condition of each segment must be considered when finalizing recommendations. As such, not every recommendation will rigidly adhere to the methods and rules below.

Table 4-1
Sewer Pipeline Improvement Alternatives

Description of Defect	Recommended Method
Roots, broken or cracked pipe, misaligned or open joint, and/or grade break at 1 or 2 locations along a pipe segment.	Point repair (if total pipeline length is > 300 feet); Replacement (if total pipeline length is < 300 feet)
Roots only, more than 2 locations	Lining, Chemical Herbicide or Repetitive Cleaning
Multiple cracks only – minor to medium	Lining
Roots most joints with multiple cracks, no offsets	Lining
Roots at most joints with major offsets, breaks, major cracks or major grade breaks and all other conditions not noted.	Replacement
Severe defects requiring replacement in difficult to access locations or areas of high traffic congestion	Pipe bursting, bore and jack, directional drilling or micro tunneling

All surface improvements shall be restored to the same condition or to a better condition than that which existed before the repair, replacement, or rehabilitation activities occurred. The following descriptions summarize a variety of rehabilitation and repair methods.

4.2.1 Point Repairs

Where defects are noted from internal and video inspections at one to two locations between manholes, point repairs should be recommended. However, for short pipe segments less than 300 feet with two (2) defects, point repairs may affect the integrity of the remaining pipe and full pipe replacement is usually recommended. Point repairs are cost effective alternatives to full pipe replacement if the remaining portions of the pipe are in good condition as noted from the internal or video inspections and replacement of the entire pipe segment appears unwarranted.

4.2.2 Pipe Lining

Pipeline lining offers a trenchless method to rehabilitate deteriorating sewer mains. Because no open trenching is required during the lining application, there is minimal disruption to residents and business owners during construction. Lining of sewer mains is recommended for pipes with rooting problems and/or cracks with no major offset joints. Generally, pipes smaller than eight (8) inches in diameter should be candidates for replacement.

Where breaks, major offsets, or bends are noted in the video inspections, lining is not recommended because the lining material cannot be applied properly where these conditions occur. In choosing an appropriate repair method, there are cases where it may be cost effective to consider combining point repairs with lining.

Several methods of lining can be used to rehabilitate a pipeline. Cured-in-Place Pipe (CIPP) lining involves inverting a resin-impregnated fabric tube into a clean, existing pipeline, then curing it in place with hot water or steam. Fold-and-form lining requires pulling a fabric tube, saturated with a resin and folded into a U-shape, into a clean, existing pipe, then expanding the tube to the shape of the pipe with pressurized water before curing with heated water or steam. Both of these methods require the flow to be plugged or diverted during the installation process.

Spiral wound pipe is another lining method that inserts a continuous strip of reinforced plastic, usually six (6) or eight (8) inches wide, into an existing pipe, which interlocks to form a watertight seal. Spiral wound pipe can typically be installed in a live sewer without plugging or diverted the flow. Pipes smaller than eight (8) inches in diameter shall not be candidates for spiral wound rehabilitation.

All of these lining methods can provide a system with independent structural integrity that does not rely on the host pipe for strength.

4.2.3 Pipe Bursting or Reaming

Pipe bursting or pipe reaming offers a solution to replacing defective pipe that has access at its end points but not between, such as pipe that crosses a freeway or major intersection. Pipes that are good pipe bursting candidates generally have no bends or curves and have adequate slope with very minor or no sags. Access pits are required at the ends of the pipe segment being burst. If any service connections must be reinstated, access pits are required at these locations as well. The size of the pipe can generally be increased to the next standard pipe diameter above the existing diameter, and possibly to the next standard pipe size depending on the existing soil conditions and adjacent utilities. The material used for the replacement pipe includes high density poly-ethylene (HDPE) pipe or joint-fused PVC pipe. This method may be more costly than traditional dig and replace, but it is generally faster and less disruptive to the environment and community, thereby resulting in intangible benefits.

4.2.4 Pipeline and Manhole Replacement

Replacements of pipe segments are recommended where multiple occurrences of breaks, cracks, misaligned joints, grade breaks and roots are identified in the video inspections. In addition, where pipe replacement is recommended, replacement of both manholes at each end of the pipe is also recommended. For maintenance purposes, pipelines with a 6-inch or less diameter are recommended for replacement with 8-inch diameter pipe. Actual replacement must be evaluated on a case by case basis after considering several factors such as pipe condition, slope, cleansing velocity, capacity, and available maintenance equipment and methods.

