

COLLECTION SYSTEM CONSTRUCTION STANDARDS



SELMA-KINGSBURG-FOWLER COUNTY
SANITATIONDISTRICT

COLLECTION SYSTEM CONSTRUCTION STANDARDS

SELMA – KINGSBURG – FOWLER COUNTY SANITATION DISTRICT

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SECTION 1

INTRODUCTION & GENERAL POLICIES

SECTION 1.0 INTRODUCTION AND GENERAL POLICIES

1.1 SCOPE

The design and construction of wastewater sewers, appurtenances and sewers in the Selma-Kingsburg-Fowler County Sanitation District shall comply with these standards herein called "Collection System Construction Standards," except where specific modifications have been approved, in writing, by the Manager. All submitted plans shall be signed by a registered civil engineer and all work shall be in accordance with good engineering practice. This document sets forth the procedure for designing and preparing plans and specifications for wastewater systems built within the District. Wherever there are differences between these standards and other county, state or federal regulations, the most stringent or highest requirement shall govern.

1.2 INTERPRETATION

The Manager shall decide all questions of interpretation of "good engineering practice" being guided by the most recent edition of the "Gravity Sanitary Sewer Design and Construction" (ASCE Manual on Engineering Practice No. 60 or WEF Manual of Practice No FD-5) both prepared by joint committees of the American Society of Civil Engineers and the Water Environment Federation.

1.3 DEFINITIONS AND TERMS

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

Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AGC	Associated General Contractors
ANSI	American National Standards Institute
APWA	American Public Works Association
ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Materials

AWWA	American Water Works Association
UBC	Uniform Building Code
UPC	Uniform Plumbing Code
WEF	Water Environment Federation

Pipe Types

ABS	Acrylonitrile Butadiene Styrene
AC	Asbestos Cement
CI	Cast Iron
CIPP	Cured in Place Pipe
CMP	Corrugated Metal Pipe
DIP	Ductile Iron Pipe
HDPE	High-Density Polyethylene
PE	Polyethylene
PVC	Poly-Vinyl Chloride
RC	Reinforced Concrete

Definitions

1. **Applicant** - is the person or entity making application for a permit for a sewer installation and shall be the owner or authorized agent of the premises to be served by the sewer for which the permit is requested.
2. **Applicant's Engineer** - The Engineer licensed by the State of California as a civil engineer, retained or employed by the Applicant, under whose direction plans, profiles, and details for the Work are prepared and submitted to the District for review and approval.
3. **Approved** - Unless specifically indicated otherwise, this shall mean approval by the General Manager.
4. **Board** - is the Board of Directors of S-K-F County Sanitation District.
5. **Building** - is any structure used for human habitation or a place of business, recreation or other purpose containing sanitary facilities.
6. **City or Cities** - shall mean the City of Selma, City of Kingsburg, and/or the City of Fowler, as applicable.
7. **Contractor** - is an individual, firm, corporation, partnership, or association duly licensed by the State of California to perform the type of work to be done under a permit and shall be the owner or owner's authorized agent.

8. **Collections System Construction Standards** - shall mean the policies and standards regulating the design, materials, plan preparation and construction of wastewater sewers and appurtenances established by the District.
9. **County** - is the County of Fresno.
10. **District** - is the Selma-Kingsburg-Fowler County Sanitation District.
11. **District Engineer** - is the Engineer appointed by the General Manager as authorized by the Board.
12. **District Inspector** - is the Inspector acting for the District and may be the District Engineer or other employee designated by the General Manager or any other person authorized by the Board.
13. **Drainage Fixture Unit** - The unit equivalent of plumbing fixtures as tabulated in the Uniform Plumbing Code.
14. **Easement** - A recorded document in which the landowner gives the District or City permanent rights to construct, operate and maintain a sewer across private or other property.
15. **House Sewer or Building Sewer** - In plumbing, the extension from the building drain to the public sewer or other place of disposal. A sewer on private property connecting a building with the service lateral on public property at the lot line. See definition for upper lateral.
16. **House Plumbing** - Plumbing fixtures, devices, and drainage piping within a building or structure contributing waste to the District's sewers.
17. **General Manager** - shall be the General Manager of the District appointed by the Board. The General Manager or their designee is authorized to enforce the rules and regulations of the District.
18. **Interceptor Sewer** - A sewer which receives wastewater from main sewers and conveys such wastewater to the District's treatment plant.
19. **Lateral Sewer** - A sewer which collects wastewater from service laterals and transports it to a main sewer.

20. **Lower Lateral** - is the portion of the side sewer within a public street, right of way, and/or easement connecting an upper lateral to the sewer main.
21. **Main Sewer** - The principal sewer collecting wastewater from a number of lateral sewers; also called a trunk sewer.
22. **Manager** - Manager shall mean the General Manager of the District, or any person engaged by the District and authorized to perform the duties assigned to the General Manager and shall include their deputies and representatives.
23. **Outside Sewer** - is a private sewer beyond the boundaries of the District.
24. **Permit** - is any written authorization required pursuant to this Ordinance or any other rule, regulation or ordinance of District or applicable state laws or regulations for the installation of any sewerage works.
25. **Person** - is any human being, firm, company, partnership, association, and private, public, or municipal corporations, the United States of America, the State of California, districts and all political subdivisions, governmental agencies thereof.
26. **Plumbing System** - includes all plumbing fixtures, traps, interceptors, industrial pretreatment system, or soil, waste, special waste and vent pipes, and all sanitary sewage pipes within the property lines of the premises.
27. **Private Sewer** - is a sewer which has an independent sewage disposal not connected with a public sewer and which accommodates one or more services.
28. **Public Sewer** - is a sewer lying within a street and which is controlled by or under the jurisdiction of the District.
29. **Right of Way** - shall mean all land or other property interest provided or acquired for the development and operation of a public facility and appurtenances.
30. **Secretary** - is the Secretary of the Board.
31. **Sewage** - is a combination of water-carried wastes from building and industrial establishments connected to sewerage works of District or from any private sewer.

32. **Sewerage Works** - are all facilities for collection, pumping, transportation, treating and disposing of sewage.
33. **Sewer** or **Sanitary Sewer** - is a pipe or conduit which carries sewage and/or industrial waste to which storm, surface and ground waters are not intentionally admitted.
34. **Sewer Service Lateral** - is the part of the horizontal piping beginning at the foundation wall of any building and terminating in the main sewer and is comprised of the upper and lower lateral.
35. **Street** - is any public highway, road, street, avenue, alley, way, easement or right of way.
36. **Upper Lateral** - is any sewer or drain beginning at the plumbing or drainage outlets of any buildings and running to the property line.
37. **Offsite** or **Off-Tract Sewer** - is a sewer beyond tract boundaries connecting the tract sewer with the District's system.
38. **Plans** - Drawings of proposed sewers and appurtenances.
39. **Plate No.** - Where not specified to the contrary, this refers to plates attached to these standards.
40. **Private Sewer** - The onsite sewer which collects and discharges wastewater into a City or District sewer and is owned and maintained by the owner of a parcel.
41. **Required** - Unless specifically indicated otherwise, this shall mean a requirement of the District.
42. **Sewerage System** - The facilities used to collect, pump, and convey wastewater from the source to the District's wastewater treatment plant.
43. **Tract Sewers** - The system of street sewers, house laterals, and manholes constructed by a developer within an approved tract.
44. **Wastewater** - The combined liquid and water-carried wastes from residences, institutions, commercial buildings, and industrial plants, together with any groundwater or storm water that may enter the system.

1.4 APPLICABLE CODES AND POLICIES

Ordinances, requirements, and applicable standards of member Cities and County having jurisdiction within the District's service area shall be observed in the design and construction of sewers. Such requirements include but are not limited to current revisions of the following:

1. The California Building Code as adopted by the Cities' and County.
2. The California Plumbing Code as adopted by the Cities' and County.
3. Ordinance No. 2014-03 of the District, as amended.
2. Road encroachment regulations of the Cities of Selma, Kingsburg and Fowler and the Counties of Fresno and Tulare.
3. Standard Specifications - State of California, Department of Transportation Standard Specifications, current edition (Caltrans).
4. Standard Specifications for Public Works Construction ("Green Book"), Joint Cooperative Committee, American Public Works Association, Southern California Chapter and Associated General Contractors of California, Southern California District.
5. All applicable standards or requirements of public agencies, utilities or railroads operating within the District (i.e., Consolidated Irrigation District, Pacific Gas & Electric, Pacific Telephone, Southern Pacific Railroad, CalTrans, etc.).

1.5 PUBLIC/PRIVATE SEWAGE DISPOSAL

As required by District Ordinance No. 2014-03, including amendments, which should be referred to for a complete explanation, a public sewer connection is required where any one or more of the following situations exist:

1. "...any part of a parcel of property that is situated within 200 feet from an accessible public sewer."

2. "...the Board declares a private disposal facility to be a public nuisance."
3. There is a change of ownership and a public sewer is accessible.
4. All new developments (except single family dwellings) not included in a new subdivision and not greater than 200 feet away from a public sewer.

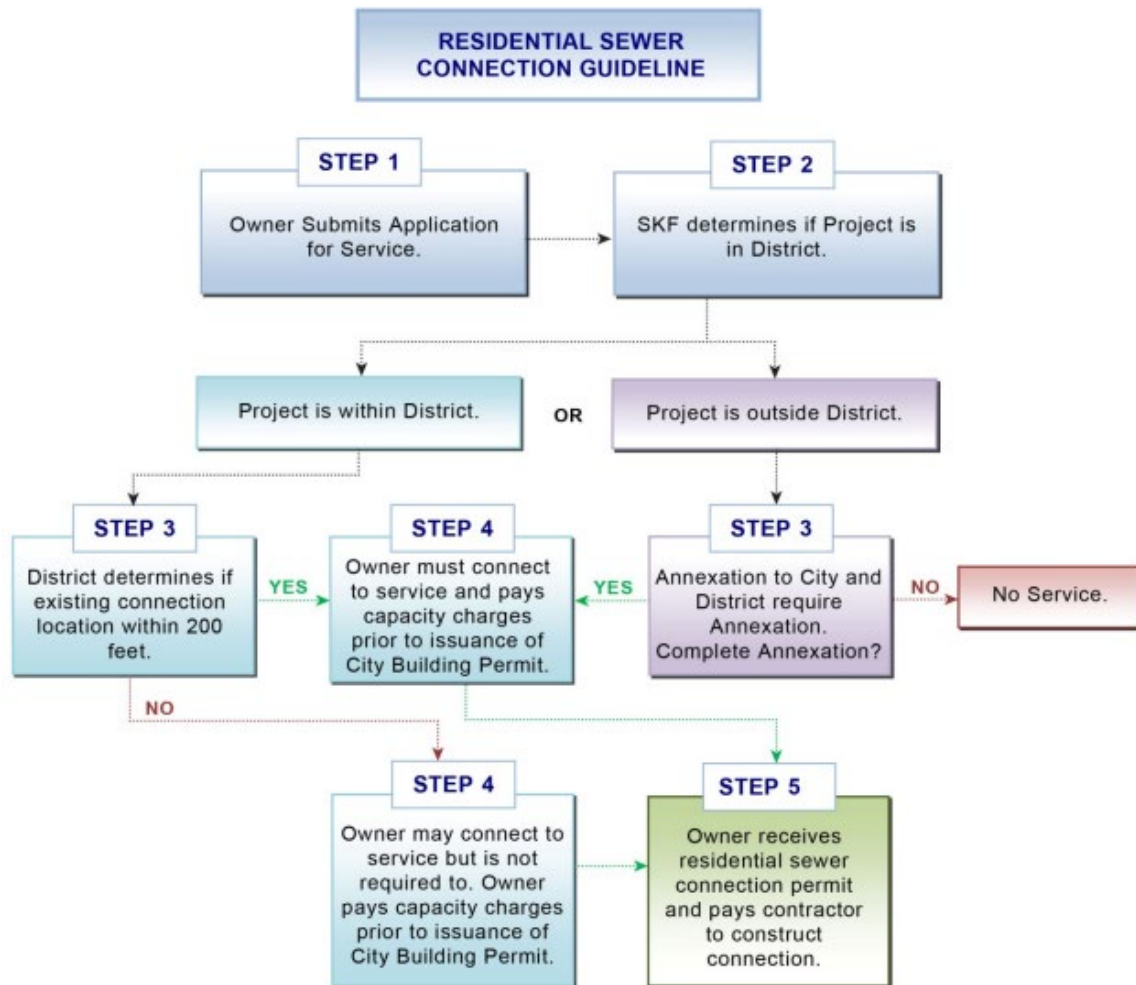
Also, connections of any cesspool seepage pit or septic tank or any other private disposal system to any sewer main line or sewer service lateral is strictly prohibited.

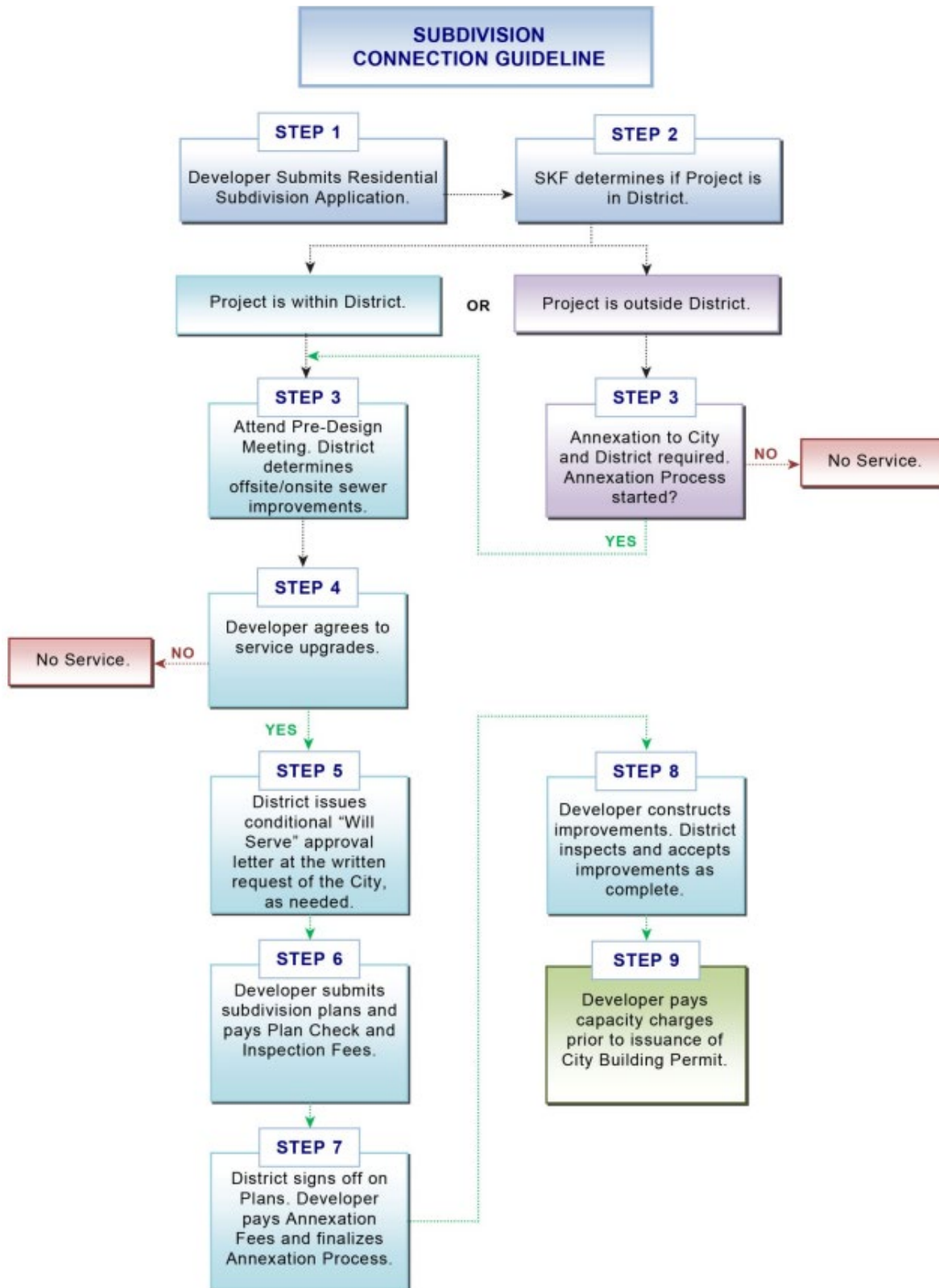
1.6 DISTRICT JURISDICTION

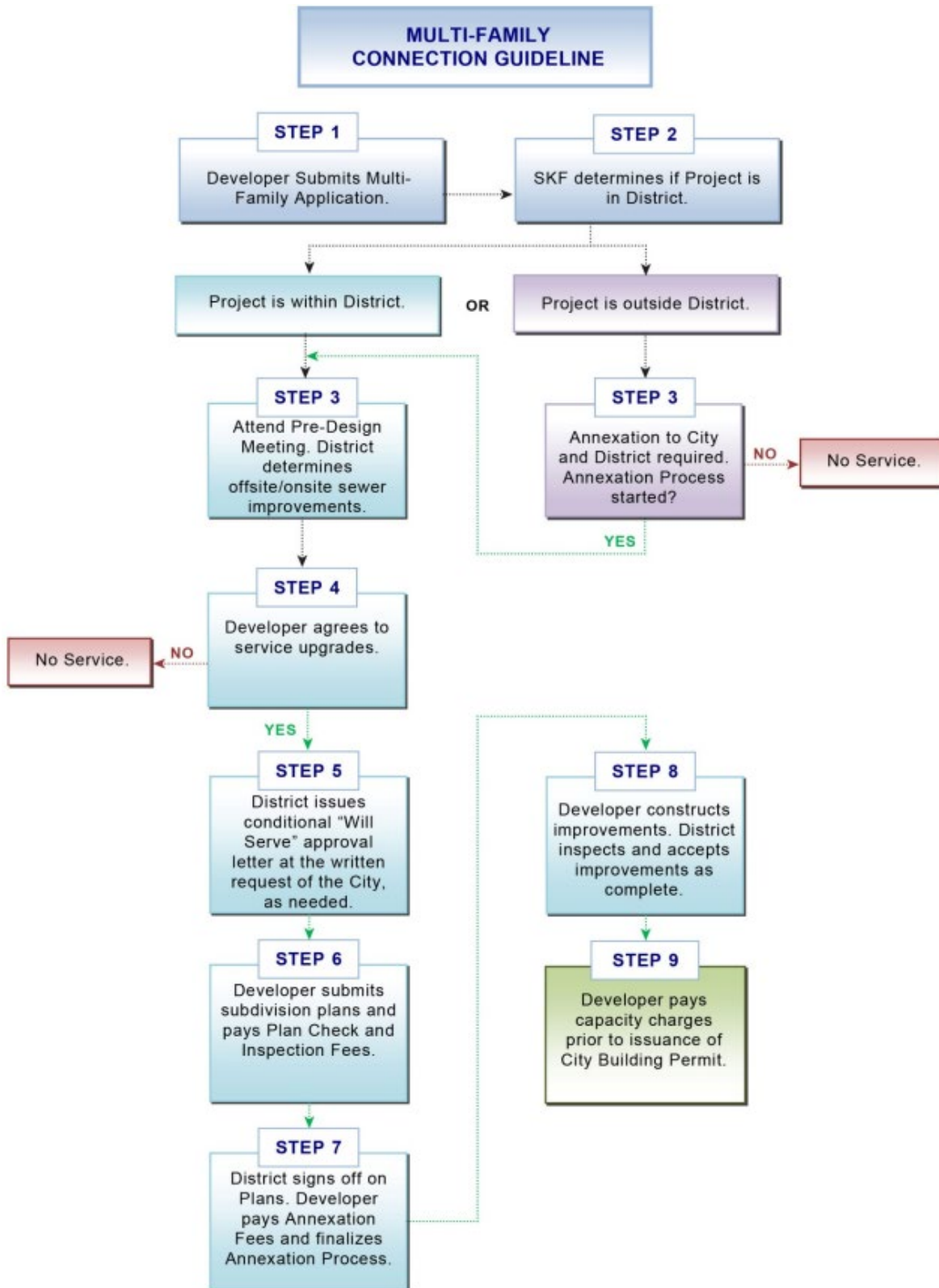
The District is responsible for the approval of construction plans and inspection of all public sewer lines and service laterals within the public right-of-way and in dedicated easements. Repair and replacement of the lower sewer service laterals in the public right-of-way is the responsibility of the District. The property owner is responsible for the proper maintenance and cleaning of the complete sewer service lateral.

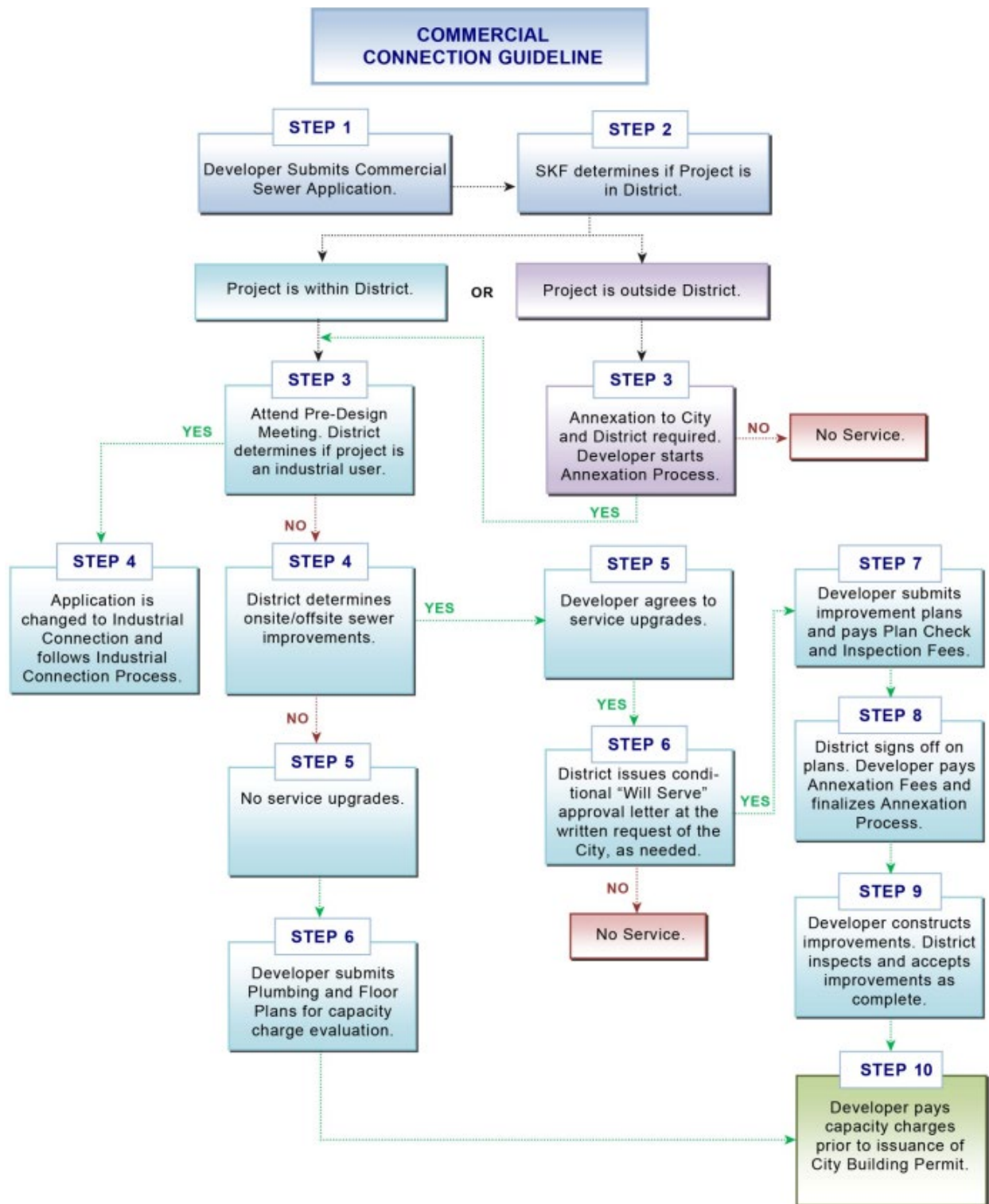
1.7 APPLICANT'S RESPONSIBILITY

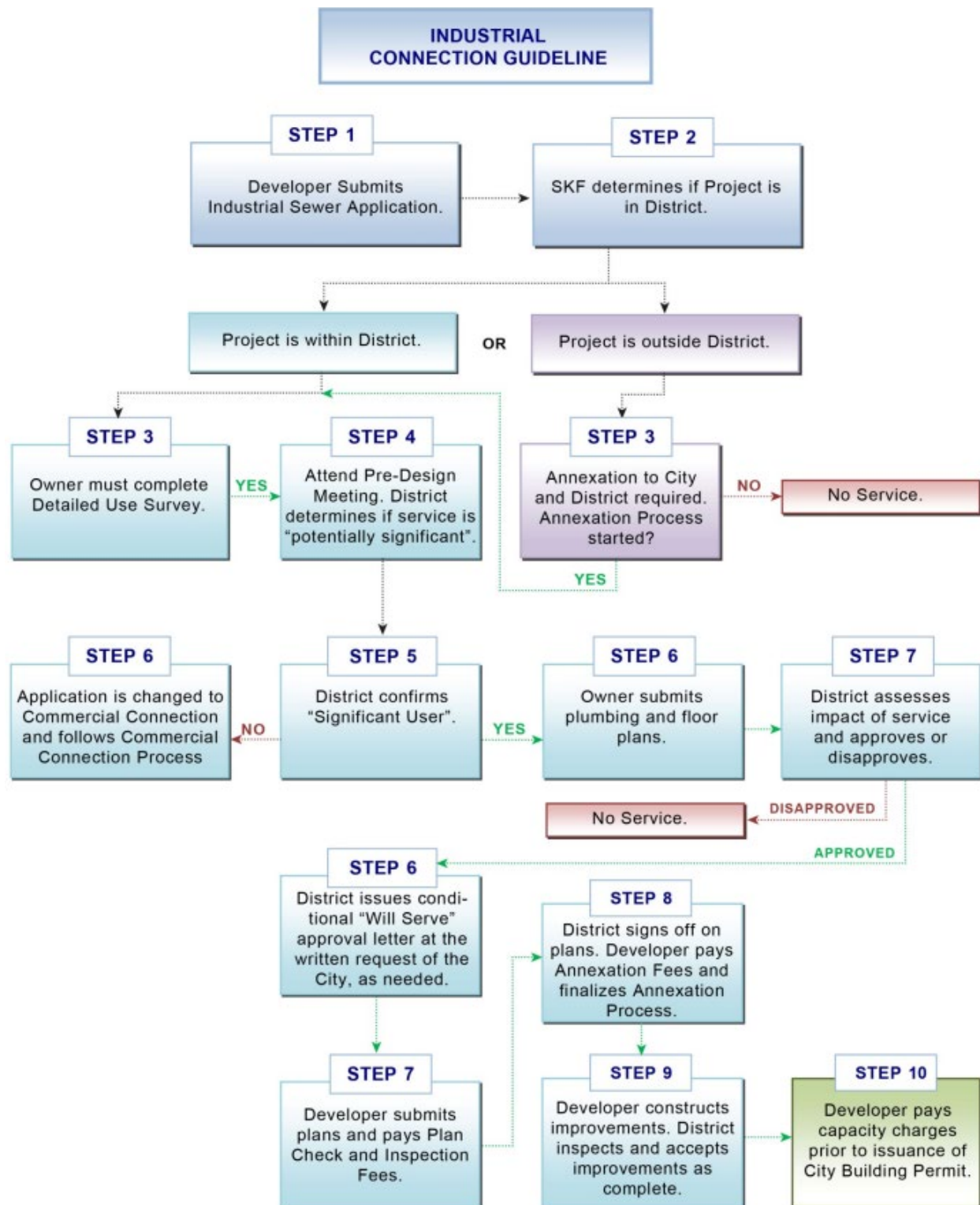
The applicant is responsible for compliance with all requirements specified within these Collection System Construction Standards and for payment of all fees. It is recommended that the applicant review these requirements with the District during the preliminary planning phases of a proposed project. The following flow charts show the various steps required to receive service from the District related to the type of development.











1.8 VARIANCES

A request for a variance from any requirement contained in these Collection System Construction Standards must be submitted in writing by the Applicant. Such request shall identify the exact requirement at issue and indicate the proposed variance with supporting factual information. The Manager will act upon such request within a reasonable period of time. Any appeal of a decision by the Manager must be submitted in writing to the Board within 10 calendar days of the Manager's action. Such appeal will be heard at a regularly scheduled Board meeting.

1.9 APPLICANT'S ENGINEER'S RESPONSIBILITY

These standards establish uniform policies and procedures for the design and construction of the District's and Cities' wastewater systems. They are not intended to be a substitute for engineering knowledge, judgment, or experience. The contained procedures shall be reviewed by the applicant's engineer and shall be applied as necessary to the project. Any proposed deviations to these standards shall be submitted in writing prior to tentative map and/or development project approval.

It is the developer's engineer's responsibility to be aware of the District's and Cities' Master Plans for wastewater collection and to indicate any mainline relocations, extensions, or oversizing on the tentative tract map. This responsibility shall include investigating any changes from the Master Plan necessitated by development subsequent to the Master Plan, although the above shall not relieve the developer from the responsibility to provide an approved system consistent with District's and Cities' requirements. Verification of the adequacy of the downstream wastewater system rests jointly with the District, City, and the developer. The District shall prevail in the event of conflicting opinions.

All plans, specifications, reports, or documents shall be prepared by a registered civil engineer, or by a subordinate employee under their direction, and shall be signed by them and stamped with their seal to indicate responsibility for them. A "Preliminary Review" and/or "Plans Recommended for Construction" signature of the District on the plans does not in any way relieve the applicant's engineer of their responsibility to use professional engineering practices and to meet all requirements of the District and Cities. The plans shall be revised or supplemented at any time it is determined that the District's requirements have not been met.

1.10 REFERENCED SPECIFICATIONS

References to standards such as ASTM shall refer to the latest edition of such standards unless otherwise specified.

1.11 OCCUPANCY/SEWER SERVICE

Clearance for occupancy will be given only after the issuance of a sewer connection permit, applicable fees paid, and all requirements by the District and City are met.