4.3 Manhole Rehabilitation

Rehabilitation of a manhole may be required for one or more of the elements associated with a manhole which includes:

a. Frame
b. Cover
c. Riser
d. Cone
e. Wall
f. Steps
g. Bench
h. Trough
i. Base
j. Pipe Connections

4.3.1 Rehabilitation or Replacement Criteria

Rehabilitation or replacement of the manhole shall be determined based on the following criteria:

a. structural integrity and condition
b. location
c. pipe size and hydraulic condition
d. invert depth
e. environmental sensitivity
f. construction accessibility
g. cost of the proposed improvements

The type and extent of the rehabilitation required will be determined based on the severity of the existing condition and accessibility of the manhole. Rehabilitation may include improvements to one or several of the elements to restore the manhole to an acceptable condition, or it may require improvements to all elements. Requirements for each manhole shall be evaluated independently and only the necessary improvements will be detailed.

Reset Frame and Raise to Grade. Resetting the frame is a method intended to adjust a frame that has moved horizontally and/or to raise the cover above grade to prevent inflow, mostly in non-paved areas (for example, when a cover is located in a slight depression where ponding of water occurs). The installation involves minimal excavation - only enough to allow replacement of damaged concrete leveling rings and addition of new rings to bring the top of the frame above grade.

- Manhole Pans. Manhole pans fit under the manhole cover and are intended to prevent inflow through holes in the manhole cover. The pans are either HDPE or stainless steel.
- Manhole Covers. Gasketed manhole covers are steel covers with an inset gasket either in the frame or placed between the frame and cover. They are intended to prevent inflow from around the manhole cover. Solid manhole lids without holes are available, as are plugs for the holes.

4.3.2 Accessibility

All manhole replacements or rehabilitations will be evaluated for accessibility. Manholes located on private property will require approval from the property owner. All required environmental clearances will be obtained from the City prior to commencement of work.

4.3.3 Repair Methods

Repair methods may include patching, grouting, sealing for infiltration, lining and replacement of various manhole elements or even the entire manhole. Selecting the appropriate lining method depends on the existing condition of the manhole. Rehabilitation methods including spray-on applications (e.g., corrosion resistant vinylesters and polyesters, and epoxy and polyurethane products), trowel-on applications (e.g., cementitious applications), T-lock liners (e.g., polyurethylene sheets), and rehabilitation liners (e.g., epoxy impregnated fiberglass liners).

4.3.4 Plans and Specifications

Plans and specifications illustrating the location of each manhole, site constraints and necessary traffic control plans will be provided to the City for review and approval. The plans, known as Sewer Development Plans, and specifications shall include typical details, details to restore the surrounding area to its existing condition or better, and manhole site-specific notes, if necessary.

Chapter 5
Design Plans and Profiles

Plans will be required for all new, rehabilitated, or extended sanitary sewers and shall include both a vicinity map and a general layout map of the area showing the location of existing facilities and of the proposed improvements. Plans should be accurate, legible and properly detailed. Dimensions should be either from right-of-way centerline or property lines. Additionally, all plans should also have a suitable title plate with the following information: name and address of owner; scale; north point; date; drawing number; and the name, address, telephone number, R.C.E. number with expiration date, and signature of the Registered Civil Engineer.

5.1 Engineering Drawings (Plans)

Plans for sewer lines should contain at least the following information:

a. Adjacent streets, property lines, tax lot numbers, utility easements and references thereto.

b. Location of sewer mains and appurtenances. Each manhole shall be numbered and stationed to facilitate checking the plans with the profiles.

c. Location of water courses, wells, stream and railroad crossings, water mains, gas mains, culverts and underground power, CATV, or other utilities wherever possible.

d. Limits of hard surface paving with dimension reference.

e. Plans should be drafted to scale at 1" = 40' (preferred), or 1" = 20' (maximum). Not to exceed 24" x 36."

f. Use of the Regional "standard symbols" is recommended for use on the plan view section.

g. City approval block and notes such as: "easement required" and "county permit required."

h. As-built plans submitted by the engineer of work shall include a 1" = 100' photo mylar transfer of the project including the sewer service.