1.12 SEWER WORK REQUEST FORM

A sewer work request form may be necessary for a variety of reasons, including maintenance, repairs, or system upgrades. To ensure proper coordination and compliance, a sewer work request form must be submitted to the District at least five (5) business days prior to the commencement of any work. The Sewer Work Request Form can be found in the appendix.

SECTION 2

DESIGN CRITERIA

SECTION 2.0
DESIGN CRITERIA

2.1 WASTEWATER CAPACITIES, HYDRAULICS AND SIZES

A. Quantity of Flow

Sewage flows shall be determined from the maximum potential population of the tributary area. Unless otherwise approved, the following criteria shall be used:

If the number of housing units is known:

single family unit	230 gallons/unit/day (gpud)
multiple family dwelling	150 gallons/unit/day (gpud)

If the number of units is not known:

Land Use Designation	Flow Coefficient
Residential Land Use (gpd/ESFR)	
Residential Land Use (gpd/ESFR)	230
Commercial and Industrial (gpd/acre)	
Industrial	Varies*
Commercial and Industrial (gpd/acre)	725
Community Facility/School (gpd/acre)	650
Park/Open Space (gpd/acre)	200

* Contact the District for more information.

An additional allowance for infiltration shall be added when a sewer is to be constructed below the ground water level. The infiltration allowance shall be approved by the District.

B. Hydraulics

Sewers shall be designed to accommodate future tributary flows, in addition to those from the project. Pipe capacities shall be determined for peak flow rates by Manning's Formula using an "n" value of 0.009 for all pipelines. Sewers less than 12" in diameter shall be designed to flow half full at peak flow rates. Sewers 12" to 18" in diameter shall be designed to flow two-thirds depth at

peak flow rate. Sewers larger than 18" diameter shall be designed to flow at 90% depth at peak flow rate.

C. Velocity

Main line sewers shall be designed to provide a mean velocity of not less than two (2) feet per second flowing at the specified depth in 2.1B, except that the District may approve a gradient that will develop a velocity of less than two (2) feet per second in unusual circumstances. 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. Oversizing and Extra Depth

Oversizing or deepening of certain tract sewers may be required pursuant to Ordinance 2014-03, as amended where such sewers can logically serve an upstream tributary area.

E. Minimum Diameter

The minimum diameter for District sewers shall be eight (8) inches.

F. PVC Pipes

PVC sewer pipe and fittings for all sizes four (4) inch through 15-inch shall meet the requirements of ASTM D3034, SDR 26, Cell Classification 12454-B or 12454-C. PVC pipe and fittings for sizes 18 inches through 24 inches shall meet the requirements of ASTM F679, Wall T-1, Cell Classification 12454-C. Use of 15-inch pipe and larger requires special approval.

In addition, the applicant's engineer should be familiar with the "Design and Construction Handbook of PVC Pipe" as published by the Uni-Bell Plastic Pipe Association, as revise

G. ABS Solid Wall Pipes

ABS solid wall sewer pipe shall be allowed upon specific approval of the District for four-(4) inch service laterals. ABS pipe and fittings shall conform to ASTM D2751 with a minimum SDR of 23.5. ABS is allowed in upper lateral only with appropriate fittings.

2.2 LOCATION OF LINES (STREETS)

The sewer centerline, wherever possible, shall be located in public streets parallel to and 5 feet south or east of the street centerline.

However, where storm drains are in the center of the street, the sewers should be located to provide a minimum of 4 feet clearance between the outsides of pipe (measured on a horizontal plane). This also applies to any case of paralleling lines.

Special care is required where storm drains or other pipes cross above flexible pipes to avoid deflection problems when the other lines are installed. When an area outside the improvements can be logically served by future extension of the sewer, it shall extend

to the improvement boundary or to the end of a paved street in a manner facilitating future extensions.

2.3 LOCATION OF LINES (EASEMENTS)

Easements shall be avoided where a reasonable alternate solution exists. Unless there are physical limitations, sewers shall be installed within streets. When easements are required, there shall be careful consideration of how the line is to be maintained and/or replaced when necessary.

When an easement is required, the easement document shall be recorded with Fresno County and it is the responsibility of the Applicant.

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 are subject to special approval.

Laterals shall not be connected to a main line within an easement unless specifically approved. Specifically, laterals should not be connected into the main where such a tie-in would be between or adjacent to structures.

A. Width

Wastewater easements for sewer main pipes up to 15 inches in diameter shall be a minimum of 15 feet wide. However, additional easement width shall be required where the depths of pipe exceed 15 feet or as deemed necessary. The plans shall clearly indicate any known block walls, pavement, trees or other obstructions within a proposed easement. Such items are contrary to District policy and require special approval.

B. Laterals

Easement widths shall be determined by the District as deemed necessary.

C. Pipeline Location

Pipelines shall generally be placed in the center of easements; only in unusual circumstances will a line be approved which is closer than 5 feet from the easement edge. Unless specifically approved otherwise, the line shall be straight without horizontal bends or deflections.

D. 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 approval is received and the sewer is not located on the lot lines.

E. Oversizing of Line

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

F. Deeds

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

G. Easement Provisions

Easements shall be provided as follows:

1. For subdivision tracts - The owners of land included within the subdivision shall offer to dedicate, for public use, the wastewater (sewer) easements designated on the Improvement Plans and Final Map. Standard language is included in Section 4.10.
2. For other than subdivision tracts - Dedication of sewer right-of-way shall occur by means of deeds of conveyance to the City for all dedications other than those dedications created by subdivision tract maps on a form and as approved.

2.4 SLOPES OF LINES

Minimum slope requirements are necessary to assure self-cleaning and self-oxidizing velocities to avoid significant generation of hazardous, odorous, and corrosive sulfur compounds. Where possible, use of the minimum slopes shall be avoided and shall not be construed as guidelines for system design. The standard minimum slope will be accepted by the District. The District may approve Slopes less than the standard minimum shall require special approval by the District.

A. Minimum Grades

The minimum grades for commonly used pipe sizes shall be as follows:

Pipe Size		Standard Slope Foot Per Foot
8"	(Peak Flow @ 50% depth)	0.0033
10"	(Peak Flow @ 50% depth)	0.0025
12"	(Peak Flow @ 67% depth)	0.0016
15"	(Peak Flow @ 67% depth)	0.0012
18"	(Peak Flow @ 67% depth)	0.0009
21"	(Peak Flow @ 90% depth)	0.0007
24"	(Peak Flow @ 90% depth)	0.0006
30"	(Peak Flow @ 90% depth)	0.0005
36"	(Peak Flow @ 90% depth)	0.0004
40"	(Peak Flow @ 90% depth)	0.0004
48"	(Peak Flow @ 90% depth)	0.0003

B. Maximum Velocity

The maximum velocity for sewers shall normally be 8-10 fps. 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. Where this value is exceeded, the designer should check the hydraulic considerations and pay particular attention to the invert drop across the manhole.

C. Substandard Grades

If grades below the standard minimum must be used in order to avoid pumping, the designer shall consult with the District before proceeding with design. Grades below the standard minimum may be used only upon specific approval (with approval designated on the improvement drawings) solicited well in advance of completion of 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 that shall provide suitable service to the properties connected and will allow subsequent installation of water lines, in accordance with the water/wastewater separation requirements shown in Appendix A.

A. Wherever possible, the minimum depth of cover shall be 5 feet. Where this cover cannot be maintained, other details may be required, such as higher strength pipe, pipe encasements, special backfill, or concrete trench slabs. Whereas depths of cover less than 5 feet require approval via the plan check process and are discouraged, the use of concrete encasements or trench slab will in general be reserved for depths of cover below 5 feet in paved areas and 3 feet in non-traffic areas. The applicant's engineer shall provide the necessary calculations evaluating the effect of traffic loading on shallow pipe.

B. Maximum depth of cover shall be as detailed in Plate 4.

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

2.6 HORIZONTAL AND VERTICAL SEPARATION

A. All horizontal and vertical separations between potable water mains and sewer mains and service laterals shall conform to the criteria contained in the State of California, Department of Health Services, "Criteria for the Separation of Water Mains and Sanitary Sewers." A copy of this document is included in the appendix of these Construction Standards and Drawings. Wherever the State of

California separation criteria cannot be maintained, all special construction criteria outlined in the State document shall be followed.

B. Vertical separation between sewers and all other utilities other than potable water shall be no less than twelve (12) inches. In special cases, a separation less than twelve (12) inches may be allowed provided the structural protection details of Plate 23 are used and special approval is obtained in advance.

2.7 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 loads per AASHTO Standard Specifications, truck loading with impact. Higher loading may be as specified by the District or as required by good design. Such designs shall require the submittal of calculations by the design engineer.

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. In this regard, particular attention shall 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 plates that detail various encasements or other protection may be required 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 a maximum of 24-inches of such structure.

D. Steep Grades

Sewers laid on grades steeper than 10 percent which are not under or intended to be under pavement shall be examined for possible erosion protection.

2.8 HORIZONTAL AND VERTICAL CURVES

In curved streets, the sewer shall follow the street curvature parallel to the centerline whenever the street curve is the same or greater than the minimum allowable radius of the sewer.

Allowable joint deflections shall be the more stringent of those set forth below and the manufacturer's recommendations.

In general, combined vertical and horizontal curves will not be allowed between manholes unless it is demonstrated that another solution is not reasonably feasible. Vertical curves shall not be used unless excessive extra depth of excavation would otherwise result.

A. Curves - PVC Pipe

Curvature shall be obtained by bending the pipe along its length within the trench. Beveling pipe ends will not be allowed. The following table shall be used as a basis for curvature.

Table 3

<u>Minimum Radius of Pipe Size Inches</u>	<u>Curvature in Feet</u>
6"	150'
8"	225'
10"	275'
12"	325'
15"	400'

Curves with a smaller radius shall not be permitted and manhole shall be required instead.

B. 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:

$$L = R (S1 - S2)$$

where: L = minimum length of curve
R = minimum radius of curve permitted
S1 and S2 are the two sewer grades
being used, with S1 being the steeper
grade.

2.9 SELECTION OF PIPE MATERIAL

The designer is referred to section 3.4 Materials, for discussion of the subject.

2.10 MANHOLES

The maximum distance between manholes shall be 400 feet from centerline to centerline. Although the approved distance for any particular reach may be modified by the items listed below. PVC end cap shall be used for future extensions where the exact orientation and slope of the future extension is known at the time of plan submittal.

Unless approved otherwise, all manholes shall be accessible to standard maintenance vehicles. Manholes placed in back or side yards will not be approved. A paved or gravel roadway shall be provided for access to manholes in open space areas.

Section 3.9 Materials, discusses appropriate manhole materials.

A. Location

Manholes shall be provided 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 sizes
4. At the terminal end of all lines exceeding 200 feet in length from the next downstream manhole. Manholes shall be provided in cul-de-sacs.
5. At all junctions of main sewers.
6. At the point of tangency of each reverse curve. (No reverse curves will be allowed between manholes, except where the District determines that the reverse curve is not detrimental to maintenance of the system.)
7. A manhole may be required for a non-residential service connection classification exceeding ten (10) single-family residential (SFR) units. A 6" minimum service lateral will be required for a non-residential connection.
8. At the connection of an eight (8) inch or larger service lateral connected to an equal or larger diameter sewer. Manholes shall generally be located no less than 15 feet from the curb line when within a cul-de-sac.
9. Manholes (and end of main cleanouts) shall generally be located at least 10 feet past the downstream property line
— of the last property served. Where future extensions of the sewer will be required, the manhole shall be located parallel with the upstream property line (i.e., within the street along the property's entire frontage).
10. Manholes shall not be located within the street where rainfall runoff is directed to the manhole.

B. Slope of Manhole Channels

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. In sewers that change slope, the slope of

the incoming sewer(s) shall be carried through to the outlet and the invert elevations at the inlet(s) and the outlet shall be given. Where diameters of sewer pipes change, the elevations of the crown of the incoming and outlet pipes shall match.

When the incoming sewer makes an angle of 45° to 90° with the outlet sewer, add 0.10' to the calculated manhole elevation drop. When the angle is 15° to 45° , add 0.05' to the calculated value.

C. Drop Manholes

While not encouraged, drop manholes may be required because of some physical constraint; they shall not be used to merely avoid extra depth in trench unless unusual circumstances exist. All proposed drop manholes shall be approved by the District. Where approved, the drop shall be a minimum of 5 feet and not exceed 10 feet and shall be constructed in accordance with Plate No. 13. Vertical curves or upstream slope changes shall be used to avoid, whenever possible, the need for a drop manhole.

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 travelled way, the height of the manhole rim will normally be 18 inches above the finished grade, highwater 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 shall be in accordance with Plate No. 8 (4' diameter), Plate No. 10 (5' diameter), Plate No. 11 (6' diameter) and Plate No. 12 (8' diameter). Shallow manholes shall be in accordance with Plate No. 9.

Normally, manholes will be 4' diameter; 5' diameter manholes are required for lines between 18" and 30" or where the depth to pipe invert exceeds 18 feet, 6' diameter manholes are required for lines between 36" and 48", and 8' diameter manholes are required for lines greater than 48".

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 requested in writing per the form in Appendix "A" and approved by the District.

H. Safety

Refer to Section 7.15 Construction for discussion of manhole safety.

2.11 END OF MAIN CLEANOUTS

Dead end lines less than 200 feet long may terminate in a cleanout unless a manhole is required by section 2.9. 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 2.9.

B. Design

End of Main Cleanouts shall be constructed in accordance with Plate No. 15.

2.12 SERVICE LATERALS

The District will inspect the construction of service laterals. 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 house, parcel, or building site. Service laterals shall be installed in general conformity with Plate No. 21, a cleanout extending to the ground surface shall be installed at the property line, at the connection of the house or building sewer to the service lateral, unless exempted by the District.

A. Size

Service laterals for single family dwellings shall be 4-inch minimum diameter unless a larger size is required by the Uniform Plumbing Code or California Building Code depending on the City's requirement. Condominiums or townhouses shall normally have separate 4-inch minimum diameter laterals, rather than one 6 inch minimum diameter lateral per building. All other laterals for commercial, institutional, or industrial uses shall be no less than 6 inches minimum diameter unless approved otherwise by the District.

Pipe lengths for laterals shall not exceed manufacturer's

recommendations. The maximum size lateral connection by wye or tee fitting to a larger diameter sewer shall be six (6) inches.

B. Depth

Service laterals from the main sewer to the property line 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 four (4) feet minimum from top of pipe to ground surface. The grade and location of laterals within the property are under the jurisdiction of the Cities/County. The laterals shall be at a minimum 2.0 percent grade from the property line to the point of connection at the house or building unless otherwise approved.

C. Future Connection

Unused openings shall be tightly sealed and supported in a manner to facilitate their future location and use. Developer's engineer shall select appropriate service lateral locations and shall instruct contractor to locate lateral according to the design elevations and locations. Likewise, the adequacy of such in-place laterals shall be verified by the owner/applicant before the future connection. A 2-inch high "S" indicating such lateral locations shall be stamped or engraved into the face of curb.

D. Laterals in Cul-de-sac Streets

Laterals in manholes is discouraged. Use PVC fittings where possible. Push manholes upstream to accommodate wye fittings where feasible.

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 sewer manhole rim (device required where pad elevation is below upstream manhole rim). In such instances, an approved backflow shall be installed. The lots where backflow prevention is required shall be indicated on the plans; the device or valve used shall be Proflo or approved equal and inspected by the District. See Plate No. 24 for details regarding installation. Installation location shall be upstream of property line and cleanout.

F. Cleanouts

Cleanouts are required at the junction of the building piping and the house or building sewer and at the property line. All cleanouts must be in a box, see Plate No. 16. Cleanouts in driveways or traffic area will require traffic rated boxes.

2.13 PUMP STATIONS

A. GENERAL

All sewage shall reach the system by gravity flow, in a fresh (non-septic) condition susceptible to conventional sewage treatment processes. Where extreme hardship conditions prevail and a substantial area cannot be sewered by gravity sewers, in accordance with these requirements, a sewage pumping station may be considered. No pumping facilities shall be designed or incorporated in sewer plans without prior approval. These Standards outline the requirements for new and replacement pump stations. Upgrades or modifications to existing pump stations must meet these Standards to the extent practicable. The station is to be designed, constructed, and demonstrated as operational before District acceptance. The contractor is responsible for providing all equipment and materials necessary for this test.

B. DESIGN CONSIDERATIONS

Pump stations for newly developed areas shall not be located in road right-of-way, but shall be located on a separate parcel of land with a minimum lot width of 40' and depth of 30' and shall include fence, gates, lighting, etc.

Grade the pump station site to prevent local ponding and provide positive drainage away from structures. Grade the site not to create a low point in relation to the adjoining properties.

If the pump station is intended for a development of a project built in phases, consider the flows that will occur at different project phases. Base the pump station design on the ultimate capacity requirement and on the interim phase flows. A design report shall be provided and must clearly identify and outline the various flows and the corresponding triggers requiring the next level of expansion or upgrade. Summarize phasing on the project-specific plans.

C. CIVIL

1. APPROACH SEWER MANHOLE AND PIPE

The approach sewer manhole is the first sewer manhole upstream of the wet well. The approach pipe is the segment of pipe connecting the approach sewer manhole to the wet well and is the inlet to the wet well. The approach pipe must be laid at a 2% slope minimum to the point of discharge into the wet well. Pipe penetrations into the sewer manhole and the wet well must be bored by the pre-cast manufacturer or blocked out for boring in the field for penetration 8-inch or less in diameter. Seal penetrations with Link-Seal or an approved equal sealing system. The approach pipe is considered part of the wet well and not part of the collector system.

2. WET WELL

A civil or structural engineer currently licensed in the State of California must design all pump station wet wells, and the design must consider the following:

- Wet wells will be accessible for necessary maintenance, and all materials and equipment used in wet wells must be corrosion-resistant.
- Do not install junction boxes in the wet well.
- Do not use dry well or dry pit pump stations.
- Construct wet wells of precast reinforced polymer concrete, or approved equal. Wet wells must be circular for all pump stations and coated with Raven's 405 Coating per manufactures specifications.
- Design wet wells that are installed below groundwater to prevent flotation and water infiltration.
- The wet well must have a bottom slope to suction lines at least 1.75 vertical to 1.0 horizontal. The width of the flat bottom in the wet well shall not exceed twice the diameter of the pump suction inlet and a 6-inch fillet along the inside perimeter edge of the wet well. Construct the fillet with a material that is resistant to corrosion and will adhere adequately to the bottom and sides of the wet well.

3. SIZE CRITERIA OF WET WELL

Calculate the required operational wet well volume to optimize pump operation to meet peak hour design flows, minimum hour flows, and the maximum pump start frequency. Every effort must be made to design a system that prevents conditions that allows sewage to become septic. Size the wet well based on the equation below:

$V = Q * T / (4 * N)$, where:

V: Wet Well operational volume in gallons

Q: flow in gpm

T: interval between pump starts in minutes

N: number of pumps

Use FLYGT submersible, centrifugal, constant speed pumps in the design. Design the wet well for the following parameters and as illustrated in Plate 31 of these Standards:

- The low-level water alarm must meet the pump manufacturer's minimum recommended safety limits.
- The pump operational band (between pump on and pump off) must begin a minimum of 6 inches above the low water alarm or greater if recommended by the pump manufacturer.

The pump start set point must provide for a minimum submergence at the pump suction inlet to prevent free surface air core vortices as per pump the manufacturer provided guidelines. If there are no submergence charts available, use the following U.S. Hydraulic Institute guideline:

$S = D + [(0.574 \times Q) / D^{1.5}]$, where:

S: Minimum submergence to prevent vortexing, in inches

D: Pump suction inlet diameter, in inches

Q: Pump design flow rate at BEP, in gpm

- The operational band must be large enough to accommodate the District's maximum number of pump starts allowed for the installed pump.
- The inside diameter of the wet well must be a minimum of 6 feet; however, retention time, pump configuration, and access may require a larger structure.
- The pump operational band will be below the incoming gravity pipe invert. No part of the incoming gravity pipe will be used under non-emergency operating conditions.
- Holding capacity in a wet well that has an overflow relief shall be equivalent to two (2) hours accumulation of the maximum design flow from the fully developed area tributary to the pump station. Wet wells that do not have overflow relief shall have a holding capacity equivalent to four (4) hours accumulation of the maximum area tributary to the pump station.

4. ACCESS HATCH

Install 36" x 48" double door clear opening aluminum H-20 traffic rated access hatch with safety grate feature, slam lock, recessed padlock HASP and angle frame. A larger access hatch may be needed based on pump station size. Hatch to be "Syracuse Castings West Model DC-HD-A0SG" or approved equal. Show the hatch opening direction on the project-specific plans.

5. VAULTS

Vaults shall be engineered precast reinforced concrete. Concrete used for manufactured vaults must have a minimum 4,000 psi compressive strength. Slope the floor of the vault within the pump station site to the drain. The floor of the vault must have a non-skid finish. Size the vault based on the number of pumps and future phasing of the station. Provide adequate space within the vaults for the District's maintenance activities. Size vaults to provide 2 feet overall

clearance (for the top, bottom, and sides), between walls of the vaults, and internal components for accessibility and routine maintenance. All vaults must have an H-20 traffic rated aluminum bolt down lids fully compliant with CBC requirements. Vaults within the pump station site must have a minimum 3-inch PVC drain pipeline that discharges to the wet well as illustrated in Plate No. 30, 31, 32, and 33 of these Standards. Pressurized pipeline penetrations must be core drilled and grouted in place and level with the surface on both sides of the wall. Pressurized pipelines within the vaults must have flange support or saddle support as approved by the District.

6. FLOW MONITORING

A flow monitoring system that includes an in-line electromagnetic flow meter on each force main, along with any ancillary equipment, vaults, conduits, instrumentation, etc., must be installed in pump stations as determined by the District. The flow monitoring system must be designed according to vendor specifications and approved by the District during the design phase.

7. BYPASS PROVISIONS

All pump stations must have a bypass vault with isolation gate valves and bypass pumping assembly located inside the bypass vault between the wet well and the discharge manhole.

D. MECHANICAL STANDARDS

1. Sewage pumps must be submersible, centrifugal non-clog solids handling pumps specifically designed for handling raw, unscreened sewage.
2. Use a duplex pump configuration configured with identical pumps; each pump should be capable of handling peak wet weather flow.
3. The design engineer must submit an analysis to support pump selection that includes number of starts per hour, flow, volume, duty pump, standby pump, and pump rotation for the District's review.
4. The District's standard pumps are Flygt.
5. Gate valves and check valves shall be DeZurik or approved equal.
6. Force mains shall be AWWA C-900 DR 14 (Pressure Class 305 psi) laid on a continuous positive grade and to grades

designed to eliminate air pockets in the line. Clean outs shall be installed every 400 feet.

7. Air release valves shall be installed to relieve accumulated air under pressure.
8. Protect all above-ground piping and equipment from freezing as appropriate.

E. ELECTRICAL

1. NOMINAL VOLTAGE SELECTION

Provide a 480-volt, 4 wire, 3 phase, and 60 Hertz electrical service, or as dictated by local utility agency.

2. EQUIPMENT SELECTION AND CONTROL CRITERIA

Electrical equipment must meet the process demands of the pump station. All equipment must meet the most recent applicable standard limits for vibration, audible noise, harmonic voltage and current, electrical surge immunity, and thermal limitations.

3. CONTROL

Equipment must have a minimum level of manual control in addition to automatic operation.

4. CONDUITS

Exposed conduits and buried conduits must meet the following requirements:

- Install rigid galvanized steel conduits for all exposed conduits.
- Install Schedule 40 PVC conduits for all buried conduits.
- Install PVC-coated rigid galvanized steel conduits in all underground and hazardous locations.
- Show the conduit runs on the project-specific plans and specifications.

F. SCADA, CONTROLS, AND INSTRUMENTATIONS

1. INSTRUMENTATION STANDARDIZATION AND CONTROL COMPONENTS

Standardization of instrumentation and control components and implementation significantly facilitates both operation and maintenance of the stations. With a standardized instrumentation and control interface, operators (both locally and via SCADA) can quickly adapt to each station with minimum effort or risk. A pump station shall have suitable adjustable level control, wet well, lights, locking entrance door, running time meters, and cathodic corrosion control in cases of metallic construction materials. For consultant

reference, the District may consider changes or upgrades to the standardized instrumentation and control components in the future, as chosen models become obsolete or new technology offers significant advantages. At this time, the District allows only Modbus, HART, or foundation field bus protocol. SCADA communications must use the DNP3.

2. ENCLOSURES

Control and instrumentation equipment located outdoors must be in NEMA 3R enclosures suitable for the location. The enclosures must provide complete access for all onsite maintenance and repair needs without requiring disassembly or removal of the enclosure. The enclosure shall be under a shaded structure and have a cooling fan to prevent overheating. For corrosive environments, provide NEMA 4X stainless steel enclosure. Where electronic equipment, PLCs, personal computers, power supplies, instrumentation, displays, or other heat-sensitive control equipment are located in an outdoor enclosure, group the equipment together in a control panel or control section of the enclosure.

3. LEVEL INSTRUMENTATION

The District requires a submersible level transducer system.

4. SCADA COMMUNICATION

Provide pump stations with standard components for SCADA communications. Contact the District to determine radio communication availability at the proposed site. If radio communication is available, provide the pump station with radio communication.

5. SPARE CONDUIT

Install a spare conduit between the RTU cabinet and the Termination Box for ease of installing future instrumentation into the wet well.

G. PRIVATE PUMP STATIONS

General District policy is to avoid private residential pumping systems except in those cases where such a system is either:

1. in the District's best interest
2. The only method for sewerage a building site which cannot be adapted to a gravity system. Design, construction and maintenance of private pumping stations are the responsibility of the property owner. Where used, the design of a private pumping system requires special District approval. As such, it is the responsibility of

the design engineer to ensure that all private pump stations are adequately sized, have sufficient redundant measures, and comply with all applicable local, State, and Federal regulations that may apply. Applicant must record a Private Sewer Maintenance Agreement on lots served by the pump station prior to any installation. Before the sewage enters the District's system, it must be gravity fed.

2.14 INDUSTRIAL WASTE DISCHARGE

An industrial use survey application shall be submitted to the District prior to any consideration of connection to the collection system.

The applicant/engineer should be aware that the District regulates the physical and chemical content of wastewaters discharged to the sewerage system. These regulations are contained in an industrial waste ordinance.

Typically, this ordinance only applies to those developments with a discharge of liquid wastes other than typical domestic wastewater. However, the ordinance should be reviewed if wastewater will contain any hazardous toxic materials, heavy metals, or any other substances that may be harmful to the operation and maintenance of the sewerage system. The ordinance requires that the substance either be prohibited from discharge or pretreated prior to its discharge to the sewer. Questions and further details concerning these regulations should be directed to the District. Plate No. 27 details a sampling well which may be required of any discharger. Major industrial waste dischargers will be required to obtain District approval of a flow meter and sampling manhole.

2.15 ABANDONMENT OF WASTEWATER LINES

Refer to Section 8.

SECTION 3

MATERIALS

SECTION 3.0

MATERIALS

3.1 GENERAL REQUIREMENTS

Materials shall be chosen for their strength, durability and ease of maintenance, with due consideration for dead and live loads, beam and sidewall 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. All materials, unless specifically approved otherwise, shall be new and unused.

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

In general, pipe installations for most projects will use PVC products. Unless the District takes exception during the plan checking process, it can be assumed that PVC is acceptable. However, if an exception is made, the acceptable material(s) shall be reflected in the next plan submittal. Where alternate materials are shown, the various load factors for each reach must be indicated for the corresponding pipe material.

3.2 TESTING AND FINAL ACCEPTABILITY OF MATERIAL

The District shall require such tests and certifications as deemed necessary to show that the specified materials have been employed. Notwithstanding prior factory or yard inspections, the District shall have the right to reject any damaged or defective materials found on the job which will affect the durability of the installation and order its removal from the site.

3.3 RIGID PIPES

Rigid pipes, fittings and joint materials specified consist of Reinforced Concrete (RC) and Ductile Iron (DI).

A. Reinforced Concrete Pipe and Fittings:

Reinforced concrete pipe and fittings shall conform to the quality and strength requirements of ATSM C76, designed for a minimum head of twenty-five (25) feet. The minimum class shall be Class III. Cement used in the manufacture of the pipe shall conform to ASTM C150 as it applies to type II cement. Special D-loadings for all pipelines shall be noted on the construction drawings. Rubber gasket joint design shall conform to ASTM C443 and as modified herein:

1. The joint shall be all concrete bell and spigot or flush bell type. Other type joints may be used if prior written

approval is obtained.

2. The gasket, either rubber or neoprene, shall be confined in a groove formed in the outside surface of the spigot end of the pipe.
3. Reinforced concrete pipe twenty-four (24) inches in diameter and larger shall be protected from internal corrosion with PVC "T- Lock"-type lining installed in strict accordance with the recommendations of the liner manufacturer.

B. DI Pipe and Fittings

Ductile iron pipe and fittings shall conform to ASTM A746. The tensile or ultimate strength shall be 60,000 psi minimum with a yield strength of 42,000 psi minimum. All pipe 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.

If required, the pipe shall have a polyethylene liner complying with the requirements of ASTM D1248 and having a thickness of approximately 20 mils. Such a liner shall be similar to that manufactured under the trade name "polybond."

All ductile iron pipe, fittings and ferrous bodied appurtenances which are to be buried shall be encased in polyethylene tubing prior to backfilling the fitting or pipe. Polyethylene encasement (baggy) shall conform to AWWA C105 (ANSI A21.5).

3.4 PLASTIC PIPES

Plastic pipe, fittings and joint materials specified herein consist of Poly-Vinyl Chloride (PVC), Acrylonitrile Butadiene Styrene (ABS), and Polyethylene (PE). 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 Plate No. 4.

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-inch through 15-inch diameter 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) shall be 26 minimum where the SDR is the ratio of pipe diameter to wall thickness. Pipe and fittings 18-inch through 27-inch diameter shall conform to the

quality requirements and strength characteristics of ASTM F679 "Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings." Minimum wall thickness for ASTM F679 Large-Diameter pipe shall be T-2. Minimum pipe stiffness shall be 46 psi.