i. Indicate if the main is private

j. Location of existing sewer

5.2 Engineering Drawings (Profiles)

Profiles for the individual sewer lines should contain at least the following information:

a. Location of manholes and other appurtenances with each manhole numbered and stationed.

b. Profile of existing and proposed ground surface and sewer invert.

c. Size, pipe class, slope, length of sewer, and pipe bedding class between consecutive manholes.

d. Elevation of original ground and finished grade shall be shown graphically and sewer inverts specified at each manhole. Datum utilized for all elevations shall be City datum (USC&GS, 1959). Project control benchmarks shall be identified on the drawings.

e. Limits of street improvements will be shown and a typical section of the subject street.

f. Profiles should be drafted to scale at 1" = 4' or 1" = 8' (if in steep terrain). Alternate scales will be considered for plans at other than 1" = 40'.

g. Existing storm drains, water lines, and other appurtenances that may create a change in the pipeline alignment

5.3 Sewer Appurtenances

Appropriate City of Pomona and Regional Standards shall be included in all plans for construction of sanitary sewer lines.

5.4 Separate Drawings

Separate plans shall be submitted for public sewers installed in combination with private sewers or site plumbing. "Site plumbing" drawings are not acceptable. Public sanitary sewer plans may be combined with other public improvement plans, provided that the plans must be legible and properly detailed.

Appropriate labeling of the services as "Public” or "Private" will be done on both the plan view and profile view.

5.5 Specifications and Special Provisions

Engineering consultants are encouraged to develop specifications and special provisions for each project. Specifications and special provisions shall incorporate the Standard Specifications for Public Works Construction, "Greenbook," the latest Edition with the Regional Supplement Amendments prepared by the California Chapters of American Public Works Association and Associated General Contractors of America. Special specifications pertaining to materials and workmanship, if developed, shall be submitted to the City for review and approval, together with check prints of the project.

In general, the sewer specifications should cover pipe material, excavation, laying of sewer pipe, jointing, backfilling, testing, etc. Strict supervision will be provided by the City during construction to assure compliance with the specifications.

5.6 Inspection and Testing

The contractor shall be responsible for providing the CCTV report and inspection documentation for submittal to the City Water/Wastewater Operations Manager at least thirty (30) working days in advance of the anticipated date that final construction acceptance.

Chapter 6
Standard Drawings

The wastewater collection system standard details on the following pages are being proposed for use by the City of Pomona. The proposed standards will be evaluated by City staff in light of current City, LACSD, and Greenbook standards. Once agreement has been reached on the final standard, the process dictates that approval must be obtained by the Public Works Director or his designee. The details are:

Detail #	Title	Number of Pages
S-1	Manhole 4’ X 3’ (15” Diameter and Smaller)	2
S-2	Manhole 5’ X 3’ (18” Diameter and Larger)	2
S-3	Drop Manhole (For 8” or 10” Pipe)	1
S-4	36” Manhole Frame and Two Concentric Covers (Heavy Duty)	1
S-5	House Connection (Sanitary Sewer Lateral)	2
S-6	Sewer Main Cleanout	1
S-7	Sewer Main Cleanout Access	1
S-8	4” Backwater Device (for Laterals 2-Feet or Deeper)	1
S-9	Backwater Device Shallow Installation (Less than 24” Deep)	1
S-10	Pipe Bedding and Trench Backfill	3

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Attachment A
City of Pomona
Approved Materials List for Municipal Sewers