Pipe straightness shall be a maximum of 1/16th inch per foot 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:

4- inch through 15-inch diameter:

- Manufacturer's name or trademark
- Nominal pipe size
- PVC cell classification (12454-B or 12454-C or 13364-B)
- Legend "Type PSM SDR-26 PVC Sewer Pipe" ASTM D3034

18- inch through 60-inch diameter:

- Manufacturer's name or trademark
- Nominal pipe size
- PVC cell classification (12364)
- Legend "PS 46 T-2 PVC Sewer Pipe"
- ASTM F679

Fittings shall be clearly marked as follows:

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

PVC solid wall laterals shall conform to ASTM D3034, Type PSM, as well as the following:

<u>I.D.</u>	<u>SDR</u>	<u>Minimum Wall Thickness</u>
4"	26	0.162"
6"	26	0.241"
8"	26	0.323
10"	26	0.404"
12"	26	0.481"
15"	26	0.588"

B. PE Pipe and Fittings

Unless otherwise approved, all polyethylene pipe and fittings shall conform to the quality and strength requirements of ASTM D1248 Type III with PPI recommended designation of PE3408. The pipe material shall contain ingredients to provide protection against ultraviolet degradation during processing and subsequent weather exposure. 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. 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 manufacturers' recommendations or as required by the District. Maximum long-term ring deflection of the pipe under proposed trench loading and bedding conditions shall be limited to 5 percent or less.

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 "PE3408"

Polyethylene pipe usage is reserved for special conditions; therefore, no installation specifications are included here.

3.5 OTHER PIPE MATERIALS

Other pipe material may be approved by the District for a specific project.

3.6 PIPE TRENCH MATERIALS

Refer to Plate No. 3 for trench cross section terminology.

The materials listed below shall be considered as standards unless specific approval is received to deviate from the values shown. In such instances, the request shall be made before any installation. All materials shall be free of vegetable matter or other deleterious substances.

A. Type A Material

shall be 3/4-inch maximum aggregate and shall conform to the grading and quality requirements of Class 2 aggregate base as specified in Section 26 of the State of California Department of Transportation Standard Specifications, latest edition, shown in the following tables:

Aggregate Grading Requirements For 3/4-Inch, Class 2 Aggregate		
Sieve Sizes	Percent Passing	
	Individual Test Results	Moving Average
1 inch	100	100
3/4 inch	87-100	90-100
No. 4	30-60	35-55
No. 30	5-35	10-30
No. 200	0-12	2-9

Quality Requirements		
Tests	Individual Test Results	Moving Average
Resistance (R-value)	78 min	25 min
Sand Equivalent	22 min	
Durability Index	35 min	

Coarse aggregate (material retained on the No. 4 sieve) shall consist of material of which at least 25 percent by weight shall be crushed particles as determined by California Test 205.

The aggregate shall not be treated with lime, cement, or other chemical material before the durability index is performed.

B. Type B Material

shall be 2-inch maximum gravel and rock and shall conform to the grading and quality requirements of Class 1, Type B permeable material as specified in Section 68 of the State of California

Department of Transportation Standard Specifications, latest edition, shown in the following tables.

Aggregate Grading Requirements For 2-Inch Maximum Class 1 Permeable Material

<u>Sieve Sizes</u>	<u>Percentage Passing</u>
2 inch	100
1 1/2 inch	95 - 100
3/4 inch	50 - 100
3/8 inch	15 - 55
No. 4	0 - 25
No. 8	0 - 5
No. 200	0 - 3

Quality Requirements

<u>Test</u>	<u>Individual Test Results</u>
Durability index	40 min

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.

C. Type C Material

Shall be select native material removed from the trench excavation or nearby surroundings which is free from vegetable matter, trash or other rubbish, and other deleterious matter. The material shall meet the following:

- Above pipe zone - 6" maximum size or as required by District, whichever is more stringent.

3.7 SPECIFIC USES OF PIPE TRENCH MATERIALS

Use Plate 5 as a guide for the selection of proper trench materials. However, if the designer feels that more stringent backfill materials should be specified, then this should be done. Also the selection of any pipe trench material shall 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 Cities and the County Public Works Road Standards. Asphalt, aggregate base and aggregate sub-base specifications are those set at by the latest published edition of State of California, Department of Transportation Standard Specifications.

3.9 MANHOLES

Manhole materials shall conform to those listed on Plate 8 in addition to the following:

A. The design and pre-cast construction of manhole sections shall conform to ASTM C478 which include the following:

1. Concrete shall be a minimum 4000 psi compressive strength.
2. Access opening shall be a minimum 24 inches in diameter.
3. Rejection of the manhole section may be made if:
(1) there are damaged or cracked ends, where such damage would prevent making a satisfactory joint, (2) any continuous crack having a surface width of 0.01 inches or more and extending for a length of 12 inches or more, regardless of position in the wall, (3) fractures or cracks passing through the wall except for a single end joint that does not exceed the joint depth, or (4) surface defects indicating honeycombed or open texture.

B. Joints between riser sections shall be cleaned and a preformed plastic or "mastic" sealing gasket or a flexible mastic grout shall be installed prior to setting the next barrel or cone section. The joints shall be grouted on the outside of each joint. Cement grouting between joints will only be allowed for the joint between the bottom ring and the base.

C. 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. In other undeveloped areas above the high-water level, sand and cement mortar mix over grade rings shall be used as specified on Plate No. 18.

Where required to prevent an extremely visible manhole in an area which is otherwise improved, additional camouflaging may be required.

3.10 MANHOLE/CLEANOUT LIDS

All manhole covers shall have "Sanitary Sewer System" and "SKF" cast around the perimeter of the top with minimum 1-1/2 inch letters indicating the use of the manhole. Cleanout lids shall include the word "Sewer."

3.11 CONCRETE MATERIAL

Approved concrete material shall be based on the current edition of the State of California, Department of Transportation Standard

Specification and shall be chosen according to the following chart showing its intended use.

<u>Class</u>	<u>Application</u>	Minimum Weight of Portland Cement	Maximum Aggregate Size	Slump Inches	
		<u>lb/cy</u>	<u>inches</u>	<u>Min</u>	<u>Max</u>
A	Walls, drip structures and reinforced structural encasement.	564 (6 sack)	1-1/2"	3	6
B	Manhole bottoms, drop pipe encasement, pipe bedding, non-structural use.	564 (6 sack)	1-1/2"	3	6
C	Pump mix for abandoning lines	376 (4 sack)	3/8"	---	---

Type V cement shall be used for concrete material used in any structure exposed to wastewater and subject to sulfide deterioration.

3.12 REINFORCING STEEL

A. Bar Reinforcement

Shall be grade 40 minimum deformed 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 twenty (20) diameters or butt welded, 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

PLAN PREPARATION

SECTION 4.0 PLAN PREPARATION

4.1 SHEET SIZE

Overall dimensions 24" x 36".

4.2 MARGINS

Two inches on left, all others 1/2 inch.

4.3 SIGNATURE BLOCK

All sheets of the plans shall have an approved signature block located in the lower right-hand corner (see Plate No. 1). The approval blocks shall be signed before any construction occurs. Any changes to the plans after initial approval shall be shown as revisions and shall be approved by the District.

4.4 COVER SHEET

This shall be the first sheet in the set and shall contain:

A. Index Map

An index map with an overall plan at a scale of 1" = 300 ft. showing a general layout of sewer lines, sizes, manhole locations and numbers, flow direction arrows, named streets, tract boundaries, lot boundaries and numbers, a sheet index, California coordinates, and other pertinent information. Special importance shall be given to make sure the scale and orientation is correct. Index maps are used to produce a wastewater system atlas, and incorrectly drawn maps will have to be redrawn.

B. Vicinity Map

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

C. Benchmarks

All benchmarks used in the project shall be graphically shown on this sheet and the 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. General Notes

The general notes shall be shown on the key map 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. Sewer Service Certification

Sewer service certification is required and shall be worded as follows:

CERTIFICATION

I hereby certify that the sewer system as shown on drawing number _____ sheets _____ through _____ has been designed to adequately service each and every lot or facility shown on said plans.

Registered Civil Engineer RCE No. _____ Date _____

If the project does not involve specific lots, then substitute the words "...designed to adequately provide for the development that the system is intended to serve."

4.5 PLAN OF SEWER 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 that are adjacent to an easement shall be shown as well as fences, walls, trees, etc. that 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 SEWER 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 bedding or 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 sewer invert elevations to 0.01 foot. Manhole rim elevations are also required. Any pipe line two inches (2") or more in diameter which crosses the sewer and especially water, gas, telephone, power, storm drains, television and oil lines, shall be shown and labeled on the profile. The grade of major lines paralleling within 5 feet of the sewer shall be shown as dashed on the profile.

The District is not responsible for the accuracy of the location of these underground lines, and approval of sewer plans by the District does not constitute a representation as to the accuracy of the location, or the existence or non-existence of any underground utility, pipe or structure within the limits of the project.

4.7 GRAPHIC SCALE AND NORTH ARROW

All plan and profile sheets shall contain:

A. Graphic Scale

A graphic scale, horizontal as well as vertical, illustrated such that a true representation is produced when the plans are reduced in size, and they shall be as follows:

horizontal	1" = 40 feet
vertical	1" = 4 feet

Vertical scales of 1" = 8 feet will only be accepted for lines in steep areas where the 1" = 4 feet scale can not properly be used.

B. North Arrow

A north arrow oriented toward the top or to the right only, or as approved.

4.8 PROCEDURE FOR APPROVAL

Approval for improvement plans consists of two phases. Each phase consists of a series of requirements which must be met before final acceptance.

A. Requirements for authorization of construction
(See Section 5.0).

B. Requirements for final acceptance
(See Section 11.0).

4.9 PLAN CHECKING LIST

The following list is intended as a guideline to assist the preparer; it is not intended to be a complete list of all requirements.

Check List for
Plan Checking and Project Requirements

- Title block
- Benchmark
- Key map (1" = 300')
- Vicinity map (1" = 1,000') North arrows (to right or up)
- Size of sheets (24" x 36") Margins around drawing
- General notes and others
- Design certificate (sign)
- Record Drawing certificate
- Graphic scales (plan and profile)
- Location of lines referring to center of streets
- No wastewater main under sidewalk
- Crossing of other lines, e.g. storm drain, gas, water
- Pad elevations
- Backwater valves
- Manhole spacing (no manholes on private property, if possible)
- Existing drawing numbers
- Existing and proposed surfaces
- Easements and assessor parcel numbers
- Deep lines, load factors
- Maximum and minimum pipe lengths
- Change order fee
- Existing laterals installed by other tracts or previous construction
- Condominium, individual laterals
- Laterals for recreation buildings, etc.
- Insurance certificate
- Check master plan
- Obtain CFS calculations
- Will serve letter
- Brokers name and bond
- End of curve (E.C.), Begin of curve (B.C.), Point of Compound Curve (P.C.C.), Point of Reverse Curve (P.R.C.), on plan and profile
- Check requirements for vertical curved sewers
- House laterals to be long enough to clear other utilities (PUE - public utilities easement)
- Submit original insurance certificate to Manager after District Council approval
- Check street names on tract map, plans and street address
- Cost estimate
- Separate laterals for each ownership
- Approval of exceptions documented.

4.10 STANDARD LANGUAGE FOR DEDICATION OF FACILITIES TO DISTRICT

The following language is intended as an example of standard language for the dedication of facilities to the Cities or the District. It shall be modified if necessary to fit a particular set of circumstances.

A. Grant Deed, Quitclaim Deed, Bill of Sale or Other

All of its rights, title and interests in and to the wastewater system, pipelines, manholes and appurtenances thereto as located in, on, over, under, and across streets, easements and rights of way shown on Tract as per map thereof recorded in Book____, Page____, and shown on the easements) as per Book____, Page____ of official Records, in the office of the County Recorder, County of Fresno, State of California.

B. Easement Deed

An easement and right of way to lay, construct, repair, maintain, operate, renew, and replace pipeline and appurtenances incidental thereto for the transportation of wastewater with the rights of ingress and egress to and from same, in, over, under and across the following described real property in the County of Fresno, State of California.

4.11 STANDARD NOTES

The standard notes shown on the following pages) shall be included on the cover sheet as applicable. They are subject to change to suit the needs of the District.

General Notes

1. Contractor shall notify the District at (559) 897-6500 five (5) days prior to commencing construction.
2. All construction shall conform to the adopted Selma-Kingsburg-Fowler County Sanitation District Collection System Construction Standards as amended.
3. Sewer Mains SDR-26 PVC Conforming to ASTM 3034 Unless Noted Otherwise.
4. Warning: Connection to existing sewer facilities shall be done only in the presence of the District Inspector.
5. The location of and existence or non-existence of underground utilities has been determined to the best of the design engineer'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.

6. Separation between wastewater and water lines shall be in accordance with the Selma-Kingsburg-Fowler County Sanitation District Collection System Construction Standards, Appendix A.
7. All trench backfill and compaction in public right-of-way above the pipe zone will be under the supervision of the Cities' and County's Departments of Public Works.
8. The contractor shall maintain a record of the locations of all wastewater laterals, tees and stubouts. This record shall be delivered to the applicant's engineers prior to final payment being authorized.
9. Backwater devices shall be installed where necessary.
10. The contractor shall mark the location of all wastewater laterals with the letter "S" at least 2" high engraved into the curb.
11. Lateral installations to property lines without curbs shall end at a 2" by 4" stake driven to a depth of 2 feet below finished grade.
12. All laterals to new pipelines are to be tied into main line through use of fittings. Cut-in saddles are not allowed.
13. The sewer systems shall be completed and tested prior to the District recommending that the City accept the sewers as complete and prior to the issuance of a Certificate of Occupancy.
14. Sewer lines will be internally inspected by television at the owner/applicant's expense.
15. The house service laterals shall be extended beyond the street right-of-way to edge of P.S.E. (public service easement).
16. A temporary metal plate shall be used to secure newly constructed manhole openings. The temporary plate shall be water tight. Frames and covers will not be allowed to be used as temporary plates. Existing manholes to be readjusted will be required to have the temporary metal plates. All frame and covers are to be USA manufactured.
17. Prior to testing and video inspection of any sanitary sewers, the following must occur: all sanitary sewers, storm drains and water lines for the entire project must be installed, backfilled and compacted; and all utility trench crossings for electrical, gas and communications, with all conduits, pipes and sleeves, must be completed, backfilled and compacted. For electrical, gas and

communications lines on the property side of the curb, the installation requirements may be waived by SKF if requested in writing with a letter accepting responsibility for retesting and repair of any damage to sewer main lines or laterals.

18. No District connection permits shall be issued until all sewers pass testing and video inspection.

SECTION 5

FEEES AND REQUIREMENTS FOR AUTHORIZATION OF CONSTRUCTION

SECTION 5.0

FEES AND REQUIREMENTS FOR AUTHORIZATION OF CONSTRUCTION

5.1 PLAN CHECK FEE

When wastewater plans are first submitted, a plan check and inspection fee shall be paid to the District, or its agent, by the applicant. This fee shall be at the rate schedule specified in the applicable District ordinance or resolution and shall use the applicant's engineer's estimate of the cost of the improvements. Such cost estimates shall be approved by the District. Under no circumstances shall refunds of the above fee be made. However, the plan check fee required may be increased if actual or subsequently estimated costs exceed that used for the initial fee calculations. A redesign of original plan submittal after initial plan check is subject to another plan check fee.

5.2 SUBMITTAL OF CONSTRUCTION PLANS

Electronic submittal in PDF format of the proposed wastewater improvements, final tract map, other non-wastewater improvement plans, and one copy of the applicant's engineer's construction cost estimate shall be submitted, together with the plan check and inspection fee for the first plan check. Plans illustrating an incomplete design and drafting detail may not meet minimum standards and may be just cause for a rejection of the first plan check. The applicant or applicant's engineer shall submit preliminary plans completed in accordance with these standards. The required submittal shall include a study of the tributary wastewater drainage area above the subject property and the criteria and calculations used to determine the size of the lines.

5.3 SPECIAL PROVISIONS

If there are unusual conditions which would require substantial deviation from the District's Collection System Construction Standards, particularly with respect to slopes, pipeline cover, or crossings, such deviations shall be submitted, in writing, prior to tentative map and/or development project approval, or in any case prior to submittal of the first plan check.

5.4 INSPECTION FEE

Staff shall analyze the plans and materials as submitted and prepare and send comments to the applicant's engineer. Also, the following is applicable:

A. Inspection Fee

An inspection fee shall be according to the applicable District ordinance or resolution.

B. Construction inspection fees for special situations

As determined by the District, such as inspections on Saturdays, Sundays, or holidays or beyond working hours which are 8 hours per day 40 hours a week shall be charged as follows:

1. For inspections of special situations during normal working hours, the current inspector rate per hour worked, plus an allowance for fringe benefits, plus the current overhead rate contained in the District's budget.
2. For inspections during overtime periods, the current inspector rate per hour worked multiplied by a factor of 1-1/2, plus fringe benefits, plus the current overhead rate. Overtime inspection shall have a 2-hour minimum time period.
3. For inspections during Sundays and holidays, the current inspector rate per hour worked, multiplied by a factor of 2, plus fringe benefits, plus the current overhead rate.

5.5 EASEMENTS

Any easements necessary must have deeds submitted for checking at this time and shall be dedicated to the respective city, or if cases of unincorporated areas, to the District.

5.6 AGREEMENTS, BONDS, AND INSURANCE CERTIFICATE

Staff will provide the applicant with the proper forms and applicant shall submit the following:

- A. Agreement for construction of sewer facilities (in triplicate and notarized).
- B. Insurance certificate with limits as stated in "Agreement".
- C. A faithful performance bond (in triplicate and notarized) equivalent to 100 percent of the estimated cost including contingencies of construction.
- D. A labor and material bond (in triplicate and notarized) equivalent to 100 percent of the estimated cost including contingencies.

5.7 APPROVAL FOR CONSTRUCTION

Upon receipt and satisfactory review of all documents, bonds, fees, the staff shall prepare a recommendation for approval to construct. Recommendation shall be accompanied by the following material:

- Tract original plans
- Agreement for construction of sewer facilities
- Easement deeds

- Faithful performance bond
- Labor and material bond.

Upon approval, the District Manager will sign the original plans and notify the applicant's engineer that the plans are signed and available. The applicant's engineer shall then provide the District with two sets of plans, pdf file and the original drawings will be returned to the applicant's engineer. After completion of the work, the original plans shall be revised as Record Drawings and the originals shall become the District's property.

No construction shall occur before the plans are signed and before a five-day notification period has been given. This notification period will allow time for a pre-construction meeting of all interested parties.

5.8 CONNECTION CHARGE

No parcel of property shall be connected to the District's sewer system or building permit issued until a connection charge has been paid. The charge shall be based upon a single-family residence or upon results of a special evaluation for commercial, institutional or industrial services.

5.9 SPECIAL CHARGES

If there are items requiring special approval, the District may require deposition of funds or agreements for funds in the future to provide for operation and maintenance of the substandard system.

SECTION 6

CONSTRUCTION STAKING

SECTION 6.0 CONSTRUCTION STAKING

6.1 GENERAL REQUIREMENTS

Construction staking is the responsibility of the applicant, its engineer or contractor. Stakes shall 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 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.

6.2 PRESERVATION OF STAKES

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

6.3 SERVICE LATERALS

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

6.4 "RECORD DRAWING"

The Contractor is responsible for maintaining a red-line mark-up of the plans indicating any changes in the work from that shown on the approved plans. The Contractor shall submit reproducible drawings with the Record Drawing changes indicated prior to acceptance of the project.

The Developer's Engineer certification shall appear on the Record Drawings.

For all street sewers, regardless of alignment or slope, the applicant's engineers shall determine Record Drawing elevations at the invert centerline of each manhole, label GPS coordinates on each manhole and shall provide a written record of such elevations to the inspector. Also, the stationing for each lateral is required on the record drawings.

SECTION 7
GENERAL REQUIREMENTS

SECTION 7.0 GENERAL REQUIREMENTS

7.1 GENERAL REQUIREMENTS

This section describes the use of materials and workmanship to be employed in construction of the wastewater collection system. The applicant/engineer shall prepare such general and special specifications as are necessary to define the nature and location of the work. Contractual arrangements, payment for work, and any other matters concerning the owner and the contractor are not included in these standards.

A. Quality of Materials

Materials and equipment to be incorporated into the work shall be new and unused unless otherwise approved. In case a reference is not clear as to which of several available grades is desired, the highest quality material shall be used. When construction bids are received directly by the District, such bids shall show the proposed pipe material and the manufacturer's name, if more than one type is allowed.

Contractor shall have at the job site, or be able to supply upon request, certified copies of factory or laboratory test reports showing the strength characteristics of any materials used in the work. For all reinforced concrete work, contractor shall furnish, in advance of pouring concrete and if requested, the mix design and calculated concrete strength as prepared by the concrete supplier.

B. Substitutions

Where articles or materials are specified by brand or trade name, alternate materials or articles equal to those specified may be approved, provided the request for approval is in writing accompanied by supporting data in ample time to permit investigations without delaying the work. Unless substitutions are approved, no deviation from the standards will be allowed.

C. Quality of Workmanship

All work will be done by persons experienced in the specific work, under competent supervision and to the District's complete satisfaction. When work is being done directly for the District, the contractor in the proposal shall name each subcontractor, and no substitutions will be permitted without prior approval.

D. Defective Work

Any defective materials or workmanship which shall become evident within one year after field acceptance of completed work shall be replaced or repaired without cost to the District.

E. District Inspection, Field Acceptance and Guarantee Period

The District is responsible for inspection of all excavation, pipe-laying, trench backfill within the pipe zone, and testing. All such work shall be available for inspection at all times. It shall be the contractor's responsibility to provide a five-(5) day notice to the District before the start of any work. Such notification will allow for scheduling a pre-construction meeting between interested parties. Failure to provide proper notification may delay the starting date since the District may not be able to inspect the work and cannot accept any work for which inspection has not been arranged.

Field acceptance is made by the inspector and most often will not coincide with the date of District recommendation for acceptance of the work. However, the one-year guarantee period for all work shall begin as of the Cities' acceptance. As mentioned in Section 7.1D, any defective work discovered during this period shall be repaired or replaced and a new one-year period will begin for that corrected work. Minor repairs or replacement, however, will not affect exoneration of the bonds and acceptance by the Cities as originally scheduled.

F. Public Relations

The contractor shall conduct its affairs in a manner that will lessen the disturbance to residents in the vicinity of the work. In this regard, normal working hours shall be observed unless prior approval is received. The job site shall be maintained in a condition that shall bring no discredit to the District or its personnel, and all affected private improvements shall be restored to at least their original condition.

If any subcontractor, workman or person employed by the Contractor shall fail or refuse to carry out the direction of the inspector or shall appear to the inspector to be incompetent or to act in a disorderly or improper manner, the District may request that the person be removed from the worksite.

G. Television Inspection

Video inspection of new sewer mains is required in all new installations and shall follow NASSCO protocol. Such inspection will be arranged by the Contractor. Video inspections shall be paid for by the Contractor and shall be completed prior to the final acceptance of the improvements. The inspection shall be in color, and shall be recorded DVD Format Disk, USB Thumb drive or an approved alternative, which shall become the property of the District. The District shall be the sole judge as to the acceptability of construction revealed by such inspection. If there are areas of pipeline not within the allowable grade tolerance, or if the inspection reveals holes or leaks in the pipeline, the Contractor will be so notified and will be responsible for making needed repairs. The District will not advise the Contractor as to recommended procedures, but will limit its comments to the acceptability of the end product. If video

inspection reveals faults such as broken pipe, misalignment, or improper grades, such faulty areas shall be promptly removed and replaced by the Contractor. Both the video inspection and subsequent repairs shall be made by Contractor. If sewers require repair, then all testing and inspection must be performed again by Contractor. A final video shall be submitted of the entire project after all repairs, mandrel, and air tests are complete and in compliance with these standards.

H. Sewer Video Inspection Requirements:

1. All CCTV work shall conform to current NASSCO-PACP standards.
2. The Contractor shall schedule a consultation meeting with the District prior to the commencement of CCTV to review requirements of the CCTV inspection
3. The testing Company is to certify as to their ability to adequately perform the video inspection.
4. All PACP header information shall be completed with PACP Guidelines.
5. The testing Company shall use the District sewer manhole identification system to indicate location of upstream and downstream sewer manholes.
6. The testing Company shall submit to District PACP CCTV Reports, PACP database, logs, electronic reports etc. noting important features.
7. The speed of travel shall be slow enough to inspect each pipe joint, tee connection, structural deterioration, infiltration and inflow sources, and deposits, but should not, at any time, be faster than 30 feet per minute.
8. The camera must be centered in the pipe to provide accurate distance measurements to provide locations of features in the sewer and these footage measurements shall be displayed on documented on the video.
9. The pipe should be clean enough to ensure all defects, features and observations are seen and logged.
10. The District Inspector will be provided at least 48-hour notice of testing schedule and will be present to monitor the test unless otherwise approved.
11. A flush truck will be required to be on-site to aid in the video inspection.
12. A digital recording shall be submitted to the District as proof of inspection and be certified to comply with plan

requirements or pointing out by station any defects found.

13. Lateral lines to be documented by stationing from center line of manhole and the testing firm shall provide a map of the tested lines.
14. A chronological log of the test performed should correlate between the sewer plans and the tape produced, including SKF sewer manhole numbers.
15. A target shall precede the camera for measuring sags and offsets (sizes shall be noted within the video). Target sizes shall be as follows, unless otherwise specified or directed by the District:

Target Size	Pipe Size
3/4 inch	≤ 12 inches
1 inch	> 12 inches ≤ 36 inches
2 inches	> 36 inches

7.2 PERMITS

The following permits may be required of the contractor:

A. Encroachment

Where construction will encroach into the public right-of-way, the contractor shall obtain all necessary encroachment permits. Within the City or County' rights-of-way, the permit shall be secured from the Public Works Departments.

7.3 CLEARING AND GRUBBING.

A. General

Clearing and grubbing, which consists of removal of objectionable material from the right-of-way, shall be done with caution such that existing wastewater improvements, adjacent property, and trees and shrubbery that are not to be removed shall be protected from injury or damage.

Within sewer easements or rights-of-way, trees, shrubs, fences, and all other improvements that have to be removed to permit construction shall be replaced in kind or size (excluding native trees under 2-inch diameter or native brush), or with approved substitutes unless permission to exclude such replacement is obtained from the owner/agency.

B. Removal and Disposal of Material

The contractor shall be responsible for leaving the site neat and finished in appearance, free from debris or inflammable material.

7.4 UTILITIES, EXISTING FACILITIES AND CONCRETE REMOVAL

A. Abandonment

Refer to Section 8.0 regarding abandonment of existing wastewater lines and/or structures.

B. Utilities and Existing Facilities

Existing utilities and/or facilities shall be protected from damage during the excavation and backfilling of trenches and, if damaged, shall be repaired.

In case it shall be necessary to remove any such utilities, facilities, or any portions thereof, the contractor shall notify the District and the owner of the facility. The contractor shall not interfere with said utility and/or facility structures until disposition of the obstruction to the work has been determined and/or notice to relocate or remove has been given by the District or authorized agent of the owner of the utility and/or facility so affected.

The fact that any underground utility and/or facility is not shown on plans shall not relieve the contractor of responsibility to comply with these standards. It shall be the contractor's responsibility to ascertain prior to commencing work the existence of any underground utilities or facilities which may be subject to damage by reason of its operations.

C. Concrete, Masonry or Mortared Construction Removal

At locations shown on plans, portions of existing concrete pavement, curbs, gutters, sidewalks, foundations, and other concrete or mortared structures shall be removed to the lines and elevations specified. Concrete structures or objects not shown or noted on the plans shall be removed where necessary and disposed of by the contractor.

Concrete removal operations in connection with the reconstruction of existing structures shall be performed without damage to any portion of the structure that is to remain in place. If damage occurs, the contractor shall repair any such damage at its own expense, to the satisfaction of the District. Where existing reinforcement is to be incorporated in new work, such reinforcement shall be protected from damage and shall be thoroughly cleaned of all adhering material before being embedded in new concrete.

7.5 EXCAVATION AND TRENCHING

A. General

Trench excavation shall consist of all excavation involved in the grading and construction of the sewer line as shown on plans. The contractor shall perform all excavation of every description and of whatever substances encountered, to depths indicated on the drawings or otherwise specified or required. During excavation, material suitable for backfilling shall be piled in an orderly manner a sufficient distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins. All excavated

materials not required or unsuitable for backfill shall be removed. Such grading shall be done as may be necessary to prevent surface water from flowing into trenches or other excavations, and any water from any source accumulating therein shall be removed by pumping or by other approved methods. Such sheeting and shoring shall be done as may be necessary for the protection of the work and for the safety of personnel. Unless otherwise indicated, excavation shall be by open cut, except that short sections of a trench may be tunneled if, in the opinion of the District, the pipe or duct can be safely and properly installed and backfill can be properly tamped in such tunnel sections.

B. Excavation

Excavation for sewers shall be made only after pipe and other necessary materials are delivered to the work site. After such delivery, trench excavation shall proceed as rapidly as possible, and the pipe installed and the trench backfilled without undue delay.

Coupling holes and depressions for bells or couplings shall be excavated after the trench bottom has been graded and shall be only of such length, depth, and width as required for properly making the particular type of joint. Overdepths shall be backfilled with the same material as the bedding zone. Whenever wet or otherwise unstable soil incapable of properly supporting the pipe, as determined by the District, is encountered in the bottom of the trench, such soil shall be removed to the depth required and the trench backfilled to the proper grade with an appropriate material to provide a stable foundation.

C. Trench Width and Grade

The width of the trench within the pipe zone shall be such that the clear space between the barrel of the pipe and the trench wall shall not exceed the amount detailed in the standard plates. In general, this will be 8 inches. The width of the trench above that level may be as wide as necessary for sheeting and bracing and the proper performance of the work. The bottom of the trenches shall be accurately graded to provide uniform bearing and support for each section of the pipe on the proper bedding material as prescribed in the plans or by appropriate details on the plates.

D. Shoring

All shoring for open excavations shall conform to the requirements of the State of California, Department of Industrial Relations, Cal/OSHA "Construction Safety Orders."

The contractor shall be responsible for adequately shored and braced excavations so that the earth will not slide, move, or settle, and so that all existing improvements of any kind will be fully protected from damage.

No shoring once installed shall be removed until the trench has been approved for backfill operations. Removal of shoring shall

only be accomplished during backfill operations and in such a manner as to prevent any movement of the ground or damage to the pipe or other structures.

The contractor shall obtain all permits for any excavations over five (5) feet in depth into which a person is required to descend or any excavation less than five (5) feet in depth in soils where hazardous ground movement may be expected and into which a person is required to descend.

7.6 PIPE BEDDING AND LAYING

A. General

This portion of the work includes the furnishing of all materials and their proper assembly to result in a proper sewer installation true to line and grade and free from leaks, cracks, and obstructions. Where choices are allowed, the contractor shall select such materials and construction methods as will result in a completed project in full accordance with these Standards. In that regard, refer to Section 3.0 - Materials, and the plates for additional details.

The contractor is reminded that the approved wastewater design is based upon a proper combination of pipe strength and pipe support. No acceptance will be given unless the work of trenching, bedding, laying, backfilling and compaction is conscientiously done in accordance with the procedures outlined in these standards.

Except as otherwise approved the maximum length of open trench shall be 600 feet, or the distance necessary to accommodate the amount of pipe installed in a single day, whichever is the greater.

Grades shall be transferred from ground surface to the bottom of the trench by experienced workers, using not less than three consecutive grade points in common, so that variations from a straight grade may be readily detected. Wherever more than 100 feet of new sewers are to be constructed, a laser level instrument shall be used to establish grade. Each length of pipe shall be laid on compacted bedding material as specified and shall have full bearing for its entire length between bell holes excavated in said bedding material to allow for unobstructed assembly of all joints. Adjustments of pipe to line and grade shall be made by scraping away or filling in and tamping approved material under the body of the pipe. No wedging or blocking with wood or soil to support the pipe will be permitted. Under no circumstances will a contractor be allowed to dump backfill materials on top of a pipe that is not continuously supported in its final grade position.

Pipe laying will proceed up-grade with the spigot ends of bell-and-spigot pipe pointing in the direction of flow. Each pipe shall be laid true to line and grade and in such manner as to form a close concentric joint with the adjoining pipe, following manufacturer's instructions for the specific jointing method being used. Pipe shall not be joined, unless specifically approved, by

"stabbing", "swinging in" or "popping in" spigot ends of pipe into the bell ends. Also where there is a "home" mark on the pipe, the joint shall be fully engaged to that mark. Pipe shall not be laid when the engineer or inspector determines that the condition of the trench or weather is unstable. As the work progresses, the interior of the sewer shall be cleared of all dirt and superfluous materials of every description. If the maximum width of the trench at the top of the pipe is exceeded, the contractor shall install such concrete cradling, pipe encasement, or other bedding as may be required to support the added load of the backfill. Trenches shall be kept free from water until sufficient backfill has been applied to keep the pipe in place. At times when work is not in progress, open ends of pipe and fittings shall be securely closed to the satisfaction of the inspector so that no trench water, earth, or other substance will enter the pipe or fittings. Pipe or fittings damaged during assembly shall be removed and replaced.

Normal bedding materials shall be as specified in Section 3.6. The trench shall be excavated at least 6 inches below sewer invert and sufficient bell or coupling holes shall be hand dug to provide 1-inch clearance under the bell or coupling. Granular bedding material as specified shall be placed in the trench and carefully shaped to receive the pipe. Pipe shall be set to exact grade in firm contact with the bedding. Each pipe section shall be individually supported.

B. Installation of Flexible (PVC or DI) Pipes

Unless otherwise modified in these Standards, all flexible pipes shall be installed per ASTM Designation: D2321 entitled: "Underground Installation of Flexible Thermoplastic Sewer Pipe." Bedding for such pipes is highly critical. Attention is also directed to Plate No. 4 of these standards as well as the information in A above. Further note the following:

1. Pipe stored outside and exposed to periods of sunlight exceeding 45 days shall be covered with canvas or other opaque material, and provided with air circulation under the protective cover.
2. PVC pipe is a flexible conduit and derives its resistance to vertical loads by pushing against the sides and bottom of the trench. This force can only be resisted by a firm trench wall and bottom and properly placed "bedding" and "haunching" material. Vertical trench walls will be required in the region from the trench bottom to above the pipe. The width of the trench at any point below the top of the pipe should not be greater than necessary for joining the pipe and compacting the bedding and initial backfill.
3. An approved water seal (gasket) shall be placed around the pipe in the manhole concrete base prior to pouring the concrete.

7.7 BACKFILL AND COMPACTION

A. General

Trench backfilling consists of all materials returned to the excavation in the process of sewer line construction. Backfill and compaction in existing streets shall be in full accordance with the City or County encroachment permit issued for the specific work, and with the City or County land development specifications. In both cases, the filling of trenches shall be subject to approval by the City or County inspector who shall have full authority to order compaction tests to demonstrate the actual backfill density.

The sequence of backfilling and compaction above the pipe zone (which extends from 6 inches to 12 inches above the top of the pipe) shall be in accordance with the City or County specifications or as directed by the City or County inspector. However, in the absence of such instructions, the following procedure shall govern: Testing for pipe and joint leakage will be done after consolidation of the backfill to the top of the subgrade zone and after laterals have been installed to the property lines.

Backfill, compaction, and resurfacing shall be scheduled so that existing public streets may be opened to normal traffic in accordance with the City or County encroachment permit, and so that the backfill operations closely follow the pipe laying to avoid open trenches overnight.

The trenches or excavations shall not be backfilled without prior inspection by the District. Such inspection does not relieve contractor from compliance with the testing of the sewer line, which shall be conducted after final assembly of main sewer, laterals, manholes and consolidation of backfill as described above. Contractor shall remove and replace backfill necessary for correction of defective conditions revealed by testing at no cost to the District.

B. Backfilling Rigid Pipes

For normal bedding, the space around the pipe, known as the "pipe zone," shall be filled with the appropriate material, with the pipe in proper alignment and at the prescribed slope on granular bedding per standard plates. Backfill in the pipe zone may be either compacted by hand tamping or mechanical means in compacted lifts not exceeding 6 inches. Acceptability of compaction in the pipe zone will be determined primarily by visual inspection and probing by the inspector to determine that no voids exist in the backfill. The backfill within the pipe zone shall meet the requirements of 90 percent relative compaction.

The backfill zone, between the top of the pipe zone and the bottom of the subgrade zone or ground surface (if no pavement is to be placed), may be filled with approved native material. In general, backfill shall be placed in lifts not exceeding 3 feet in uncompacted thickness, and compacted by water or mechanical means to obtain 85 percent relative density. Backfill in the subgrade zone, consisting of the space under pavement and/or shoulder to at

least 2.5 feet below finished road grade, shall be filled and compacted to the prevailing city or county requirements without flooding or jetting.

C. Backfilling Flexible (PVC, DI) Pipes

Compaction of bedding, haunching and initial backfill shall be by either hand tamping or mechanical means in compacted lifts not exceeding 6 inches. Acceptability of compaction in the pipe zone will be determined primarily by visual inspection and probing by the inspector to determine that no voids exist in the backfill. The backfill within the pipe zone shall meet the requirements of 90 percent relative compaction.

The backfill zone, between the top of the pipe zone and the bottom of the subgrade zone or ground surface (if no pavement is to be placed), may be filled with approved native material. In general, backfill shall be placed in lifts not exceeding 3 feet in uncompacted thickness, and compacted by water or mechanical means to obtain 85 percent relative density. Backfill in the subgrade zone, consisting of the space under pavement and/or shoulder to at least 2.5 feet below finished road grade, shall be filled and compacted to the prevailing city or county requirements without flooding or jetting.

D. Final Backfill

If the work is in private property and not subject to public agency requirements, excavations shall be backfilled, compacted and finished to match original conditions as interpreted by the District and as further described in Section 10 - Final Clean Up.

7.8 BORING AND JACKING OPERATIONS

A. General

Placement of pipe by boring or jacking methods requires special District approval for each instance. However, as a general guideline see Plate No. 26 and the following shall pertain:

1. Except for the use of air or water, the methods and equipment used in boring and jacking operations shall be optional to the contractor provided that the District reviews them prior to any work.
2. The placement of pipe shall be to the lines and grades shown on the plans.
3. Voids remaining outside the casing pipe (or carrier pipe if applicable) shall be backfilled with cement mortar.
4. Casing pipe, where used, shall be no less than 8 inches greater in diameter than the sewer pipe to be installed.
5. The placement of pipe in casings shall be supported with

2" minimum height ultra high molecular weight polymer runners.

B. Bores

The boring machine shall cut a true circular bore to the required line and grade. The bored tunnel shall be no more than 2 inches larger in diameter than the maximum outside diameter of the casing or sewer pipe to be installed.

C. Jacked Steel Casings

In addition to applicable portions above, the following shall pertain:

1. Where casings are used, the size and wall thickness of the casing shall be at the contractor's option except that the minimum casing thickness shall be not less than 1/4 inch.
2. Field joints of steel casings shall be welded with a continuous circumferential weld.
3. The placement of pipe in casings shall be supported with 2" minimum height ultra high molecular weight polymer runners.
4. Prior to backfilling the annular space between the pipe and casing, the pipeline shall be tested in accordance with Section 9.0 - Testing.
5. The annular space shall be backfilled with washed concrete sand blown or rammed into place until the entire cavity is filled. Concrete plugs shall be placed at each end of the cased section to retain the backfill material.

7.9 RESURFACING AND RESTORATION

If the work occurs in streets where no paving exists, the contractor shall, in accordance with City and County requirements, leave the completed trenches in a suitably compacted condition for finish grading, placement of base material, and paving by others.

If the work is within existing City or County streets, any required resurfacing shall be in accordance with the City or County encroachment permit.

If the work has disturbed or damaged existing public or private streets, alleys, driveways or other improved surfaces, the damaged portions shall be removed and restored, including the provision of adequate subgrade where these operations have disturbed the original material.

Structures removed or damaged on public or private property shall be restored or replaced unless such structures are designated on plans "to be abandoned." Such structures include, but are not limited to, trees, bushes, plantings, ground cover, mailboxes,

fences and sprinkler systems.

Any temporary paving, barricades, or special provisions required by public agencies shall be furnished by the contractor as required.

7.10 CONCRETE AND MORTAR WORK

A. Concrete

1. Material:

Concrete used for manholes, encasements, filling, blocking, piers, and other typical wastewater construction applications shall be transit-mixed concrete from a supervised batch plant which issues certified delivery tickets with each load. Certified delivery tickets shall show the mix proportions, mixing time, truck departure time and water added. Such certified tickets shall be handed to the inspector at the time of delivery. Ready-mixed concrete shall be batched and handled in accordance with ASTM C94. Job mixed concrete shall be limited to that needed for patching and minor non-structural uses requiring one sack of cement or less. In these cases, the materials and workmanship shall be the same as if transit-mixed concrete had been used. The 28-day compressive design strength of concrete shall be chosen according to its intended use as outlined in Section 3 of these standards.

2. Placement:

Concrete shall be placed in clean forms before its initial set begins, using the minimum amount of mixing water required for good workability. Concrete shall be worked into forms by rodding or vibrating to secure a dense homogeneous mass free from voids and rock pockets. All concrete shall be vibrated unless the inspector approves solely rodding to avoid having the concrete run out of the forms or trench.

3. Finish:

Concrete surfaces to be in contact with sewage shall be steel trowelled to a smooth hard surface free from ridges, holes, and surface roughness. Exposed walls shall be left with a surface finish comparable to that obtained with new plywood forms. Slabs and walkways shall be finished with a wood float unless otherwise specified. Corners and edges shall be neatly beveled. Surface defects shall be repaired to match the surrounding concrete.

B. Mortar

Mortar shall consist of one part Type II Portland Cement, and two parts of sand, by volume, thoroughly mixed in a dry state before

adding sufficient water to give the mortar a proper trowelling consistency.

7.11 MANHOLE BASES

A. Precast Manholes

Manhole bases for precast manholes shall be poured against native undisturbed material which has been excavated to the dimensions shown on the plans and plates. If the contractor over-excavates 6 inches beyond the horizontal dimensions shown, contractor shall construct forms and pour the base to the specified dimensions.

B. Concrete

Concrete shall be 6 sack concrete mix poured to a level seating surface 6" minimum above the highest pipe, with the base centered over the sewer intersection unless otherwise specified.

In order to provide for a watertight manhole, a metal forming ring shall be used to form a level joint groove in the fresh concrete. This groove shall be used to receive the first barrel section of the manhole. Setting barrel sections on wet concrete without the forming ring will not be permitted.

C. Flow Channels and Shelves

Flow channels and shelves shall be completed at the time the manhole base is poured. The flow channels shall be completed in a uniform U shape to fit the dimensions of the pipes being joined. Channel sides shall rise vertically to the springline of the pipe outlet. The channels shall clearly defined and sloping from bottom of the metal forming ring to the pipe springline toward the main channel. District inspectors shall have final say and approval of all flow channel and shelf forming work.

D. Embedment Materials

All embedment materials under, around, and at least 3 inches over all pipelines located within 5 feet of structure bases shall be compacted without jetting prior to barrel section placements.

7.12 MANHOLES

A. General

All materials for pre-cast manhole sections shall conform to the requirements set forth in Section 3. The applicable plate will depend upon the depth of the manhole as listed on the plates see Plate Nos. 8, 10, 11 and 12.

Precast manholes shall have a minimum wall thickness of 6 inches. Where there is a question of quality and conformance to the material specification, the District will render the decision.

Drop manholes shall be set on poured concrete bases which provide integral support for the outside drop assembly.

B. Assembly of Precast Manholes

All wall and floor joints shall be cleaned prior to setting any manhole sections. These sections shall be set into position using a preformed plastic sealing gasket (Federal Specification SS-S-00210) or mastic sealing gasket. If plastic gaskets are used, they shall be in strict conformance with the manufacturer's recommendations including application of a primer coat, drying the joint and careful use of the gasket to avoid displacement. If a mastic is used, it shall be first approved by the inspector, shall be of sufficient size, and placed to provide a tight joint. Grouting with mortar will only be allowed for the joint between the manhole base and the first barrel section, and then the grout shall be placed to tightly exclude groundwater.

The top of the concentric cone section shall be set at such an elevation that not more than an 18 inches height of entrance, or manhole throat is present with the manhole cover at finished grade.

C. Adjustment to Street Grade

The contractor shall set the transition section after the finished street elevation is known. The applicant or its agent shall coordinate the fitting of entrance sections and covers with the final paving so that the finished manhole covers blend neatly with the street surface. Successful completion of the testing of sewer line does not relieve the contractor from making these final adjustments. The contractor shall also be required to make any adjustments in the manhole cover sections during the one-year guarantee period if there is additional paving work. During final grading, paving, and manhole adjustment, all debris shall be removed from the completed work.

D. Transitions, Flow Channels

Mainline grade changes at manholes shall occur in the outlet sewer at the outside face of the manhole. Alignment changes shall be made in smooth curves, and size changes shall taper uniformly between inlet and outlet pipe walls. Also refer to Section 7.11 - Manhole Bases for further discussion.

E. Other Requirements

All PVC pipes entering or leaving concrete structures, including manholes, shall have a rubber sealing gasket, as supplied by the pipe manufacturer, firmly seated perpendicular to the pipe axis, around the pipe exterior, and cast into the structure as a water stop.

7.13 CLEANOUTS

Cleanouts shall be brought to finished grade in smooth turns having the same internal diameter as the sewers which they serve. Cast iron frames and covers having clear openings at least equal to the internal pipe diameter shall be independently supported over the

cleanout opening, in accordance with the appropriate plate.

7.14 SERVICE LATERALS

A. General

Contractor shall install only those service laterals shown on the plans or called for in writing by the District or by the applicant with the written approval of the District. Workmanship shall be equal to that specified for the street sewers.

The contractor shall mark the location of all sewer laterals with the letter "S" at least 2 inches high engraved into the curb. For laterals serving vacant lots or where no concrete curbs exist, contractor shall furnish and place 2" x 4" x 24" long hubs at the property line directly above the end of the pipe, with the letters "H.L." and the depth to the lateral marked on the hub with paint. Trenches shall be compacted in accordance with Section 7.7 of these Standards.

B. Residential House Laterals

Unless otherwise shown on plans, laterals shall be installed from the street sewer to the lot line in accordance with Plate No. 21, and plugged at the lot line in preparation for the leakage test. Laterals shall consist of factory-made standard wye-branch fittings with ends to suit the street sewer pipe, tilted 30° upward and plugged with factory-made removable plugs. Wyes shall face in a logical manner to facilitate future installation of house laterals to the properties to be served. The branch portion shall be firmly bedded in damp imported sand under, over, and around the future inlet.

C. Laterals from Certain Commercial and Industrial Premises

These require special features and access for sampling as described in Plate No. 27 of these Standards. Refer to Section 2.14 for discussion of the wastewater ordinance.

D. Deep Laterals

No lateral connected to a street sewer shall slope more steeply than 45 degrees see Plate No. 22. Laterals sloping more than 30 degrees, but less than 45 degrees shall be cradled in concrete as shown in Plate No. 23. Laterals sloping 30 degrees or less shall be bedded and laid to the same standards as street sewers, without need for cradling in concrete.

E. Backflow Protection

Where the contractor's work includes backflow devices on private property as specifically called for on plans, such devices are to be placed in well drained locations near the premises being protected, with unobstructed access for observation and repair. Backflow devices shall follow additional requirements as identified and called out on Plate No. 24

7.15 SAFETY

Wherever the contractor is aware of unsafe operations, such operations shall be discontinued immediately. Also, if the inspector is aware of such conditions and informs the contractor, it shall be the contractor's responsibility to immediately discontinue operations. In such instances, the advice shall not be construed as implying any District liability.

With regard to entering manholes, the contractor (and designer) shall be aware of the following:

1. Unconsciousness may be caused by lack of sufficient oxygen in the manhole or sewer atmosphere. This condition can occur SUDDENLY and with NO WARNING, possibly causing death within three to five minutes.
2. All manholes, unventilated for any considerable time, are deficient in oxygen, particularly terminal manholes. Also manholes on large sewers are often dangerous because of toxic and corrosive gases in addition to deficient oxygen.
3. Because the sewer atmosphere may be explosive due to leakage into the sewer from nearby conduits transporting gas, gasoline, or other explosive materials, the use of an open flame in or near the top of an open manhole is dangerous.

Therefore, contractor and designer shall comply with the following requirements:

1. All Cal/OSHA Confined Space entry requirements.
2. Written permission from the District shall be obtained prior to opening or entering any District sewer manhole.
3. All manholes shall be ventilated and oxygen deficiency detection equipment shall be used before entering. In shallow manholes on small sewers, this may be accomplished by removing the manhole cover and waiting for at least five minutes, allowing ventilation by the air currents across the top of the manhole. In manholes on large sewers, it may be necessary to use blowers on upstream or downstream manholes to secure adequate ventilation.
4. Warning devices to provide adequate warning to motorists of the work in progress shall be used where the manhole is in a traveled roadway.

7.16 CLEANING OF SEWERS

See Section 10.1.

SECTION 8

ABANDONMENT

SECTION 8.0 ABANDONMENT

8.1 GENERAL

All existing wastewater sewers or structures to be abandoned shall be indicated on the drawings by the applicant's engineer. In general, in-service lines that are to be abandoned shall be replaced with a parallel line of equal or larger size. The engineer shall demonstrate in all cases that the abandonment will not adversely affect the wastewater system.

All abandonment and construction techniques shall be discussed with the District inspector and approved prior to any such work.

8.2 SEWER LINES

Sewer lines to be abandoned shall be entirely filled with CLSM or other District approved material. Laterals to be abandoned shall be plugged at the property line or as directed by the District.

8.3 STRUCTURES

Structures to be abandoned shall have all openings, inlets and outlets sealed off as set forth in Section 8.2 of these Standards. The structure shall then be removed and the excavation filled with material in accordance with District requirements. Demolition debris shall be properly disposed of in accordance with all local, state and federal laws and regulations.

8.4 SALVAGED MATERIALS

Disposal of salvaged metal castings such as frames and covers and other metal appurtenances, unless otherwise specified, shall be the contractor's responsibility.

SECTION 9

TESTING

SECTION 9.0

TESTING

9.1 SEWER LINES

All completed sewers, force mains, and building laterals shall be tested by and at the expense of the contractor in the inspector's presence prior to field acceptance of the work, and prior to connection of any house sewer. The contractor shall correct all defects in workmanship or materials that become evident by inspection or testing at any time during the work. Testing shall be done after the complete installation and compaction of all underground utilities.

Air Test: All air testing shall conform and comply with ASTM F 1417. After plugging all openings and providing thrust blocking as necessary, air shall be admitted to the section under test at an inlet pressure not exceeding 5 psi. The air source shall be regulated by an adjustable pressure control valve and measured by a sensitive pressure gauge calibrated from 0 to no more than 10 psi. When the internal gauge pressure has reached 3.5 psi under stabilized temperature conditions, the air supply to the test section shall be cut off. The inspector shall then observe the time interval during which the internal pressure drops from 3.5 to 2.5 psi. The length of time for such loss shall not be less than that shown in the following table for the street sewer size being tested and also for the length of main line being tested:

MINIMUM TIME (MIN:SEC)
Minimum Specified Time Required for a 0.5 PSIG Pressure Drop
Length of Line (feet)

Pipe Dia. (inches)	0 to 100	101 to 150	151 to 200	201 to 250	251 to 300	301 to 350	350 to 400	401 to 450
4	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54
12	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50
15	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51
21	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16
24	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17
27	14:25	21:38	28:51	36:04	43:16	50:30	57:42	64:54
30	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07
33	21:33	32:19	43:56	53:52	64:38	75:24	86:10	96:57
36	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23
42	34:54	52:21	69:49	87:15	104:42	122:10	139:37	157:04
48	45:35	68:23	91:11	113:58	136:46	159:33	182:21	205:09
54	57:42	86:33	115:24	144:15	173:05	201:56	230:47	259:38
60	71:14	106:51	142:28	178:05	213:41	249:18	284:55	320:32

Note: If there has been no leakage (zero psig drop) after one hour of testing, the test section shall be accepted and the test complete.

Test plugs for any air test shall not be removed until the pressure is no longer measurable. Air shall be released slowly through a valve. If the pipe to be tested is submerged in groundwater, determine the backpressure due to groundwater submergence and increase all gauge pressures in the test by that amount.

Failure to Meet Air Test Requirements: If the air test indicates leakage greater than the specified limits, the contractor shall locate the defects by inspection and shall make such repairs and replacements as are necessary. Various methods may be used to locate the section of sewer which fails the air test, such as: remote cameras, adjustable low pressure air devices, or the line may be filled with water by plugging the inlet of the downstream manhole and maintaining at least a 2-foot depth over the outlet of the upstream manhole until the leaks are located by observing wet spots along the trench. Water shall be drained in a manner approved by the inspector. Under no conditions shall clay, cement, or other sealer be applied inside the pipe to meet the test requirements. All defective portions shall be exposed and repaired or replaced, including defective bedding, to the satisfaction of the inspector.

A. Leakage Test

In special cases, a water exfiltration test may be required as described below.

Wastewater sewers shall be tested between successive manholes by plugging the lower end, and the inlet of the upper manhole. The pipe and manhole shall be filled with water to a depth 4 feet

above the invert at the center of the upper manhole, or in the presence of groundwater, 4 feet above the average adjacent groundwater level. The allowable leakage shall be computed as follows over a period of at least a one-hour test:

$$E = 0.00002 \text{ LD} \cdot H$$

L = Length of line being tested including laterals in feet

D = Internal diameter of pipe in inches

E = Allowable leakage in gpm

H = Elevation between upper manhole water surface and invert of pipe at lower manhole (or if groundwater is present, upper manhole water surface and groundwater level at lower manhole).

B. Pipe Diameter Ring Deflection Test of PVC Pipe

Upon completion of the backfill and road sub-base (if applicable), and prior to acceptance of the air test, each main pipe line shall be checked for ring deflection by pulling a template or mandrel through the main pipe line. This test shall be a minimum of 4 days after backfilling operations are completed and passed compaction test requirements. The mandrel shall be cylindrical in shape with a diameter that is 95% of the testing pipes nominal inner diameter.

The above mandrel sizes are based upon five percent deflections for PVC pipes including allowances for out-of-roundness due to manufacturing plus statistical manufacturing tolerances. The mandrel length shall be a minimum of one nominal pipe diameter. The mandrel shall be constructed so as not to "hang-up" at joints and shall be "nine pointed." If the mandrel does not pass through the pipe, it will be assumed that the pipe deflection exceeds the allowable amount and the pipe section or sections shall be removed and replaced to the satisfaction, and at no expense, to the District. If requested, the mandrel shall be checked by the inspector to determine if it meets the size requirements.

In addition, the District reserves the right to check the ring deflection in the pipe line at any time during the period up to one year from the date of its field inspector's acceptance of the work. If required, the contractor shall be responsible for this additional testing with the limitation that the District will be responsible for testing in excess of one additional passing test per any one section of pipe between adjacent manholes. Any defective pipelines shall be repaired or replaced at no District expense.

9.2 BACKFILL MATERIALS

Sieve analyses gradation curves and sand equivalency determinations shall be made by an independent testing laboratory on representative materials for the bedding and haunching materials. If requested, written results shall be submitted to the District's engineer for approval prior to backfilling with any of the tested material.

9.3 COMPACTION TESTS

Compaction tests will be required for PVC pipe along the pipeline in the haunching area. A minimum of one test per 400 feet of pipeline spaced approximately equidistant along the pipeline shall be taken by an independent testing laboratory. At the direction of the District representative, more frequent compaction testing may be required.

The compaction requirement shall be as presented in Section 7.7 (ASTM D698 or better). If requested, written results including the compaction curve shall be submitted in writing to the District.

9.4 TELEVISION INSPECTION

Television inspection requirements are covered in Section 7.1.

SECTION 10

WASTEWATER SYSTEM AND WORK AREA CLEANUP

SECTION 10.0
WASTEWATER SYSTEM AND WORK AREA CLEAN UP

10.1 CLEANING OF WASTEWATER SYSTEM

Upon satisfactory completion of the air test and after all necessary repairs and adjustments have been made, including setting manhole frames to final elevations, the entire new system of sewers and manholes shall be cleaned. Before beginning the cleaning operation, a standard sand trap (Southwest Flexible Co. or equal) shall be placed in the manhole at which the new work connects to the District's system, and it will remain in place until all solid matter has been removed. Under no conditions shall material other than clear flushing water be discharged into the District's system before final acceptance of the new work.

Splattered mortar and all irregularities shall be removed from the flow channels, leaving smooth dense uniform surfaces.

High velocity cleaning equipment shall be used to flush and clean the sewer lines. The equipment must have a selection of two or more high-velocity nozzles with a minimum capacity of 30 gpm for pipe diameters 8 inches and below with a minimum working pressure of 2,000 psi. The nozzles must produce a scouring action from 15 to 45 degrees in all sizes of pipelines designated to be cleaned. The equipment must have a minimum of 400 feet of 3 /4 inch inside diameter high-pressure hose. Equipment must also include a high-velocity gun for washing and scouring manhole walls and floors.

Solid material washed into the lowest manholes shall be removed from the system. The standard sand trap between the new work and the District system shall be removed only after the District has given final approval of all phases of the work.

10.2 FINAL PROJECT CLEAN UP

Upon completion of all backfilling, paving or repaving, manhole cover adjustments, testing, and sewer cleaning, the work site shall be cleaned of construction debris by the contractor. All private improvements damaged during construction shall be restored to at least the original condition of said improvements, including but not limited to trees, shrubs, curbs, gutters, sidewalks, fences, grass, etc. Filled excavations in private property shall be neatly finished in a manner to facilitate natural drainage and eliminate hazards to persons or property. The project shall be left in a final condition which brings no discredit to the District. Written and signed releases shall be obtained and submitted to the District signifying the owner's satisfaction that the restoration work is acceptable.

SECTION 11

REQUIREMENTS FOR ACCEPTANCE

SECTION 11.0
REQUIREMENTS FOR FINAL ACCEPTANCE

11.1 FIELD ACCEPTANCE

After satisfactory completion of the improvements, the District inspector will prepare a field acceptance letter. However, it shall be the applicant's responsibility to initiate action and supply the required administrative items for official acceptance of the improvements.

11.2 RECORD DRAWINGS

Original Record Drawings in digital format shall be submitted to the District. The Record Drawings shall reflect the actual improvements made and give the accurate location, including GPS coordinates for all sewer manholes and cleanouts, 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 Certificate

I hereby certify that the work shown on drawing _____ sheet _____ through _____ marked Record Drawings has been revised to correctly indicate any changes during construction as recorded in all available field notes, logs, reports, etc.

Registered Civil Engineer Number Date

11.3 WASTEWATER CONNECTION FEES

Applicant shall submit required information and pay, or arrange to pay satisfactory to the District, sewer capacity charges (connection fees) in accordance with the current District fee schedule.

11.4 NOTICE OF COMPLETION

The applicant shall submit a copy of the recorded notice of completion of the wastewater system to the District.

11.5 GRANT DEED

The applicant shall submit the original unrecorded grant deed executed by the applicant conveying the system to the City or District, including notarization of all signatures.

11.6 ITEMIZED COST/ADDITIONAL FEES

A certified and itemized copy of the cost of the facilities offered for dedication shall be submitted. Such certification shall 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 District an additional amount of plan check fee and inspection fee, based on the difference between the estimate and the final cost and the current rates of such fees.

11.7 APPROVAL FOR ACCEPTANCE

When all requirements (field and administrative) have been met, staff will prepare a recommendation for the City's acceptance of the improvements and exoneration of a portion 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 applicant and their surety. Once acceptance has been approved, occupancy of the homes/premises will be recommended to the respective City or District legislative bodies.

Whereas, the normal maintenance and guarantee period is one year and the bond retention is 10 percent, both of these may be increased if, in the opinion of the Cities (Selma, Kingsburg or Fowler), the normal period and amount are not sufficient.

11.8 STATUS DURING MAINTENANCE AND GUARANTEE PERIOD

The applicant/contractor is responsible for the full guarantee period of one year for the proper cleaning and maintenance of the new sewer system. Should District crews have to perform any of this work, the costs will be invoiced to the applicant/contractor.