CITY OF POMONA
APPROVED MATERIALS LIST FOR MUNICIPAL SEWER

SUBJECT	SPEC. REF.	MANUFACTURER (Series/Model No.)	ADDITIONAL REQUIREMENTS
A. Sewer Pipe[1]			
(1) Vitrified Clay Extra Strength Pipe and Fittings	[2]207-8 ASTM C 780	Pacific Clay Pipe Gladdin & McBean Mission Clay	Plain End & Bell and Spigot Type Pipe
B. Sewer Laterals			
(1) Vitrified Clay	[2]207-8	Gladdin & McBean Mission Clay	Plain End & Bell and Spigot Type Pipe
C. Sewer Fittings			
(1) Vitrified Clay	[2]207-8	Gladdin & McBean Mission Clay	Plain End & Bell and Spigot Type Pipe
D. Pre-Cast Manhole Bases	ASTM C 478	Mar-Con Products	
E. Sewer Rehabilitation Products[3]			
(1) PE Solid Wall	500-1.3	Chevron Plexco Phillip Driscopipe	Reno, NV plant Watsonville, CA plant
(2) Cured-In-Place	500-1.4	Inliner-Fabric tube: polyester felt, Resin: Dow Derakane 411 vinylester	Houston, TX plant
(3) Profiled PVC	500-1.5	Insituform-Fabric tube: Polyester felt Resin #1: Shell Epon 9215 epoxy Resin #2: Interplastics VE8319 vinylester	Memphis, TN plant
(4) Deformed Solid Wall PE	500-1.7	Danby Hydroconduit Uliner – Novacor resin	Toronto, Canada plant Roaring Springs, TX plant Houston, TX plant
(5) CCFRPM	500-1.8	Hobas	Birmingham, NY plant Waco, TX plant
		American Plastics AMLiner Insituform Nupipe	Gepps Gross, South Australia Plant
(6) Folded Solid Wall PVC	500-1.10	Rib Loc	Manufacturing Plant Site: Terre Hill Composites, Division of Terre

SUBJECT	SPEC. REF.	MANUFACTURER (Series/Model No.)	ADDITIONAL REQUIREMENTS
			Hill Concrete Products, Terre Hill, Pennsylvania
(7) Machine Spiral Wound PVC	500-1.13	Product: MultiPlexx Liner System by Terre Hill Composites	Resin: Manufactured by Resolution Performance Products
(8) MultiPlexx Liner System, Type PVCP	**Add: 500-2.5** Cured-In- Place Manhole Rehabilitation	MultiPlexx Liner System: Type/Model PVCP 20-28 ≥ 88 mils consisting of : PVC Liner: 20 mils PVC Polyester Fleece Backing: 10 oz/yd² Fiberglass Backing: 18 oz/yd² Resin: EPON 9215 at 0.0005 gallons per square foot of manhole area Epoxy: Application to substrate surface of manhole to be rehabilitated.	Installers: Tejon Constructors,Inc.
(9) Raven 405 Epoxy Lining System	**Add: 500**	Product: Raven 405 Epoxy Liner System by Raven Lining Systems, Inc. Raven 405 is a solvent-free 100% solids, extra high-build epoxy which can be applied over 200 mils in a single application. Light blue is the standard color when applied. Theoretical coverage averages 40 ft² per gallon at 40-mil thickness. Product shall be applied by an applicator approved and certified by Raven Lining Systems.	Raven 405 Epoxy is manufactured by Raven Lining Systems, Inc. Plant is located at 1024 North Lansing Avenue, Tulsa, Oklahoma 74106
F. Miscellaneous			
(1) Flexible Couplings		Smith-Blair 441 Rockwell APAC (331, 323, 335), (CDC-EC) DFW Plastics, Inc.	
(2) Transition Gaskets	ASTM D 1869	Newby Rubber, Inc.	
(3) High-Deflection Couplings 4 thru 12 inches diameter		Certainteed	
(4) Flexible Saddles (Wye)		DFW Plastics, Inc.	

[1] PVC pipe shall be furnished in 12-½ foot maximum laying lengths, with specific approval needed from the City Water/Wastewater Operations Manager for 20-foot lengths or longer.

[2] References are to the 2006 Edition of the Standard Specifications for Public Works Construction and the latest versions of the ASTM Specifications.

[3] A limitation is placed on the sealing and bonding methods and processes for lateral connections of the pipe rehabilitation methods included in this list. The limitation will continue on each method until a proven, permanent sealing and bonding method compatible with the liner material and having structural integrity equal to the liner material is availed. In the interim period the City will determine the sealing and bonding method of its choice for laterals on City projects. For projects where no lateral connections are needed, this limitation may not apply.

Attachment B
California Department of Health Services
Guidance Memo No. 2003-02: Guidance Criteria for the Separation of Water Mains and Non-Potable Pipelines

Attachment C
Pomona Sewer Standards 2011

Attachment D
City of Pomona Sewer Atlas Sheet Sample

Attachment E
City of Pomona Sewer Rate Ordinance

Attachment F
City of Pomona City Ordinance for Sewer Connection Fee