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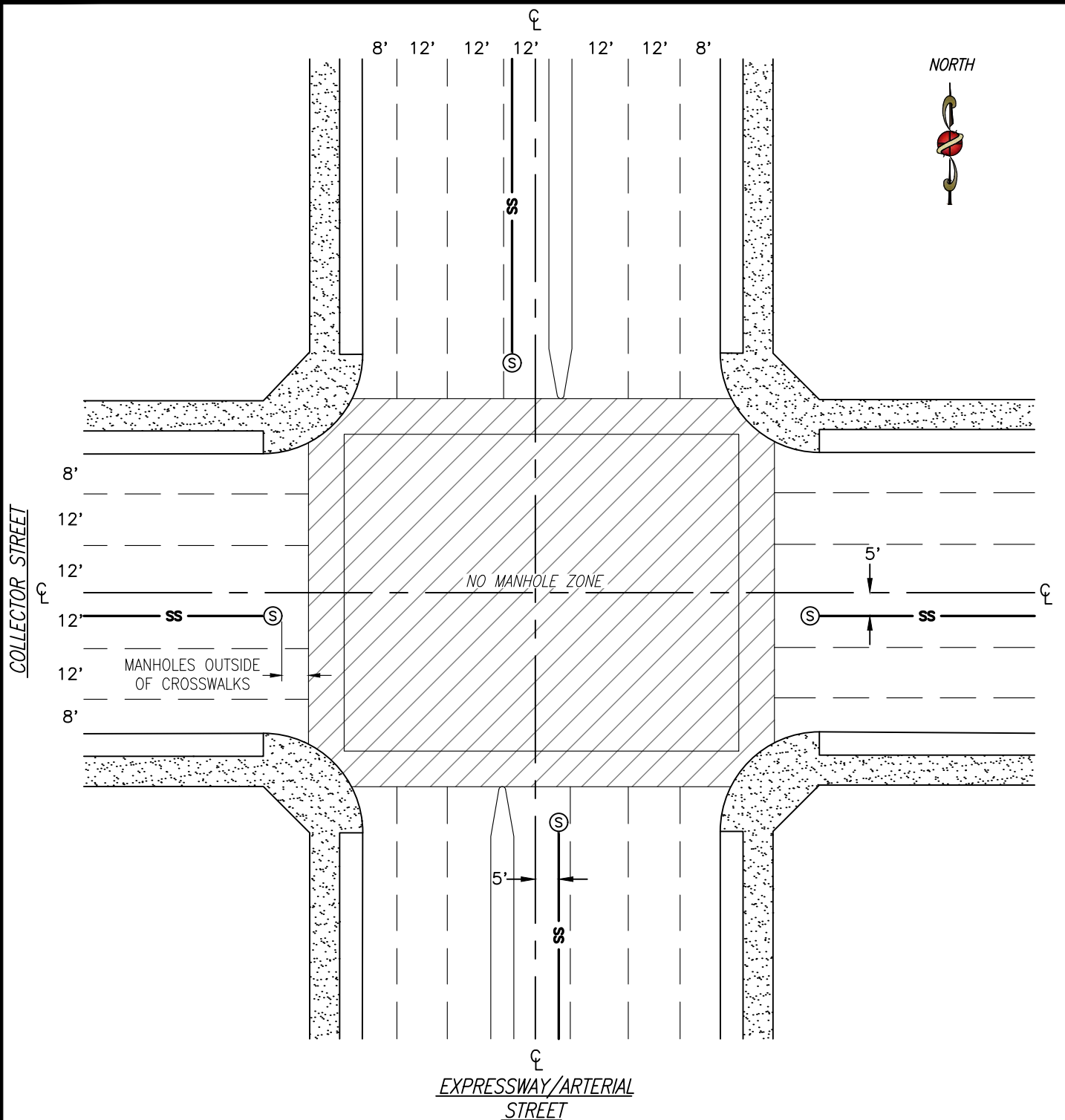
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STANDARD DRAWINGS



NOTES:

1. THIS "STANDARD" IS A GUIDE ONLY AND DEVIATIONS WILL BE ACCEPTABLE WHERE CONDITIONS DICTATE.
2. DIMENSIONS SHOWN ARE DESIRABLE, BUT DO NOT GOVERN. THE INTENTION IS TO SHOW THE RELATIVE POSITION OF SEWER.
3. MANHOLES ARE ALLOWED IN LOCAL-LOCAL INTERSECTIONS.

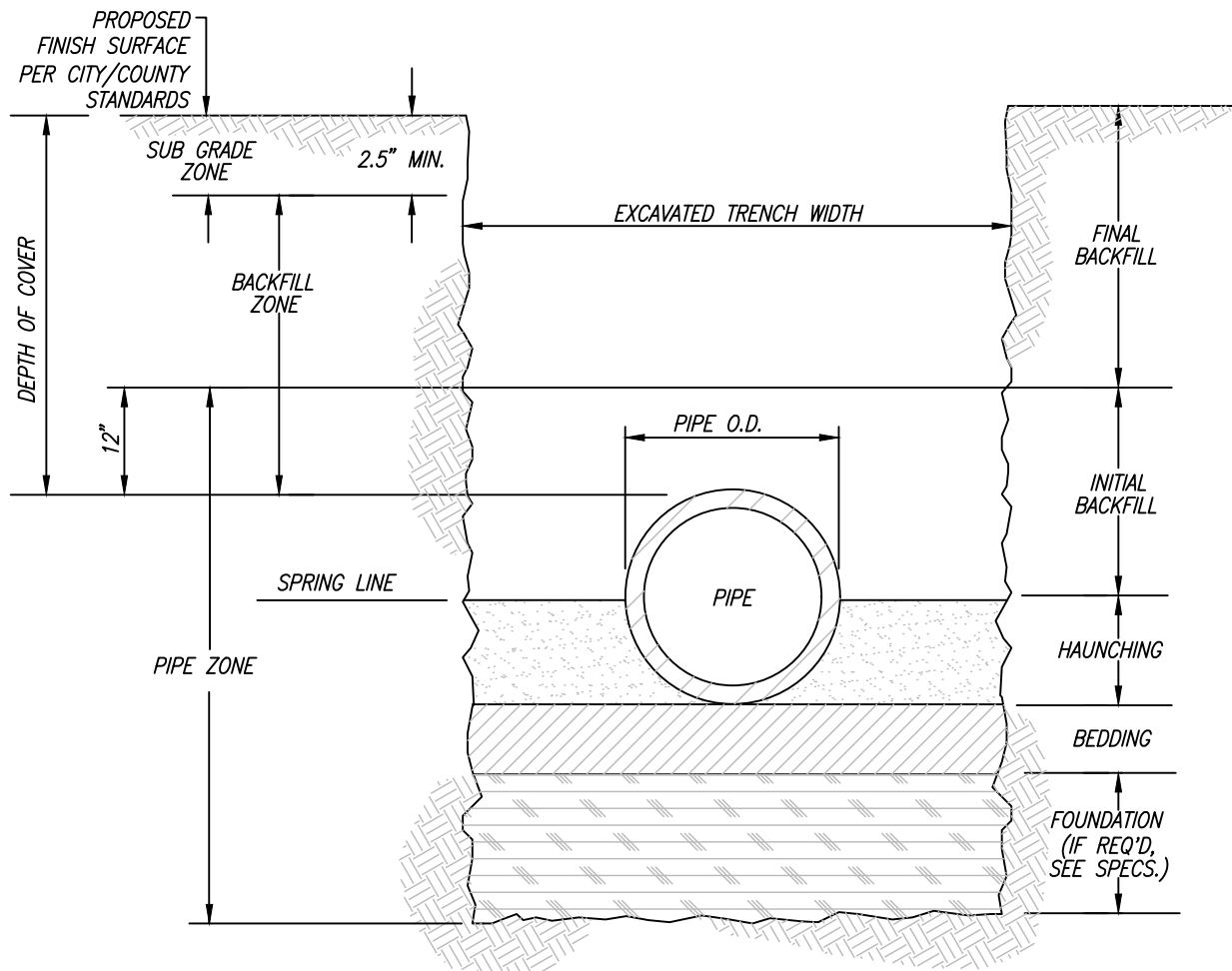


**SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT**

**COLLECTION SYSTEM
CONSTRUCTION STANDARDS**

LOCATION OF SEWER FACILITIES

REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	2



- NOTES:
- 1) STANDARD DEPTH OF COVER IS 5 FEET; HOWEVER, 3 FEET IS ALLOWABLE IN AREAS NOT EXPECTED TO RECEIVE TRAFFIC SUCH AS EASEMENTS.
 - 2) EXCAVATED TRENCH WIDTH IS NORMALLY A MAXIMUM OF PIPE O.D. PLUS 8 INCHES ON EACH SIDE.

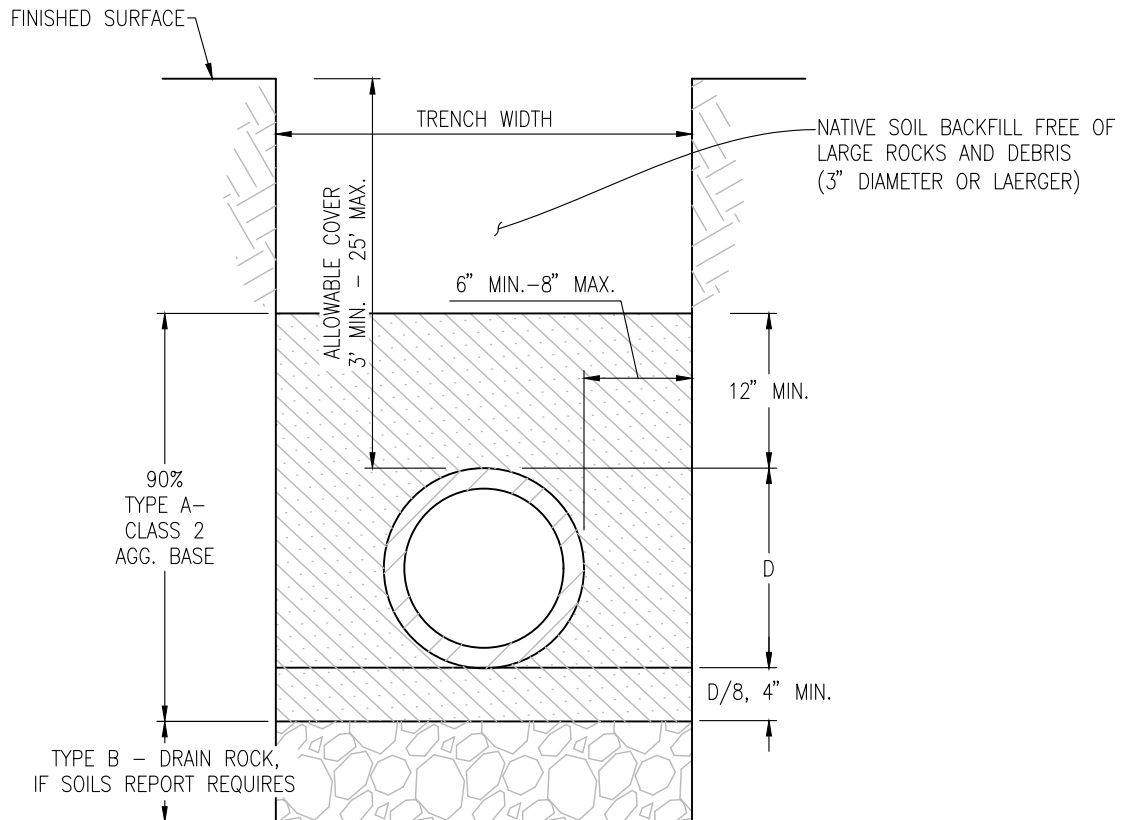


**SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT**

**COLLECTION SYSTEM
CONSTRUCTION STANDARDS**

**TRENCH CROSS-SECTION
TERMINOLOGY & STANDARD SIZES**

REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	3



D = OUTSIDE DIAMETER OF PIPE

NOTES:

1. DISTRICT DEPTHS FOR THIS BEDDING SHALL BE BETWEEN 3' TO 25' OF COVER.
2. DEPTHS LESS THAN 3 FEET OR GREATER THAN 25' WILL REQUIRE SPECIAL DETAILS SUBMITTED, REVIEWED, AND APPROVED BY THE DISTRICT.
3. WIDER TRENCHES REQUIRE SPECIAL DISTRICT REVIEW AND APPROVAL.
4. GRAVITY SEWER PIPE AND FITTINGS SHALL BE PVC, SDR-26 WITH INTEGRAL RUBBER GASKET JOINTS.
5. COMPACTION TESTING OF ALL TRENCHES SHALL BE REQUIRED AS DIRECTED BY THE DISTRICT ENGINEER.
6. SPECIFIED COMPACTION REQUIREMENTS ARE DISTRICT MINIMUMS AND IN THE EVENT OF CONFLICTS, THE MORE RESTRICTIVE REQUIREMENT SHALL PREVAIL.
7. ALL NEW INSTALLATION REQUIRE AIR TEST, MANDREL TEST, AND CCTV INSPECTION PRIOR TO DISTRICT APPROVAL AND ACCEPTANCE.
8. SOIL REPORT AND BEDDING CALCULATIONS CAN BE SUBMITTED FOR REVIEW AND APPROVAL FOR REDUCED BEDDING REQUIREMENTS.



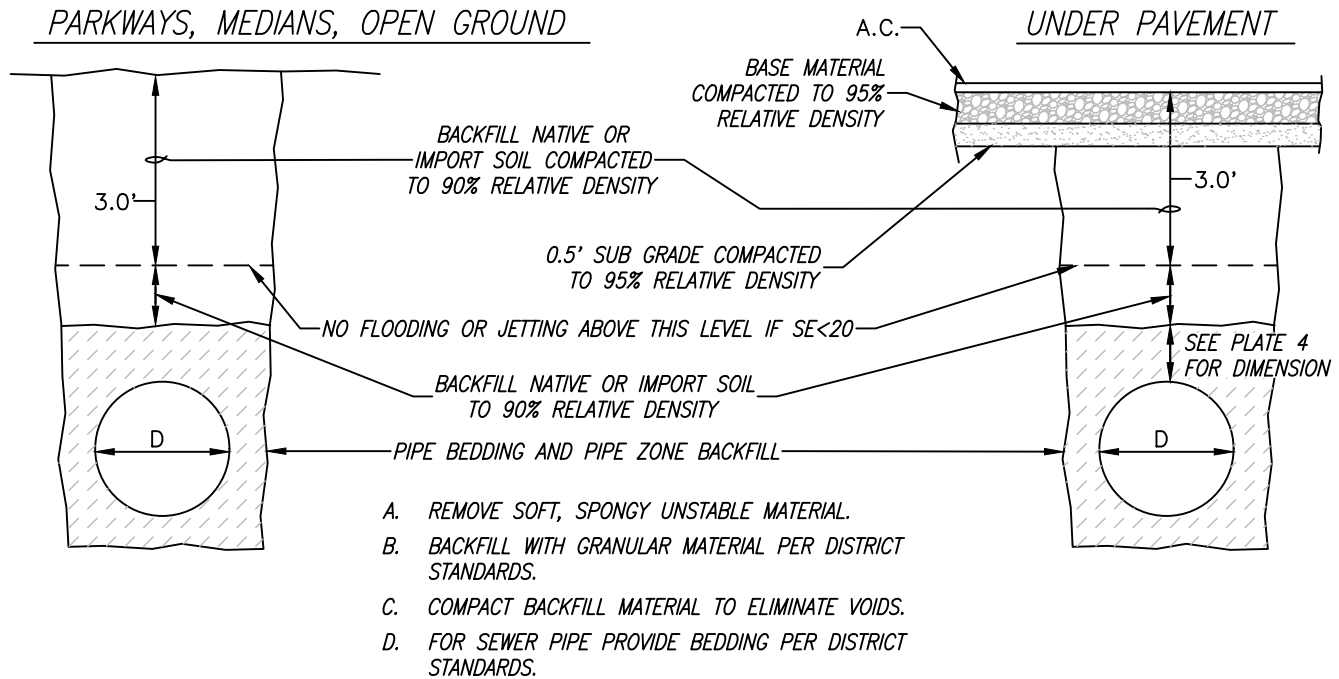
**SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT**

**COLLECTION SYSTEM
CONSTRUCTION STANDARDS**

**STANDARD PIPE BEDDING
AND DEPTH REQUIREMENTS**

REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	4

PARKWAYS, MEDIANS, OPEN GROUND



MAXIMUM LIFTS

A. MECHANICAL COMPACTION	
HYDROHAMMER	3.00'
CAUTION SHOULD BE EXERCISED IN USING HYDROHAMMER WHEN THE COVER OVER THE PIPE IS LESS THAN 4.0'	
VIBRATORY	2.00'
ROLLING STOCK	1.00'
HAND TAMPER	0.33'
B. HYDRAULIC DENSIFICATION	
FLOODING AND PUDDLING	7.00'
JETTING UNDER PRESSURE	7.00'
NOTE - BEDDING MUST BE FREE DRAINING IF FILL IS NOT	

CONTROL OF COMPACTION

*VISUAL INSPECTION CONFIRMED BY TESTS IN THE LOWER PORTION OF EACH LIFT.

FOR ROCK FILLS

SUFFICIENT SAND AND FINES MUST BE FLOODED INTO THE BACKFILL TO FILL THE VOIDS. CONTROL BY VISUAL INSPECTION.

MAXIMUM SIZE ROCK IN FILL 6 INCHES.

BROKEN P.C.C. AND A.C. ALLOWED IN NATIVE BACKFILL ONLY, WITH 6 INCHES MAXIMUM SIZE.

* A LIFT IS ONE LAYER OF MATERIAL PLACED, PROCESSED, AND COMPACTED AS A UNIT.

IF A LIFT IS THICKER THAN ONE (1) FOOT, THE LOWER PORTION IS BELOW THE MID POINT OF SAID LIFT.

NOTE: THIS PLATE IS INCLUDED FOR INFORMATION. CITY PUBLIC WORKS DEPARTMENT SHOULD BE CONSULTED FOR SPECIFIC APPROVALS AND INSPECTIONS.

PAVEMENT STRUCTURAL SECTIONS

- ON CITY PROJECTS:
 - CONSTRUCT IN ACCORDANCE WITH PLANS AND SPECIFICATIONS
- ON LAND DEVELOPMENT PROJECTS:
 - CONSTRUCT IN ACCORDANCE WITH PLANS AND APPLICABLE CITY STANDARDS.
 - CONTRACTOR PLACING PAVEMENT STRUCTURAL SECTION SHALL COMPACT MATERIAL IN THIS ZONE.
- ON ENCROACHMENT PERMIT PROJECTS:
 - REPLACE STRUCTURAL SECTION AS FOLLOWS A.C. - ONE (1) INCH MORE THAN EXISTING THICKNESS BUT NOT LESS THAN THREE (3) INCHES.
BASE - SAME TYPE AND THICKNESS AS EXISTING BASE MATERIAL.
 - CONSTRUCT IN ACCORDANCE WITH THE APPLICABLE CITY STANDARDS AND LAND DEVELOPMENT SPECIFICATIONS.
 - TOP TWO (2) FEET OF STRUCTURAL SECTION TO BE RESURFACED PER CITY OR COUNTY STANDARDS.

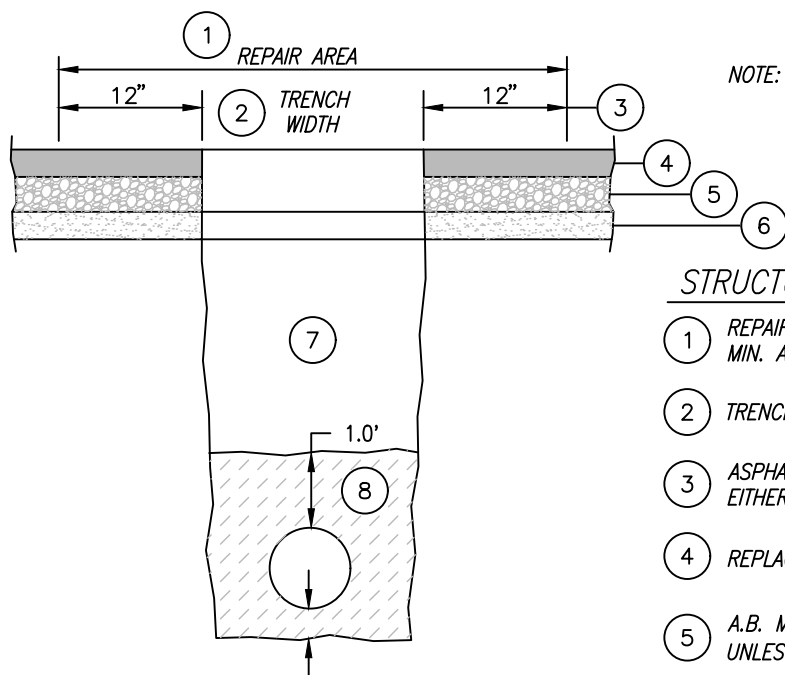


SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT

COLLECTION SYSTEM
CONSTRUCTION STANDARDS

UTILITY TRENCH
COMPACTION REQUIREMENTS

REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	5



NOTE: TOP TWO (2) FEET OF STRUCTURAL SECTION TO BE RESURFACED PER CITY OR COUNTY STANDARDS.

STRUCTURAL SECTION

- ① REPAIR AREA TO BE SAWCUT 12" BEYOND TRENCH EXCAVATION 4' MIN. A.C.
- ② TRENCH WIDTH VARIES
- ③ ASPHALT TO BE REMOVED 12" BEYOND TRENCH EXCAVATION ON EITHER SIDE
- ④ REPLACE A.C. 1" GREATER THAN EXISTING MIN. 3"
- ⑤ A.B. MATCH EXISTING - REPLACE ONLY WITHIN TRENCH EXCAVATION UNLESS SPECIFIED BY INSPECTOR - MIN. 6" CL. II A.B.
- ⑥ SUB-GRADE TO BE COMPACTED TO 95% RELATIVE DENSITY - 24"
- ⑦ TRENCH BACKFILL TO BE NATIVE MATERIAL OR IMPORT SOIL (IF NATIVE IS UNSUITABLE) ONE (1) FOOT ABOVE PIPE
- ⑧ PIPE BEDDING AND PIPE ZONE BACKFILL PER PIPE OWNER'S AND/OR DISTRICT SPECIFICATIONS
 - A. REMOVE SOFT, SPONGY, UNSUITABLE MATERIAL
 - B. BACKFILL WITH GRANULAR MATERIAL PER DISTRICT SPECIFICATIONS
 - C. COMPACT BACKFILL MATERIAL TO ELIMINATE VOIDS. NO JETTING, UNLESS SPECIFIED BY INSPECTOR
 - D. FOR WASTEWATER PIPE PROVIDE BEDDING PER DISTRICT STANDARDS
 - E. COMPACTION TEST REQUIRED UNLESS EXEMPTED BY DISTRICT INSPECTORS

MAXIMUM LIFTS

A. MECHANICAL COMPACTION	
HYDROHAMMER	3.00'
CAUTION SHOULD BE EXERCISED IN USING HYDROHAMMER WHEN THE COVER OVER THE PIPE IS LESS THAN 4.0'	
VIBRATORY	2.00'
ROLLING STOCK	1.00'
HAND TAMPER	0.33'
B. HYDRAULIC DENSIFICATION	
FLOODING AND PUDDLING	7.00'
JETTING UNDER PRESSURE	7.00'
NOTE - BEDDING MUST BE FREE DRAINING IF FILL IS NOT	

NOTE: A LIFT IS ONE LAYER OF MATERIAL PLACED, PROCESSED, AND COMPACTED AS A UNIT. IF A LIFT IS THICKER THAN ONE (1) FOOT, THE LOWER PORTION IS BELOW THE MID POINT OF SAID LIFT.

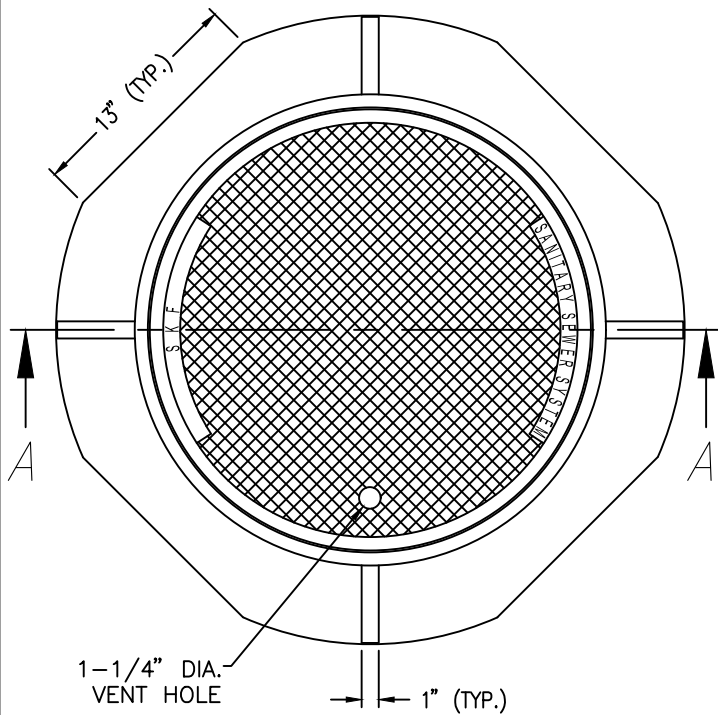


**SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT**

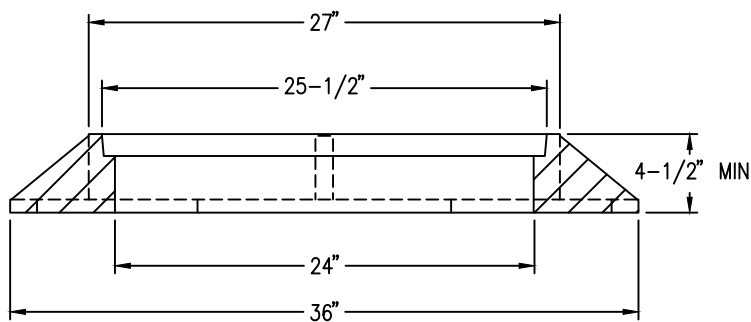
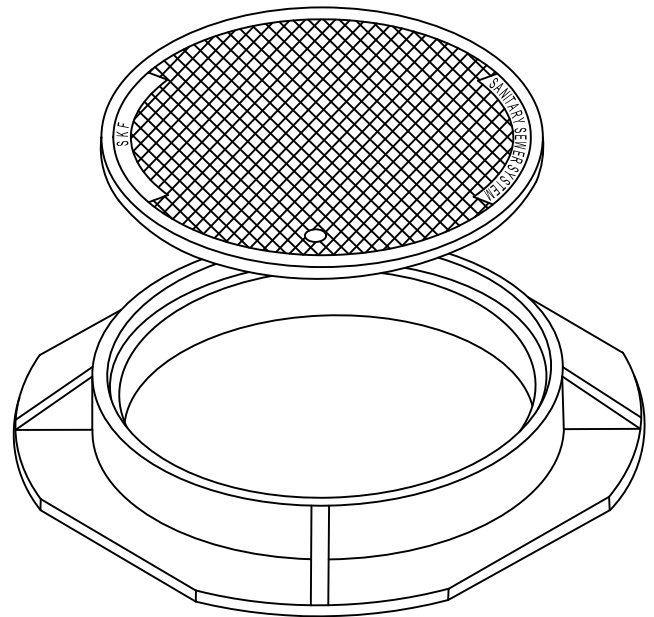
**COLLECTION SYSTEM
CONSTRUCTION STANDARDS**

**TRENCH REPAIR WITHIN
PAVED RIGHT OF WAY**

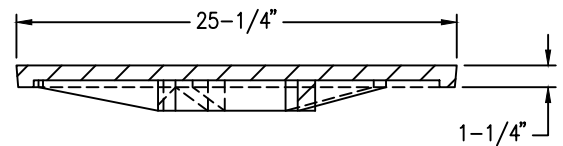
REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	6



PLAN VIEW



SECTION A-A



WEIGHT (LBS)	
FRAME	± 180
COVER	± 147
TOTAL	± 327

NOTES:

1. MANUFACTURER SHALL BE "SOUTH BAY FOUNDRY" OR APPROVED EQUAL
2. ALL MATING CONTACT SURFACES ON THE FRAME AND COVER SHALL BE MACHINED.
3. IDENTIFY ALL MANHOLE COVERS "SANITARY SEWER SYSTEM", AND "SKF" RESPECTIVELY AS SHOWN.
4. FRAME AND COVER SHALL BE FULL H-20 RATED.

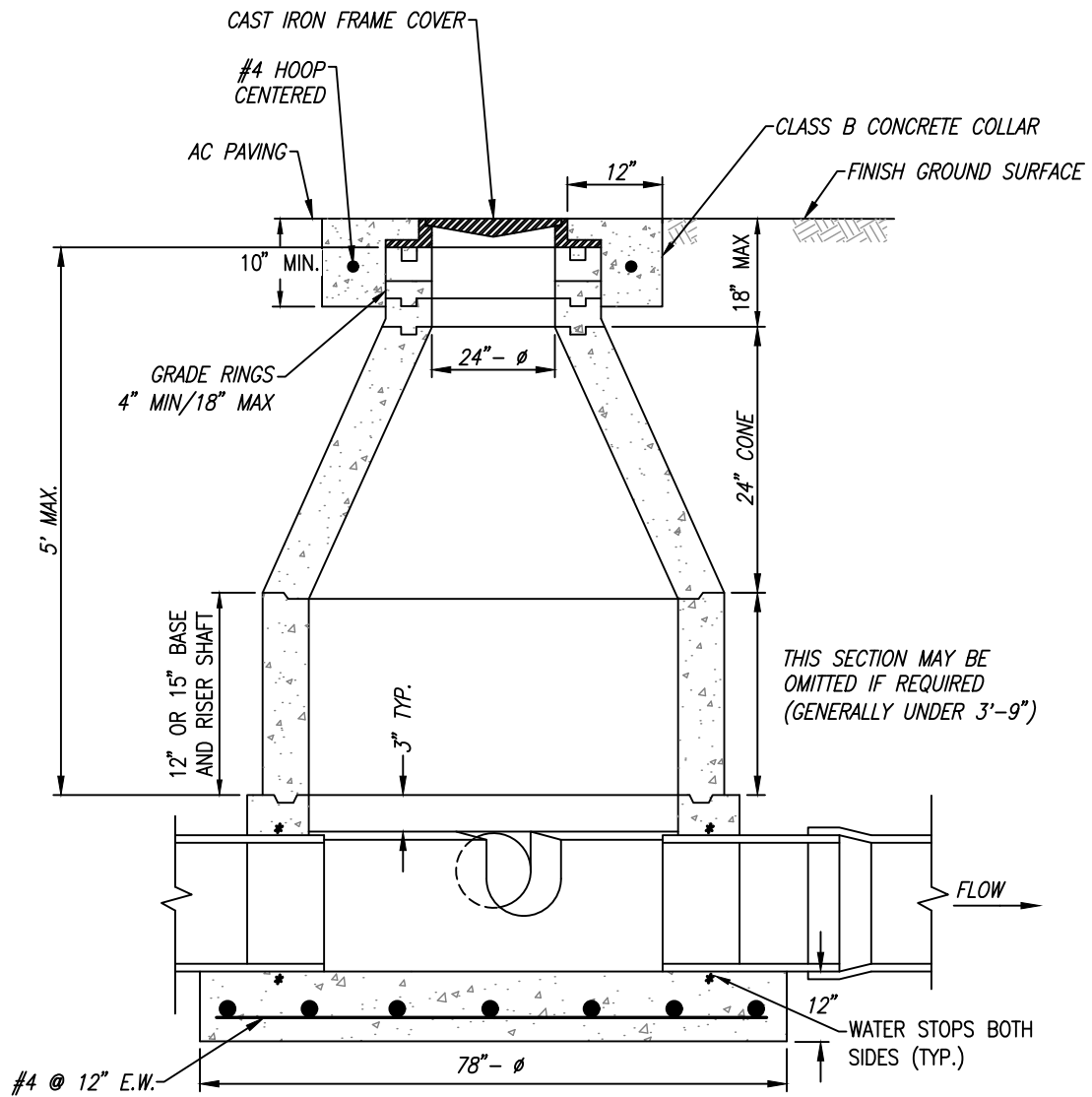


**SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT**

**COLLECTION SYSTEM
CONSTRUCTION STANDARDS**

**STANDARD SEWER
MANHOLE FRAME & COVER**

REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	<u>7</u>



3 FEET TO 5 FEET DEPTH TO TOP OF BASE

NOTES:

1. APPLICABLE NOTES, DESIGNATIONS AND DETAILS NOT PRESENTED HERE ARE AS SHOWN ON PLATE 14.

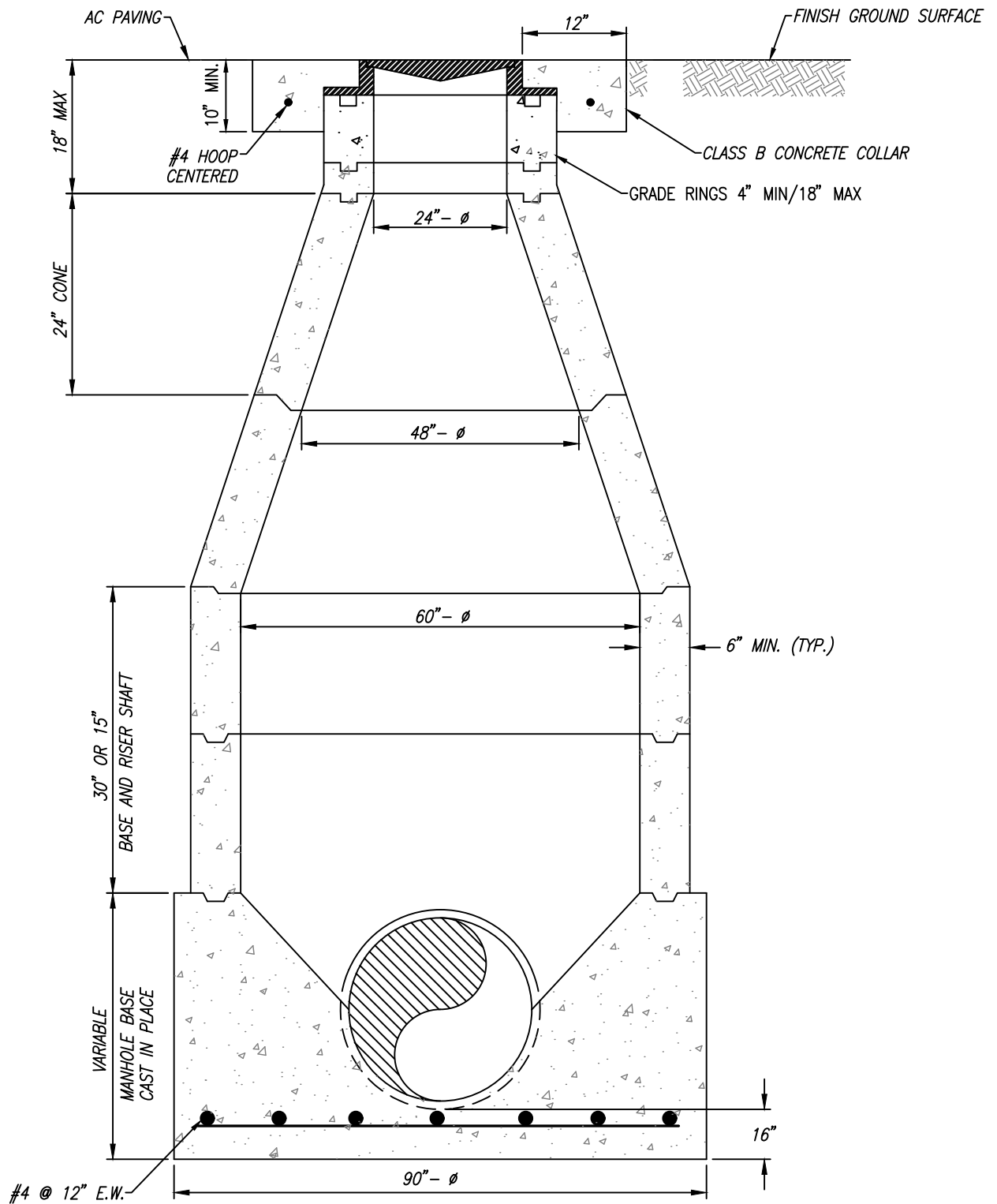


**SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT**

**COLLECTION SYSTEM
CONSTRUCTION STANDARDS**

SHALLOW MANHOLES

REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	9



APPLICABILITY OF 5 FT. DIA. MANHOLE
 WHERE WASTEWATER LINE IS 18"-30" DIAMETER
 WHERE WASTEWATER LINE IS 18 FT. OR DEEPER.

NOTES:

1. APPLICABLE NOTES, DESIGNATIONS AND DETAILS NOT PRESENTED HERE ARE AS SHOWN ON PLATE 8.

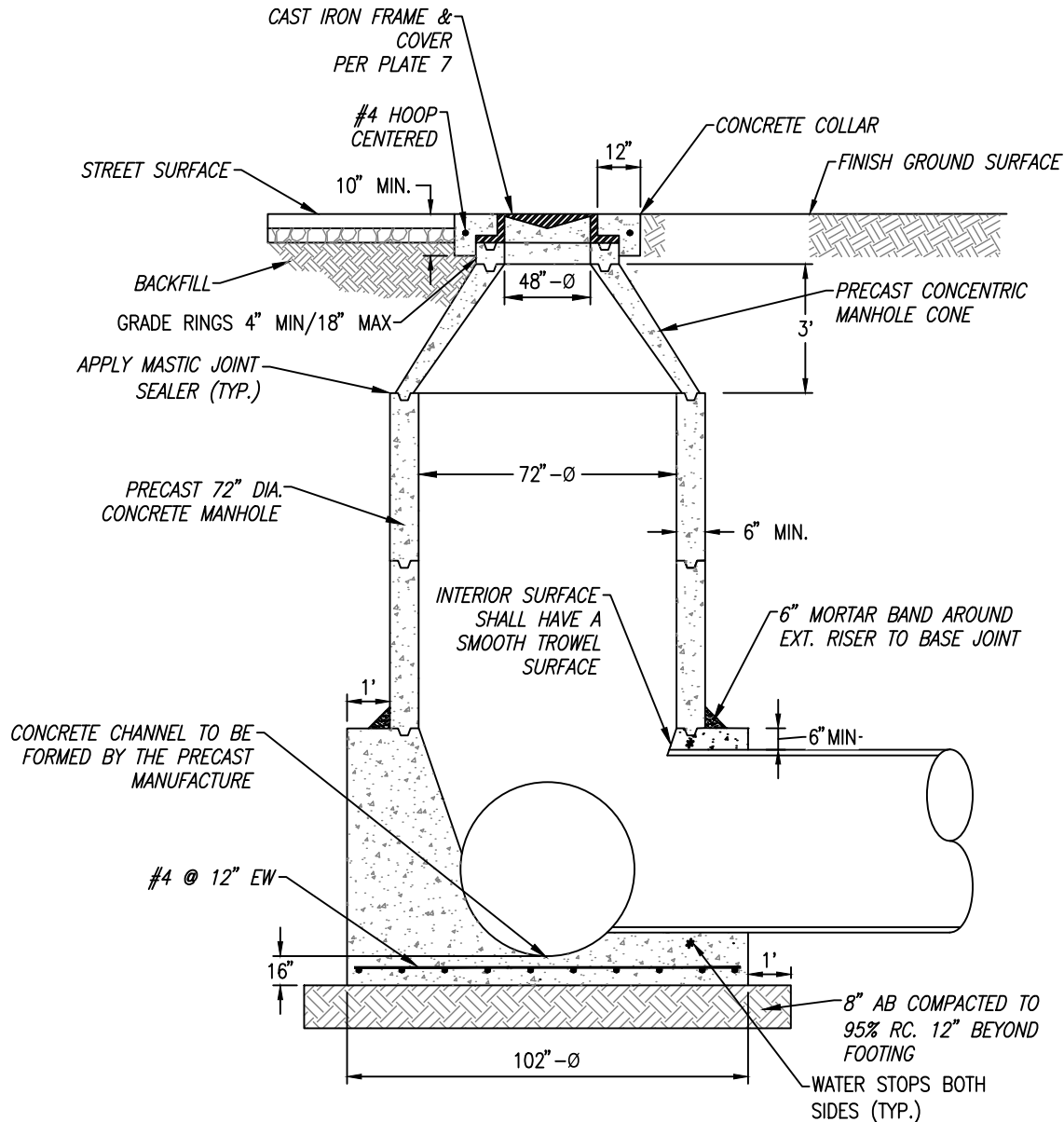


**SELMA-KINGSBURG-FOWLER
 COUNTY SANITATION DISTRICT**

**COLLECTION SYSTEM
 CONSTRUCTION STANDARDS**

60" DIAMETER MANHOLE

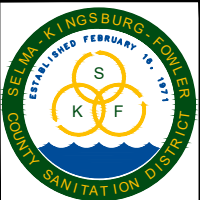
REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	10



APPLICABILITY OF 72" (6 FT.) DIA. MANHOLE
WHERE WASTEWATER LINE IS 36" - 48" DIAMETER

NOTES:

1. APPLICABLE NOTES, DESIGNATIONS AND DETAILS NOT PRESENTED HERE ARE AS SHOWN ON PLATE 8.
2. MANHOLE BASE TO BE CLASS B CONCRETE CAST IN PLACE.
3. BOTTOM OF FIRST BARREL SECTION MUST BE SEALED. IF TONGUE AND GROOVE, USE METAL FORMING RING IN CONCRETE BASE.
4. FOR MASTIC JOINT SEALER.
5. THE BASE SHALL BE POURED TO A LEVEL 6" MIN. ABOVE THE HIGHEST PIPE.

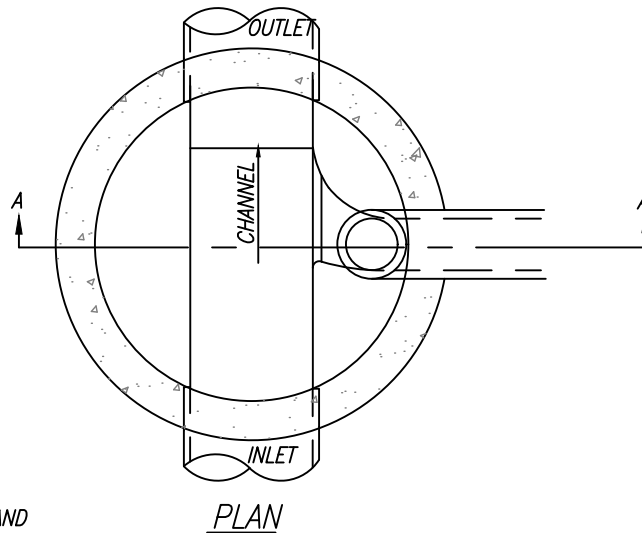
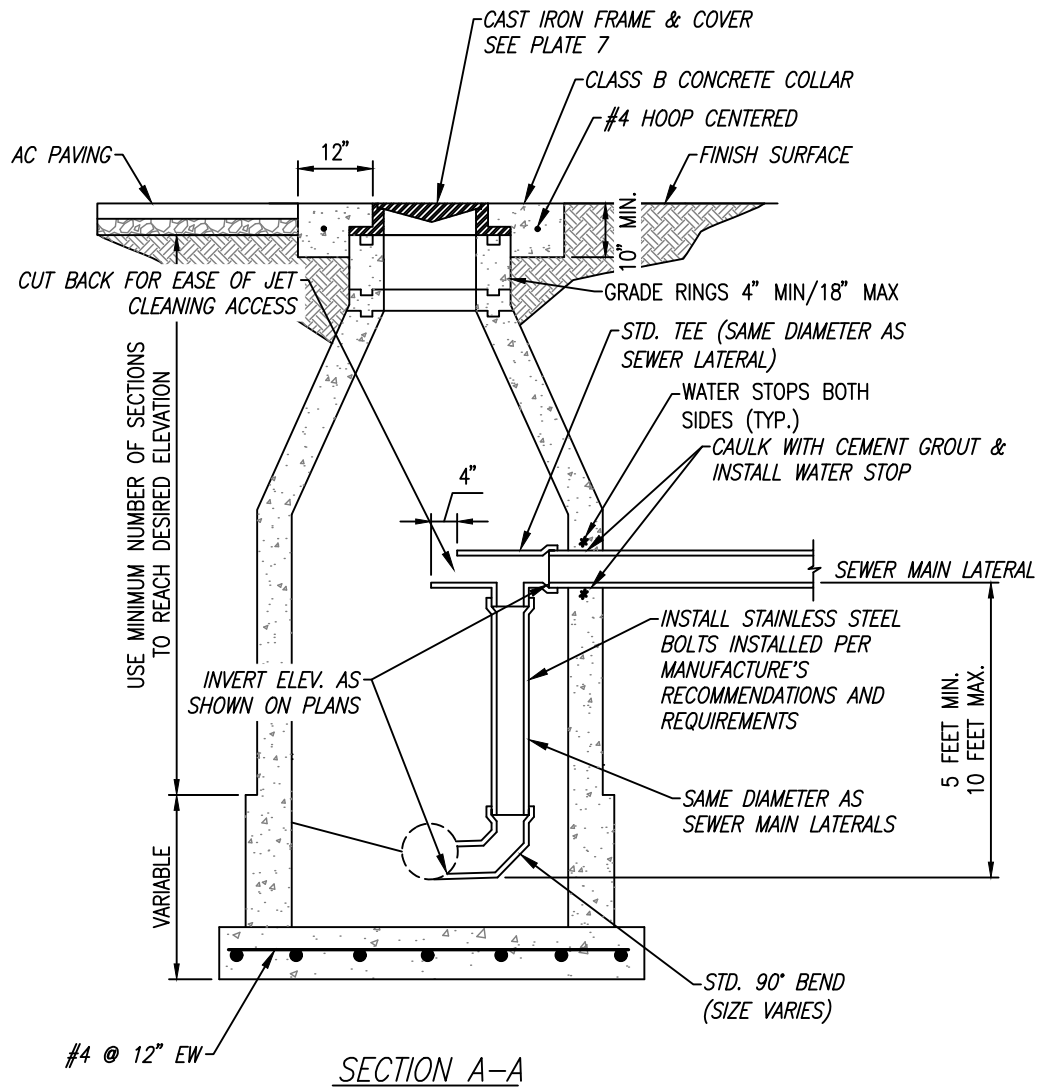


**SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT**

**COLLECTION SYSTEM
CONSTRUCTION STANDARDS**

72" (6') MANHOLE

REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	11



NOTES:

1. SEE PLATE 8 FOR APPLICABLE NOTES AND DESIGNATIONS.
2. PLASTIC PIPES REQUIRE WATER STOPS.

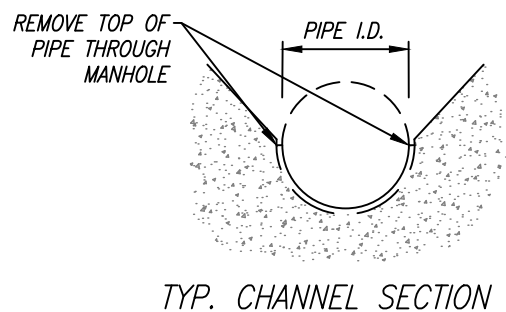
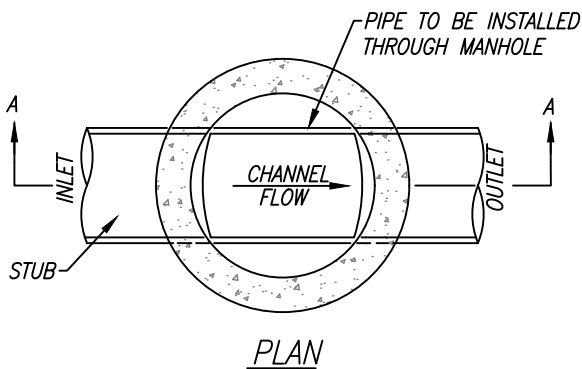
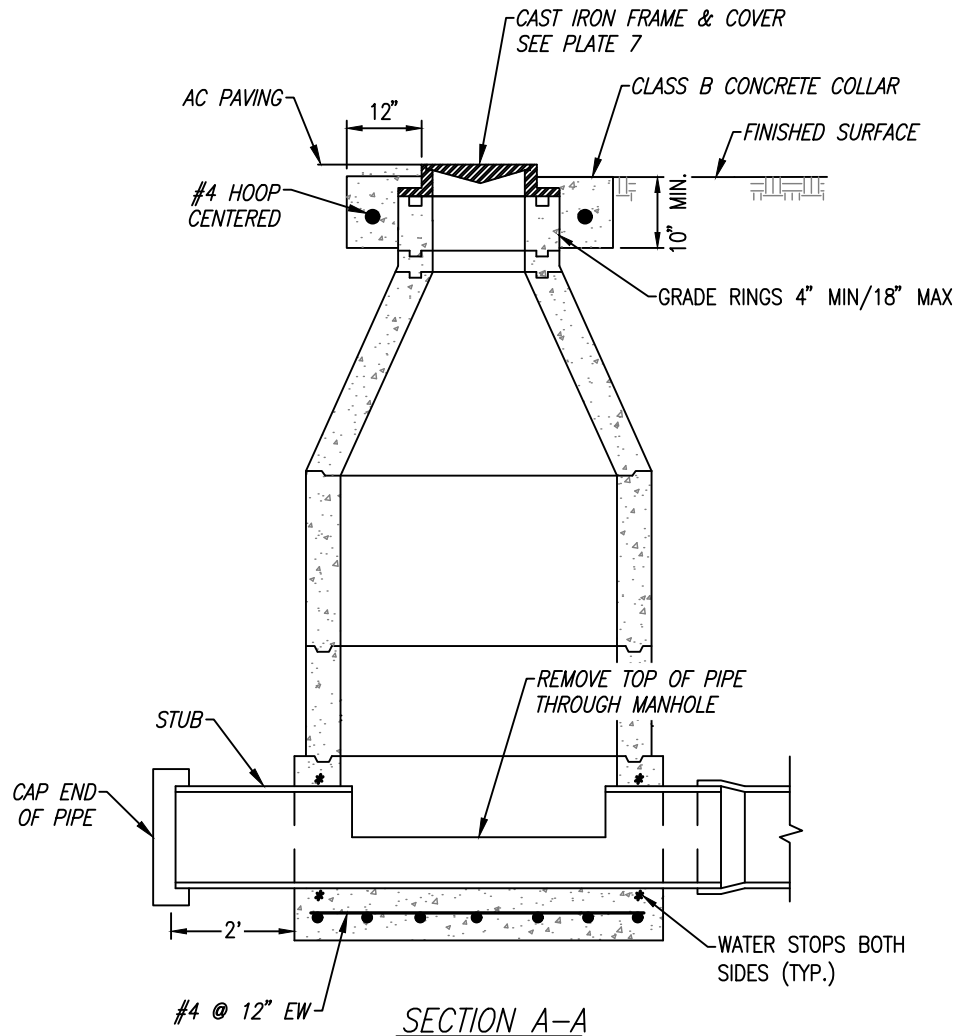


**SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT**

**COLLECTION SYSTEM
CONSTRUCTION STANDARDS**

DROP MANHOLE

REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	13



NOTES:

1. APPLICABLE NOTES, DESIGNATIONS AND DETAILS NOT PRESENTED HERE ARE AS SHOWN ON PLATE 8.
2. INSTALL PROPOSED SANITARY SEWER PIPE THROUGH MANHOLE. FIELD ADJUSTED AS DETERMINED BY INSPECTOR.



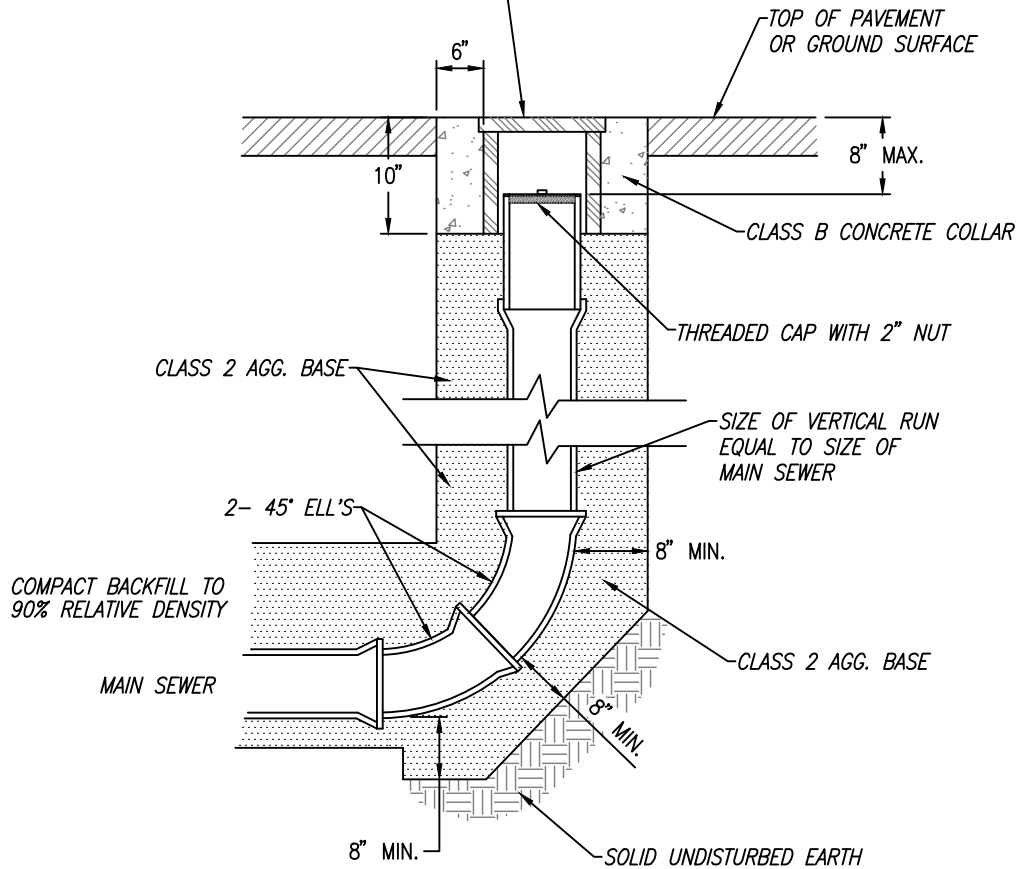
**SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT**

**COLLECTION SYSTEM
CONSTRUCTION STANDARDS**

END OF MAIN MANHOLE

REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	14

CHRISTY CLEAN-OUT BOX OR APPROVED EQUAL
 SIZE ACCORDING TO CLEAN-OUT LATERAL SIZE
 SHALL BE TRAFFIC RATED OR
 NON-TRAFFIC RATED DEPENDING ON LOCATION
 LID SHALL READ "SEWER"



NOTES:

1. GRAVITY SEWER PIPE & FITTINGS SHALL BE PVC, SDR-26 WITH INTEGRAL RUBBER GASKET JOINTS.
2. CLEANOUT PIPE & FITTINGS SHALL BE SAME SIZE AS MAIN PIPE.
3. IDENTIFY ALL CLEANOUT COVERS "SEWER".
4. INSTALLATIONS IN NON-PAVED AREAS SHALL HAVE A CIRCULAR CONCRETE COLLAR AND EXPOSED EDGES SHALL RECEIVE $\frac{1}{2}$ " RADIUS AND SURFACE SHALL RECEIVE A NON-SLIP BROOM FINISH.



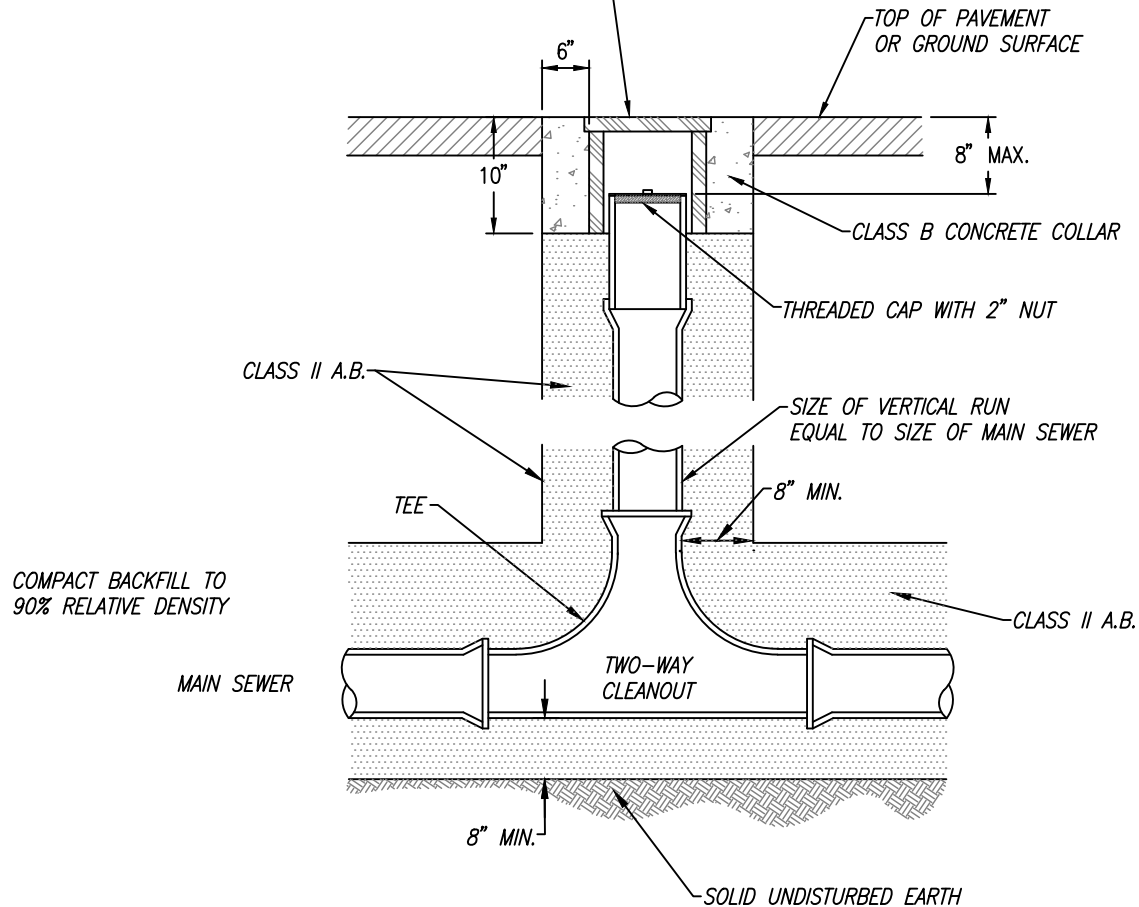
**SELMA-KINGSBURG-FOWLER
 COUNTY SANITATION DISTRICT**

**COLLECTION SYSTEM
 CONSTRUCTION STANDARDS**

END OF MAIN SEWER CLEANOUT

REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	15

CHRISTY CLEAN-OUT BOX OR APPROVED EQUAL
SIZE ACCORDING TO CLEAN-OUT LATERAL SIZE
SHALL BE TRAFFIC RATED OR
NON-TRAFFIC RATED DEPENDING ON LOCATION
LID SHALL READ "SEWER"



NOTES:

1. GRAVITY SEWER PIPE & FITTINGS SHALL BE PVC, SDR-26 WITH INTEGRAL RUBBER GASKET JOINTS.
2. CLEANOUT PIPE & FITTINGS SHALL BE SAME SIZE AS MAIN PIPE.
3. IDENTIFY ALL CLEANOUT COVERS "SEWER".
4. INSTALLATIONS IN NON-PAVED AREAS SHALL HAVE A CIRCULAR CONCRETE COLLAR AND EXPOSED EDGES SHALL RECEIVE $\frac{1}{2}$ " RADIUS AND SURFACE SHALL RECEIVE A NON-SLIP BROOM FINISH.

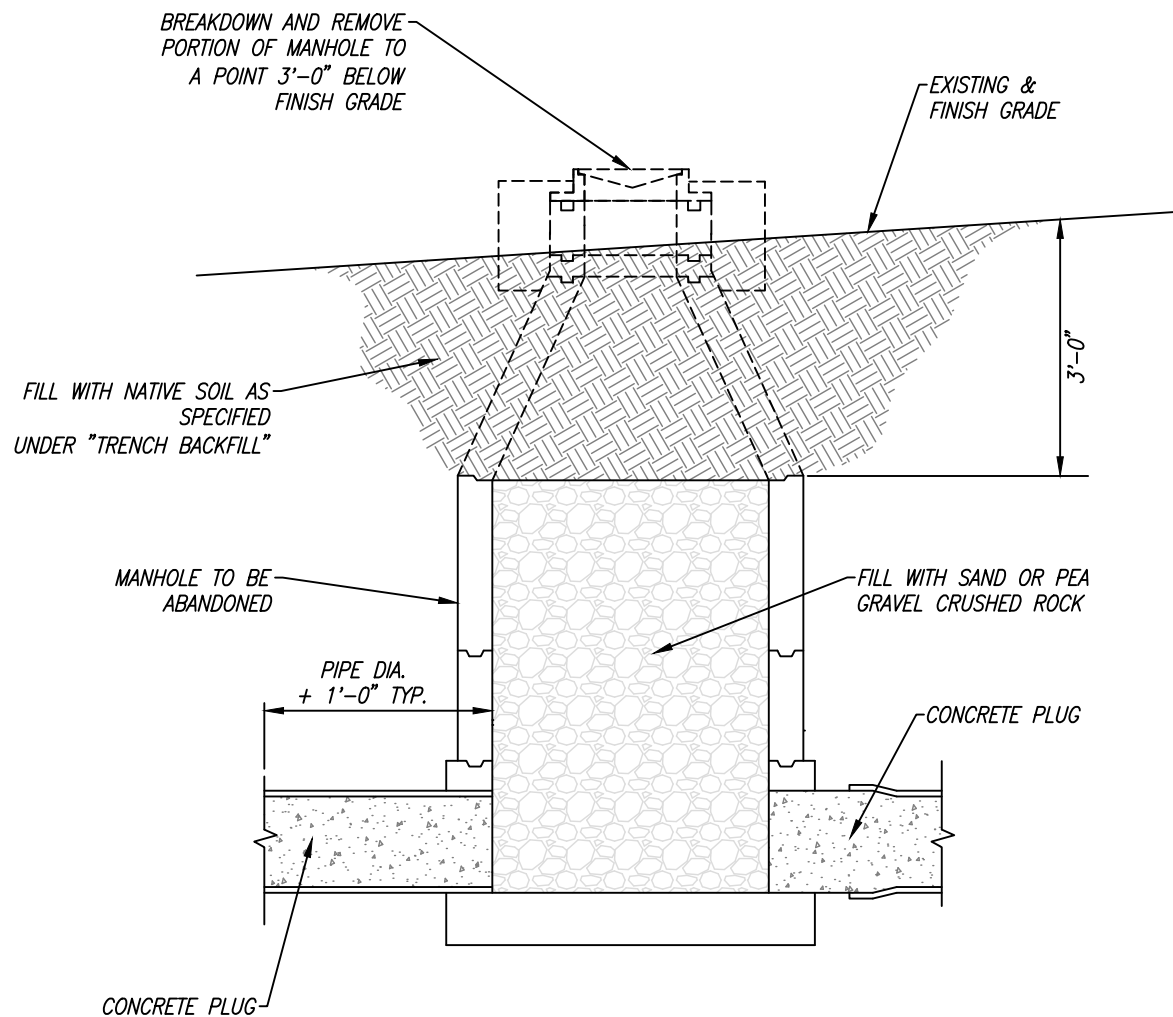


**SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT**

**COLLECTION SYSTEM
CONSTRUCTION STANDARDS**

IN-LINE SEWER CLEANOUT

REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	16



NOTES:

1. SEE SECTION 8.0 ABANDONMENT OF SPECIFICATIONS FOR ADDITIONAL INFORMATION.
2. MANHOLES WHICH ARE TO BE ABANDONED WILL FIRST HAVE BOTH INFLUENT AND EFFLUENT LINES PLUGGED INSIDE THE MANHOLE WITH CONCRETE PLUGS. THE MINIMUM LENGTH OF CONCRETE PLUGS WILL BE THE DIAMETER OF THE ABANDONED PIPE PLUS ONE FOOT. THE MANHOLE WILL THEN BE FILLED WITH SAND OR PEA GRAVEL CRUSHED ROCK TO A POINT THREE (3'-0") BELOW THE FINISH GRADE. THE REMAINDER OF THE MANHOLE SHALL BE BROKEN DOWN AND REMOVED. THEN THE EXCAVATION SHALL BE BACKFILLED TO FINISH GRADE AS SPECIFIED UNDER TRENCH BACKFILL.

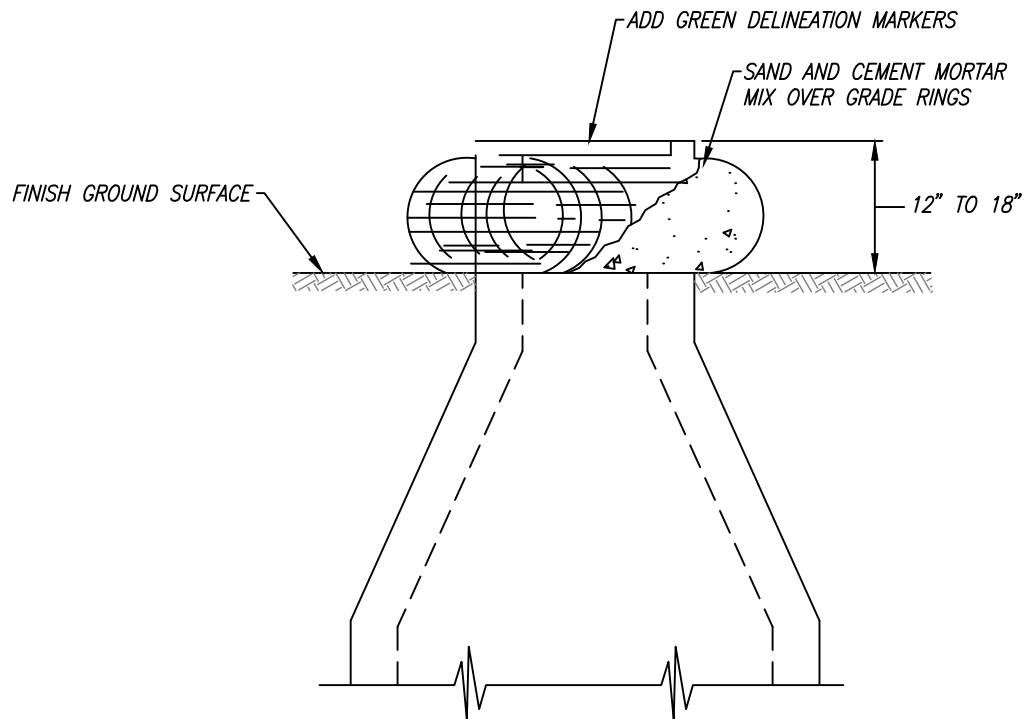


**SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT**

**COLLECTION SYSTEM
CONSTRUCTION STANDARDS**

MANHOLE ABANDONMENT

REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	17



NOTES:

1. APPLICABLE NOTES, DESIGNATIONS AND DETAILS NOT PRESENTED HERE ARE AS SHOWN ON PLATE 8.

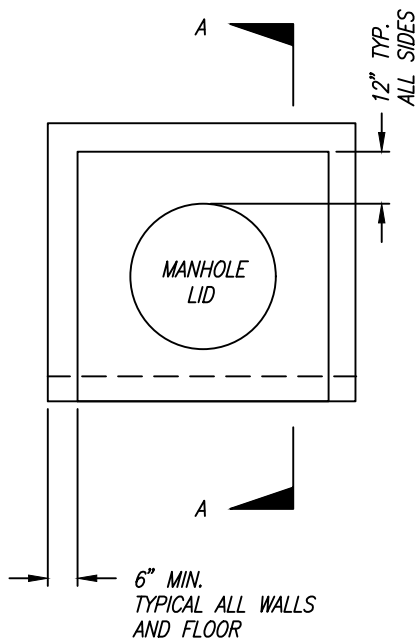


**SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT**

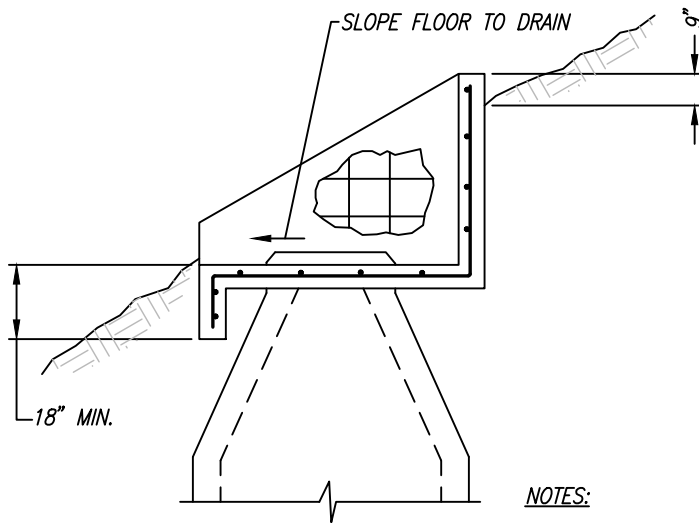
**COLLECTION SYSTEM
CONSTRUCTION STANDARDS**

**MANHOLE SECURING DETAILS
IN UNDEVELOPED AREAS**

REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	18



PLAN

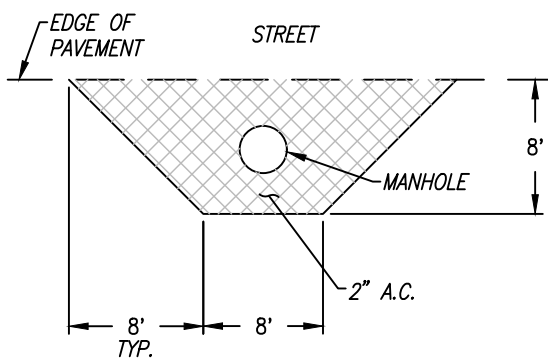


SECTION A-A

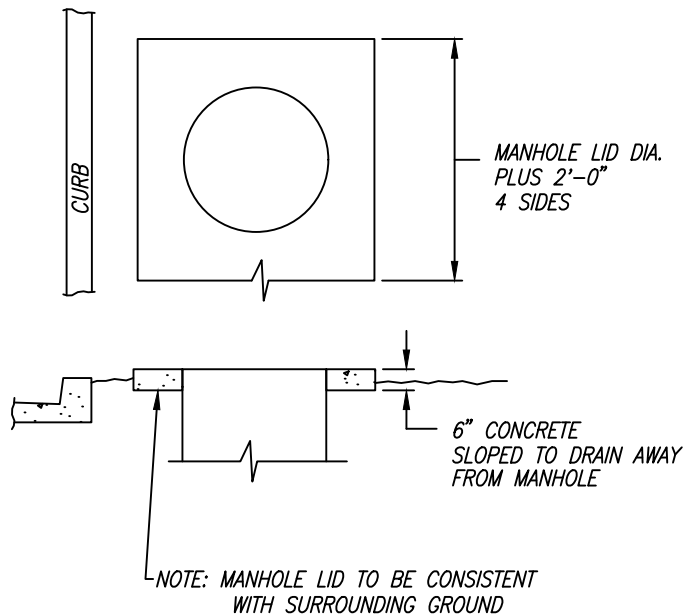
NOTES:

1. ALL REBAR #4 @ 12"
2. CONCRETE BLOCK MAY BE SUBSTITUTED FOR WALL SECTIONS.

CONCRETE (OR BLOCK) RETAINING WALL
(TO BE USED WHERE GROUND SLOPE EXCEEDS 30% OR MORE)



MANHOLE IN STREET
SHOULDER



MANHOLE IN PARKWAY



SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT

COLLECTION SYSTEM
CONSTRUCTION STANDARDS

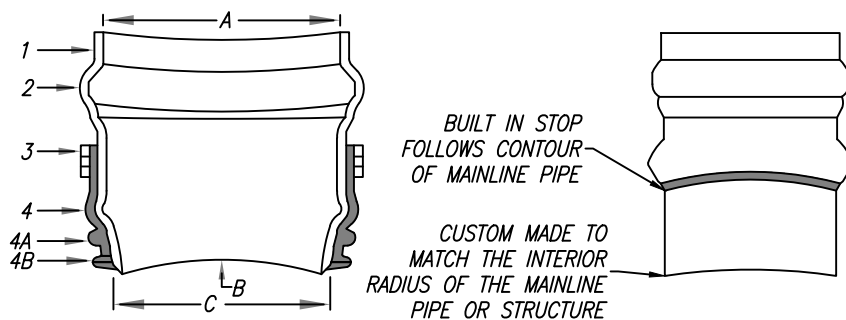
MISCELLANEOUS MANHOLE DETAILS

REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	19

A. BELL END ACCEPTS PIPE WITH SDR-26, SDR-28, SDR-35 AND ASTM D3034 OR EQUIVALENT O.D. SPECIFICATION IN 4" AND 6" SIZES, BELL END ACCEPTS PIPE WITH SDR-26, ASTM D3034 OR EQUIVALENT SPECIFICATION IN 8", 10", 12", 15" AND 18" SIZES.

B. CURVATURE VARIES WITH MAINLINE DIAMETERS.

C. SPIGOT END PVC SDR-35, ASTM D3034 DIAMETERS: 4" AND 6" SPIGOT END PVC SDR-26, ASTM D304 DIAMETERS: 8", 10", 12" AND 15".



PART #	PART NAME
1	HUB ADAPTOR
2	RUBBER GASKET
3	SECURING CLAMP*
4	RUBBER SLEEVE
4A	UPPER SEGMENT**
4B	LOWER SEGMENT***

INSERTA TEE SIZE	HOLE DIAMETER
4"	4 1/2"
6"	6 1/2"

OPTIONAL: #316 STAINLESS STEEL BAND,
* SCREW, AND HOUSING
DISTANCE BETWEEN 4A AND 4B WILL VARY
** BY PRODUCT TYPE
WILL NOT APPEAR ON RUBBER SLEEVES
*** FOR CONCRETE OR CLAY PIPE

INSERTA TEE INSTALLATION INSTRUCTIONS

- CORE THE HOLE WITH RECOMMENDED INSERTA TEE HOLE SAW. HOLE PLACEMENT SHOULD BE AT THE SPRING LINE OR HIGHER ON THE HOST PIPE. TYPICAL INSTALLATION IS HALFWAY BETWEEN SPRING LINE AND CROWN OF PIPE (AT 45°). APPLYING SOAP AND WATER TO THE HOLE SAW IMPACT POINT CAN BE BENEFICIAL WHEN CORING INTO THE MAINLINE PIPE.
- REMOVE SHAVINGS FROM MAINLINE PIPE, CREATING A CLEAN HOLE (DEBURR EDGES AS NEEDED). PLACE RUBBER SLEEVE, WITH RUBBER SLEEVE SEGMENTS (FLANGES) ON BOTH SIDES OF THE MAINLINE'S WALL THICKNESS. ALIGN GOLD LINE PERPENDICULAR TO MAINLINE. FOR ONEFIT, INNER SLEEVE SHOULD BE SNUG TO INNER LINING OF MAINLINE PIPE AND OUTER SLEEVE SHOULD BE SNUG TO EXTERNAL OF MAINLINE PIPE.
- LUBRICATE INSIDE OF RUBBER SLEEVE AND OUTSIDE OF PVC HUB WITH PROVIDED SOAP SOLUTION.
- ALIGN RED LINE ON PVC HUB WITH THE GOLD LINE ON RUBBER SLEEVE.
- USING A WOOD BLOCK AND 4-LB HAMMER, DRIVE THE PVC HUB THROUGH THE RUBBER SLEEVE AND MAINLINE PIPE TO THE RED HORIZONTAL HOMING LINE ON PVC HUB.
- PLACE AND TIGHTEN STAINLESS STEEL BAND ONTO RUBBER SLEEVE. THE FITTING SEALS WITH COMPRESSION FROM THE PVC HUB DRIVING THROUGH THE RUBBER SLEEVE. THE STAINLESS STEEL BAND DOES NOT PROVIDE A SEAL. THE STAINLESS STEEL BAND FASTENS THE PVC HUB AND SLEEVE TOGETHER WHILE THE INSERTA TEE SOAP SOLUTION IS STILL WET; ONCE THE SOLUTION IS DRY, THE STAINLESS STEEL BAND'S PURPOSE HAS CONCLUDED.

INSERTA TEE SERVICE CONNECTION SPECIFICATION

PRODUCT REQUIREMENTS

INSERTA TEE SERVICE CONNECTIONS, AS MANUFACTURED BY INSERTA TEE, SHALL CONSIST OF A PVC HUB, RUBBER SLEEVE, AND STAINLESS STEEL BAND. CONNECTION SHALL BE A COMPRESSION FIT INTO THE CORED WALL OF A MAINLINE PIPE. HUB SHALL BE MADE FROM HEAVY-DUTY PVC MATERIAL. STAINLESS STEEL CLAMPING ASSEMBLY SHALL BE OF SS #301 FOR THE BAND AND HOUSING AND SS #305 FOR SCREWS. RUBBER SLEEVE AND GASKET, WHEN APPLICABLE, SHALL MEET THE REQUIREMENTS OF ASTM F477. GASKETS SHALL BE INSTALLED PER THE MANUFACTURER SPECIFICATIONS. A WATER-BASED SOLUTION PROVIDED BY THE MANUFACTURER SHALL BE USED DURING ASSEMBLY.

THE INSERTA TEE CAN BE INSTALLED INTO ANY MAINLINE PIPE OR STRUCTURE. CONNECTION HUBS ARE AVAILABLE TO CONNECT TO CORRUGATED POLYETHYLENE, CORRUGATED POLYPROPYLENE, PVC C900, SDR 26 HWS, SDR 35 (GASKETED BELL), IPS/SCH 40 (GASKETED BELL & SOLVENT WELD BELL). AVAILABILITY OF CONNECTION DIAMETERS IS BASED ON THE SERVICE PIPE MATERIAL.

JOINT PERFORMANCE

INSERTA TEE PRODUCT SHALL PROVIDE A WATERTIGHT CONNECTION ACCORDING TO THE REQUIREMENTS OF ASTM D3212 OR ASTM F2946-12.

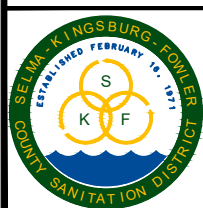
INSERTA TEE FIELD PIPE AND JOINT PERFORMANCE

TO ASSURE WATERTIGHTNESS, FIELD PERFORMANCE VERIFICATION MAY BE ACCOMPLISHED BY TESTING IN ACCORDANCE WITH ASTM F2487. APPROPRIATE SAFETY PRECAUTIONS MUST BE USED WHEN FIELD-TESTING ANY PIPE MATERIAL. CONTACT THE MANUFACTURER FOR RECOMMENDED LEAKAGE RATES.

INSTALLATION

INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDED INSTALLATION GUIDELINES. THE USE OF INSTALLATION METHODS OR HOLE SAWS NOT PURCHASED FROM INSERTA FITTINGS WILL VOID THE PERFORMANCE WARRANTY OF THE PRODUCT. BACKFILL AROUND THE INSERTA TEE SERVICE CONNECTION SHALL BE OF THE SAME MATERIAL TYPE AND COMPACTION LEVEL AS SPECIFIED FOR THE MAINLINE PIPE INSTALLATION.

FOR SHALLOW H-20 TRAFFIC APPLICATIONS (< 2' OF COVER) OR DEEP BURIAL APPLICATIONS (>= 25' IN BURIAL DEPTH), INSERTA TEE SHALL BE ENCASED IN CONCRETE. ACTUAL DIMENSIONS OF CONCRETE MUST BE DESIGNED (BY OTHERS) TAKING INTO CONSIDERATION LOCAL SOIL CONDITIONS & OTHER APPLICABLE DESIGN FACTORS, BUT SHALL EXTEND NO LESS THAN 12" IN ANY DIRECTION FROM THE FITTING. CONTACT YOUR LOCAL REPRESENTATIVE OR VISIT THE WEBSITE AT WWW.ADSPICE.COM FOR A COPY OF THE LATEST INSTALLATION GUIDELINES.

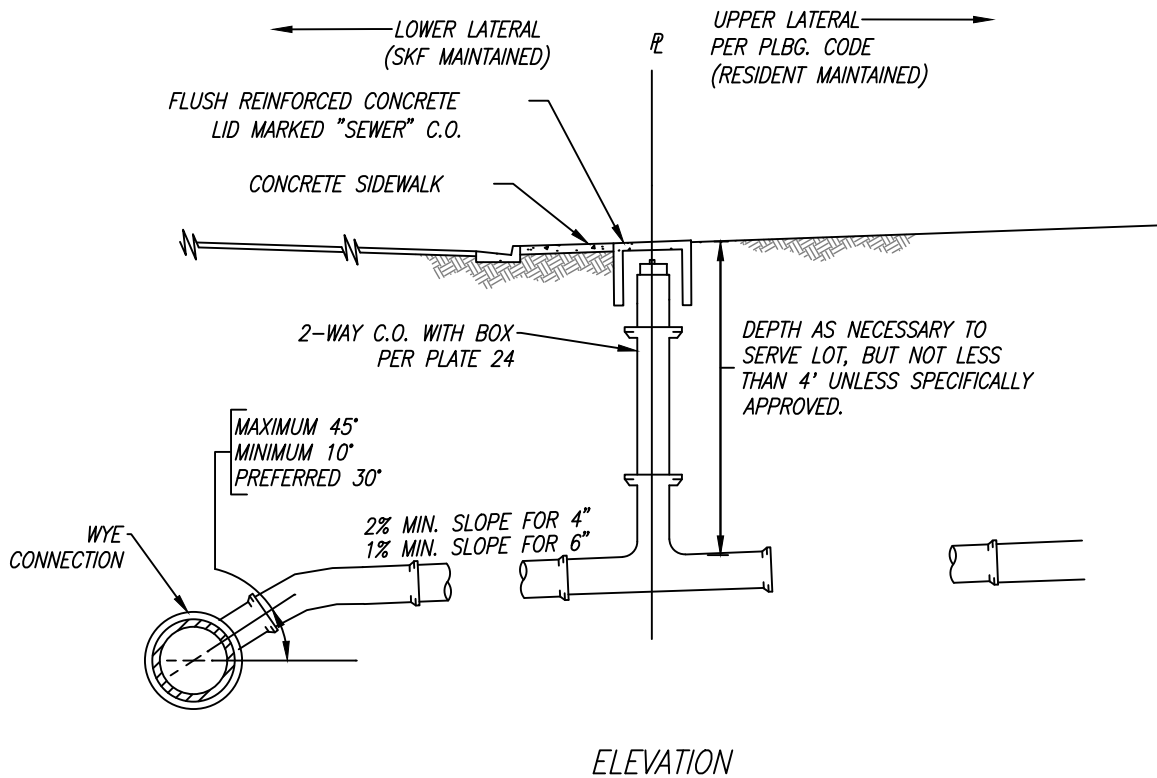
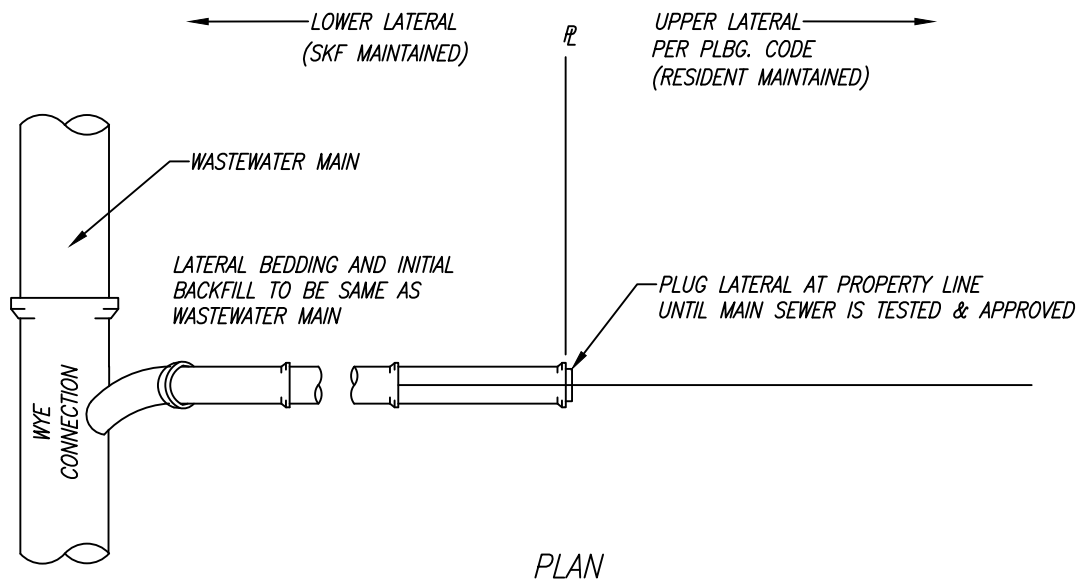


SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT

COLLECTION SYSTEM
CONSTRUCTION STANDARDS

INSERTA TEE
SEWER LATERAL CONNECTION TO MAIN

REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	20



NOTES:

1. TO CONNECT SIX INCH AND SMALLER HOUSE LATERALS, INSTALL INSERTA TEE IN EXISTING WASTEWATER MAIN WITH INSPECTOR'S APPROVAL.
2. LOCATE LATERAL IN ACCORDANCE WITH POTABLE WATER-WASTEWATER SEPARATION ORDINANCE – SEE APPENDIX A.
3. SERVICE LATERALS LARGER THAN SIX INCHES SHALL BE CONNECTED WITH A MANHOLE.
4. LOCATION OF ALL LATERALS SHALL BE SHOWN ON AS-BUILT DRAWINGS.
5. HOMEOWNER IS RESPONSIBLE FOR UPPER LATERAL CONNECTION.
6. LATERAL PIPE AND FITTINGS SHALL BE SDR-26.

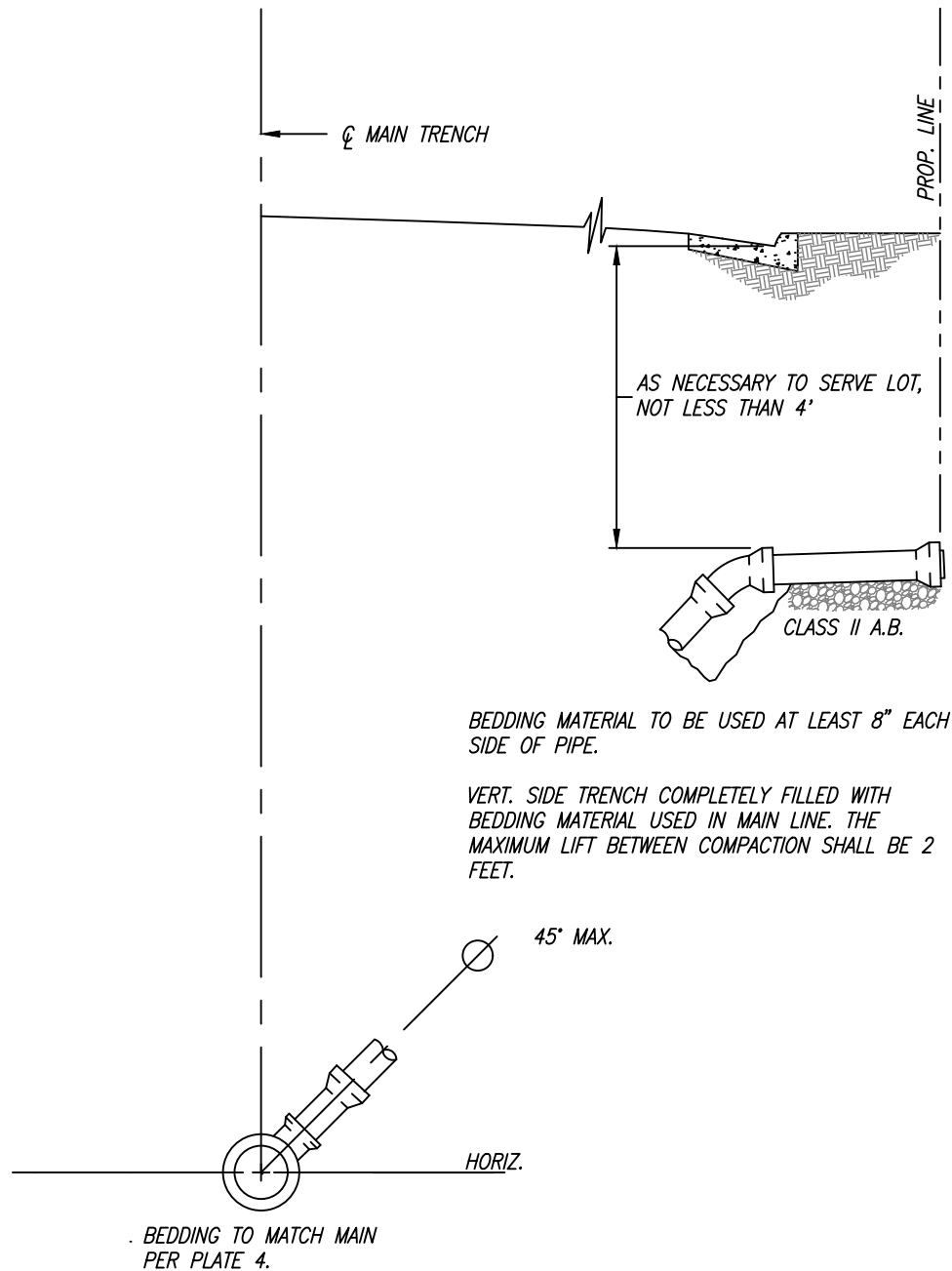


**SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT**

**COLLECTION SYSTEM
CONSTRUCTION STANDARDS**

SERVICE LATERAL

REVISIONS:	SEP. 2026	SCALE:
ADOPTED:	9/10/2026	NOT TO SCALE
		PLATE NO. 21



NOTES:

1. 4" FOR SINGLE FAMILY DWELLING.
2. 6" FOR MULTI-FAMILY DWELLING OR COMMERCIAL.
3. POTABLE WATER AND WASTEWATER LINE SEPARATION SHALL COMPLY WITH "CRITERIA FOR THE SEPARATION OF WATER MAINS AND SANITARY SEWERS" ISSUED BY THE STATE OF CALIFORNIA DEPARTMENT OF HEALTH SERVICES. (SEE APPENDIX A)

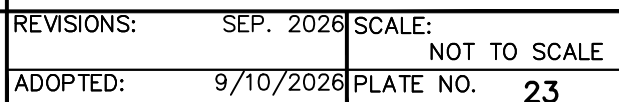


**SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT**

**COLLECTION SYSTEM
CONSTRUCTION STANDARDS**

DEEP SEWER LATERAL CONNECTION

REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	22

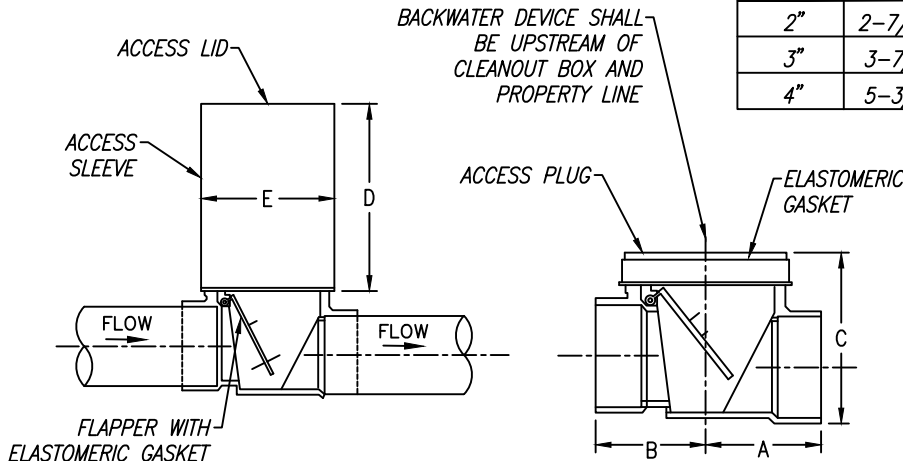


VALVE WITH SLEEVE

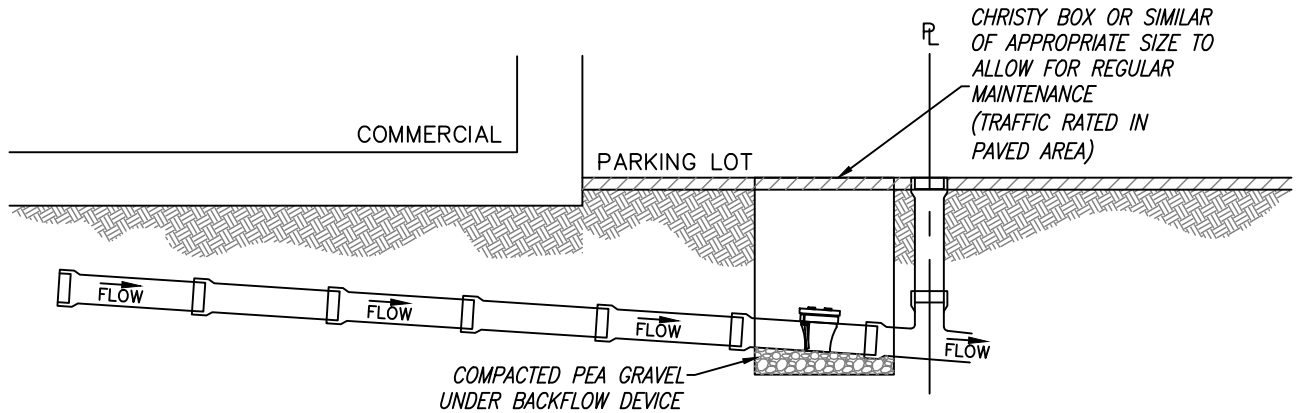
PIPE SIZE	A	B	C	D	E
2"	2-7/16"	2-1/16"	3-7/8"	16"	4"
3"	3-7/8"	3-1/2"	6"	16"	5"
4"	5-3/8"	5-3/8"	6-3/4"	16"	7-3/4"

VALVE ONLY

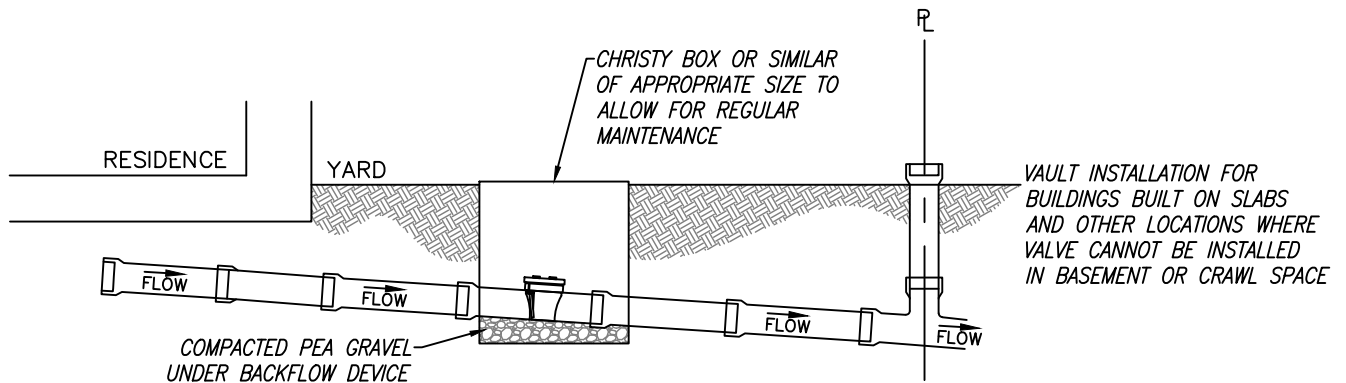
PIPE SIZE	A	B	C
2"	2-7/16"	2-1/16"	3-7/8"
3"	3-7/8"	3-1/2"	6"
4"	5-3/8"	5-3/8"	6-3/4"
6"	7-11/16"	7-11/16"	10-1/8"



TYPICAL SANITARY SEWER SERVICE BACKWATER VALVE



TYPICAL COMMERCIAL SANITARY BACKWATER VALVE INSTALLATIONS



TYPICAL RESIDENTIAL SANITARY BACKWATER VALVE INSTALLATIONS

NOTES:

1. BACKFLOW DEVICE SHALL BE PROFLOW OR APPROVED EQUAL.
2. INSTALLATIONS OF GREATER THAN 4' IN DEPTH MAY REQUIRE MANHOLE.
3. VALVES MUST BE INSTALLED IN A LOCATION AT WHICH THEY CAN BE CLEANED AND SERVICED REGULARLY. (OWNER IS RESPONSIBLE FOR MAINTAINING IN PROPER WORKING ORDER.)
4. THESE SHALL BE USED ON ALL BASEMENTS AND CONNECTIONS TO INTERCEPTORS OR AS REQUIRED BY THE DISTRICT.
5. BACKFLOWS ON PIPE SIZES LARGER THAN 6" SHALL BE APPROVED CASE-BY-CASE.
6. BACKFLOWS SHALL BE OWNED AND MAINTAINED BY THE PROPERTY OWNER.

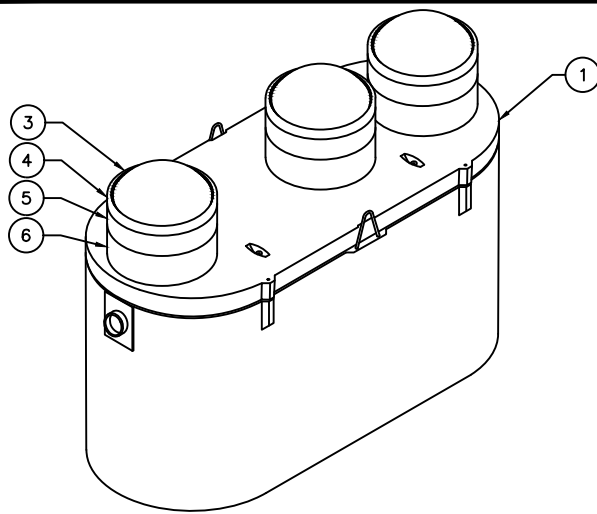


SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT

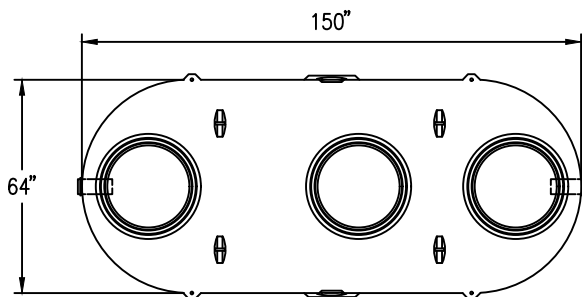
COLLECTION SYSTEM
CONSTRUCTION STANDARDS

SEWER BACKFLOW DEVICE

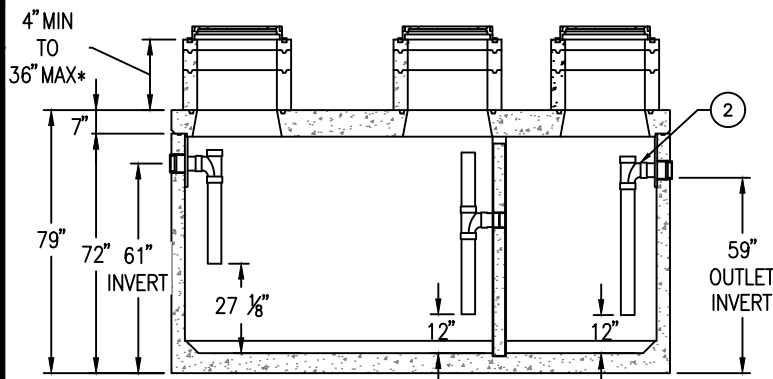
REVISIONS: SEP. 2026 SCALE:
ADOPTED: 9/10/2026 NOT TO SCALE
PLATE NO. 24



ISOMETRIC VIEW



PLAN VIEW



CROSS SECTION

INSTALL NOTE

MUST BE INSTALLED PER "JENSEN PRECAST UNDERGROUND WASTEWATER PRECAST CONCRETE TANK INSTALLATION PROCEDURE" WHICH CAN BE FOUND AT: [HTTPS://WWW.JENSENPRECAST.COM/TANK-LNSTALLATION-PROCEDURE-D2106.PDF](https://www.jensenprecast.com/tank-lnstallation-PROCEDURE-D2106.PDF). THIS PROCEDURE ADDRESSES REQUIRED EXCAVATION, SITE PREPARATION, INSTALLATION, VENTILATION, AND WATER/VACUUM TESTING.

LIFTING NOTE

THIS CONCRETE PRODUCT IS DESIGNED TO BE LIFTED AT 2500PSI WITH 2 LIFT CONNECTIONS EQUALLY LOADED TO 2 LIFTING POINTS AT A MINIMUM 90° SLING ANGLE, MEASURED FROM HORIZONTAL.

NOTES:

1. PROPER SIZING TO BE DETERMINED BY CALCULATION, SUBJECT TO APPROVAL BY THE DISTRICT.
2. MINIMUM ALLOWABLE SIZE SHALL BE 1,500 GALLONS.
3. RESPONSIBILITY FOR CLEANING AND MAINTENANCE BELONGS TO PROPERTY OWNER.
4. GREASE INTERCEPTOR SHALL BE JENSEN OR APPROVED EQUAL.
5. ALL CONCRETE SHALL BE 6 SACK CONCRETE & 3,000 PSI MINIMUM.
6. DESIGN LOAD: H-20 TRAFFIC WITH DRY SOIL CONDITIONS (WATER LEVEL BELOW TANK) AND 1'-6" EARTH COVER.
7. SUITABLE SUB-BASED BEDDED WITH GRANULAR MATERIAL SHALL BE PREPARED TO HANDLE ANTICIPATED LOADS.
8. ALL CHAMBERS MUST BE RAISED TO FINISHED GRADE (WITH FRAME AND COVERS PER PLATE NO. 7).

KEYNOTES

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	200079487	TANK JOP 1500 GALLON 4 INCH ASSEMBLY 24"E, 24"B, 24"E SINGLE BAFFLE
2	1	200080354	200080362 PLUMBING - JOP 1500 GALLON 4 INCH LAYOUT GRAVITY GREASE INTERCEPTOR 24"E, 24"B, 24"E SINGLE BAFFLE
3	JOB SPECIFIC	100005850	CL RINGCOVER 240IA B-5105-021B-R2 ASTM A48 CL35B CP O-RING GASKET OSI JENSEN/INTERCEPT
4	JOB SPECIFIC	100001524	GRADE RING D2432X3
5	JOB SPECIFIC	100001525	GRADE RING D2432X6
6	JOB SPECIFIC	100001526	GRADE RING D2432X12

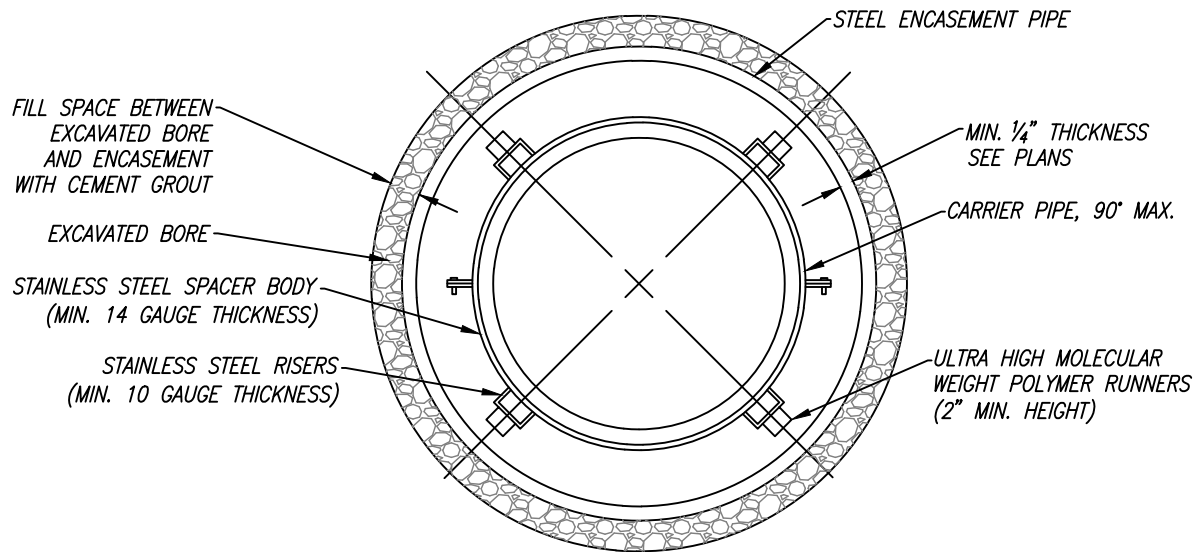


SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT

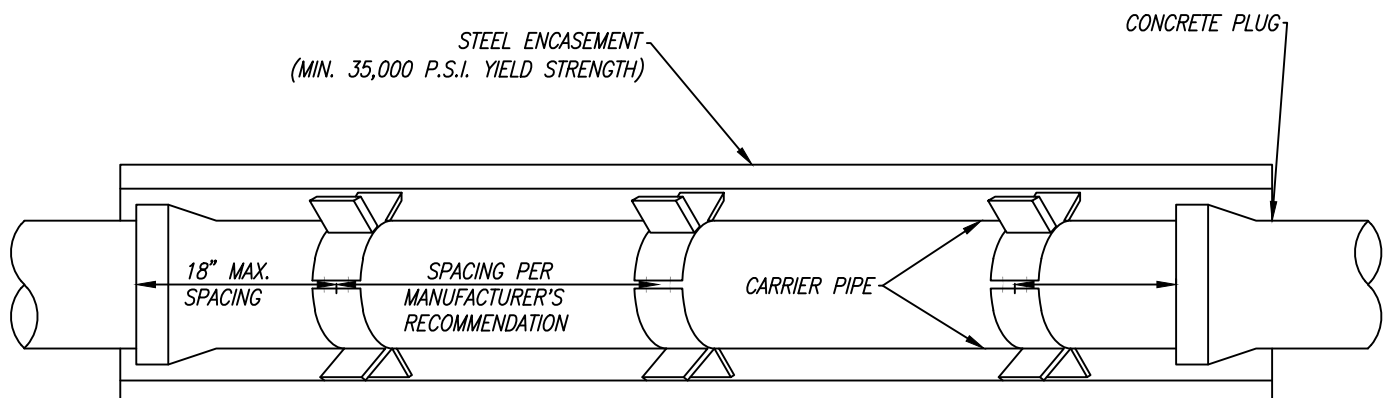
COLLECTION SYSTEM
CONSTRUCTION STANDARDS

GREASE INTERCEPTOR

REVISIONS: SEP. 2026 SCALE:
ADOPTED: 9/10/2026 NOT TO SCALE
PLATE NO. 25



PIPE SIZE-CARRIER (DIAMETER)	PIPE SIZE-CASING (DIAMETER) (MIN.)	MINIMUM PIPE THICKNESS (INCHES)	
6"	16"	1/4	0.2500
8"	18"	1/4	0.2500
10"	20"	5/16	0.3125
12" ~ 14"	24"	3/8	0.3750
16" ~ 18"	30"	7/16	0.4375
20"	36"	1/2	0.5000
24"	42"	1/2	0.5000
30"	48"	1/2	0.5000

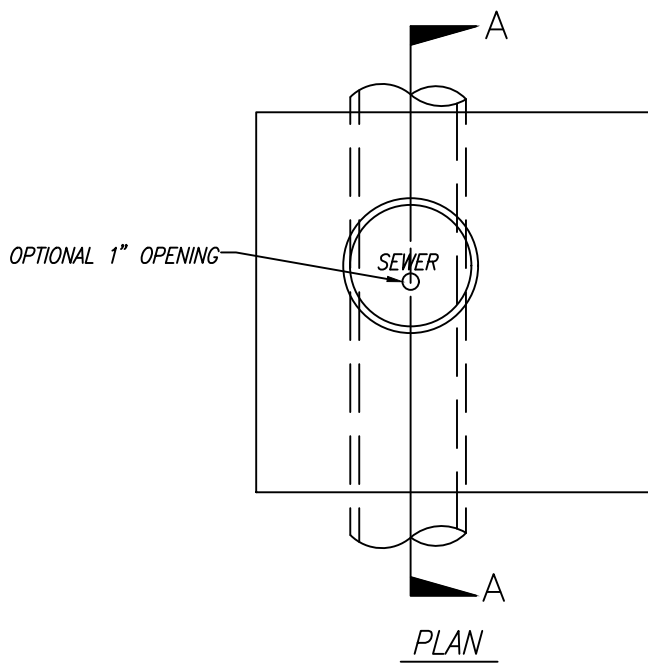
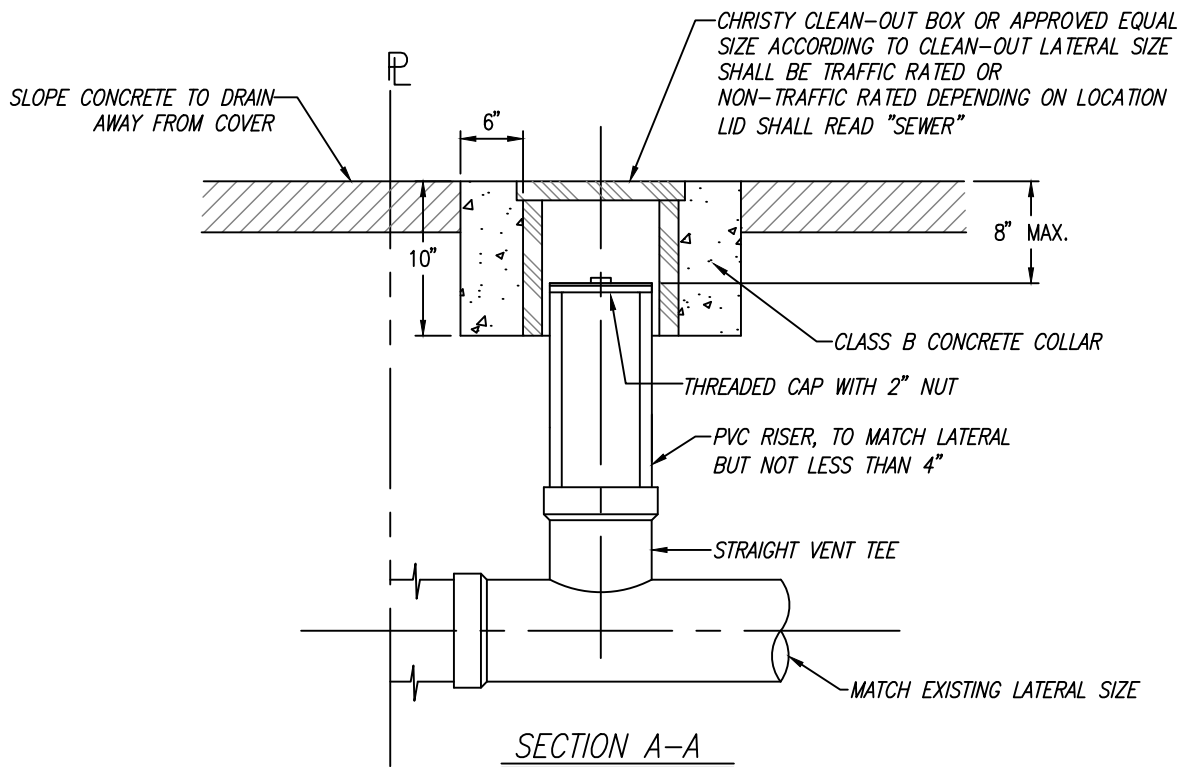


**SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT**

**COLLECTION SYSTEM
CONSTRUCTION STANDARDS**

PIPE & CASING FOR JACK & BORE

REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	26



NOTES:

1. ON EXISTING SEWER, INSTALL APPROVED STANDARD "T" SADDLES, USING A SEWER TAPPING MACHINE, OR EQUAL. A PLAIN END SECTION OF PIPE WITH PREMOULDED "T" AND CALDER COUPLING MAY BE USED.
2. LOCATION OF SAMPLING WELL SHALL BE DESIGNATED BY THE DISTRICT PRIOR TO APPROVAL AND ISSUANCE OF NON-RESIDENTIAL USER PERMIT.
3. CONTACT THE INDUSTRIAL WASTE INSPECTOR FOR LOCATION OF SAMPLING WELL, IF LOCATION IS NOT SHOWN ON APPROVED DRAWINGS.
4. INDUSTRIAL WASTE DISCHARGERS SHALL INSTALL A 5 FT. DIAMETER MANHOLE (PLATE NO. 10) IF THE LATERAL IS MORE THAN 5 FT. DEEP. A 5 FT. SQUARE COVERED VAULT OVER THE LATERAL MAY BE REQUIRED FOR SHALLOWER INSTALLATION. ALL WASTE DISCHARGERS SHALL OBTAIN DISTRICT APPROVAL OF SAMPLING WELL PLANS AND DETAILS.

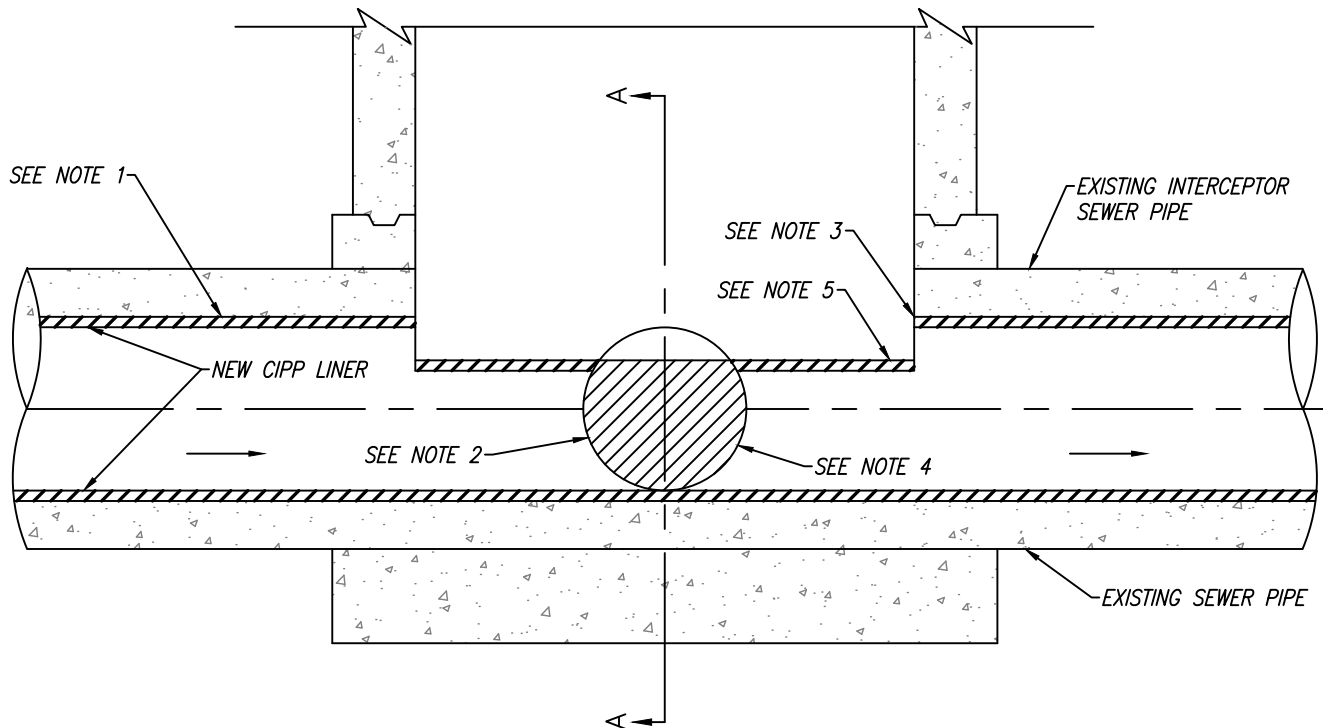


**SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT**

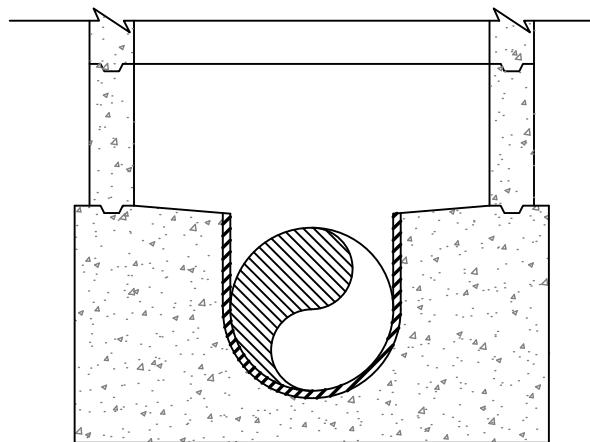
**COLLECTION SYSTEM
CONSTRUCTION STANDARDS**

SAMPLING WELL

REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	27



UNLINED MANHOLE, CIPP THROUGH, W/ OR W/OUT INTERSECTING SEWER



SECTION A-A

NOTES:

1. FILL ANY VOIDS BETWEEN CIPP LINER AND HOST PIPE WITH EPOXY MANHOLE LINER MATERIAL TO A MAXIMUM DEPTH OF 8-INCHES OR DEPTH OF VOID, WHICHEVER IS SMALLER.
2. REMOVE LINER AND SEAL TO ACCOMMODATE EXISTING SEWER PIPES, WHERE APPLICABLE, SEAL LINER PER LINER MANUFACTURER'S RECOMMENDATIONS.
3. SEAL ALL INTERFACES BETWEEN CUT CIPP AND EXISTING SEWER WITH FLEXIBLE SEALANT PER SPECIFICATIONS.
4. EXISTING INTERSECTING SEWER PIPE, SEE CIVIL PLAN VIEW DRAWINGS FOR PIPE SIZE, (TYP).
5. CUT AND REMOVE CIPP LINER ALONG EDGE OF BENCH AND ENTRANCE AND EXIT OF MANHOLE. LEAVE CIPP LINER IN FLOW LINE (ALONG CUT EDGE(S)) SEAL WITH FLEXIBLE SEALANT PER LINER MANUFACTURER'S RECOMMENDATIONS).

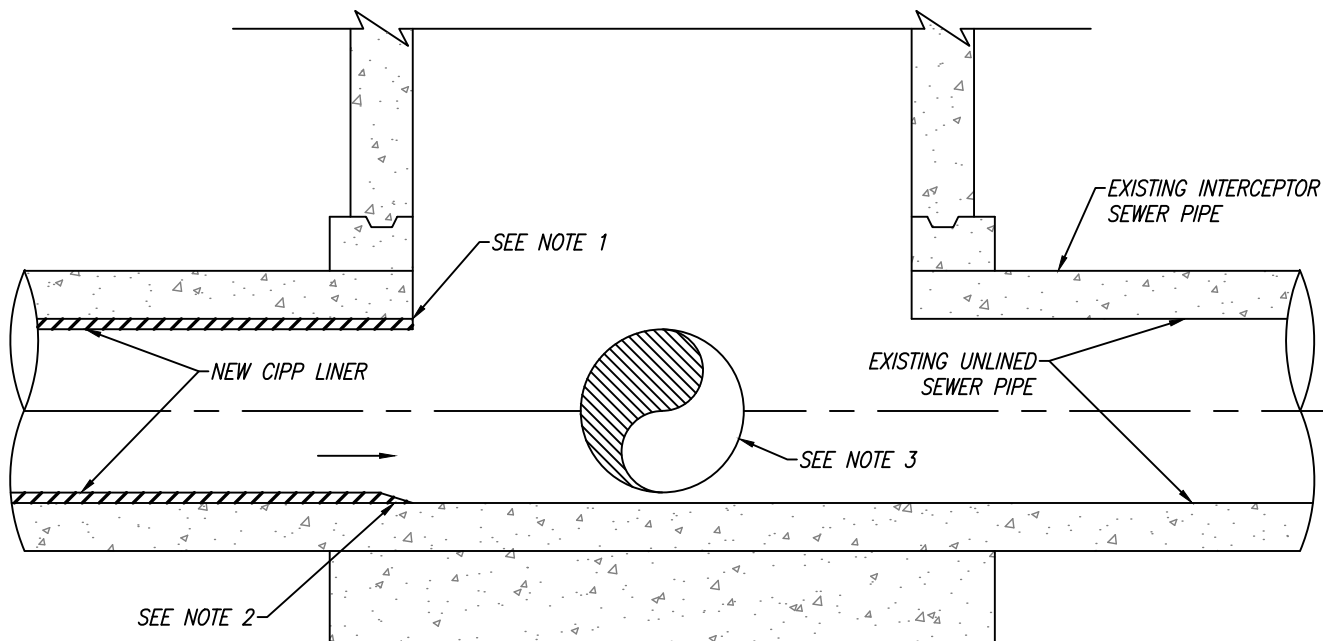


**SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT**

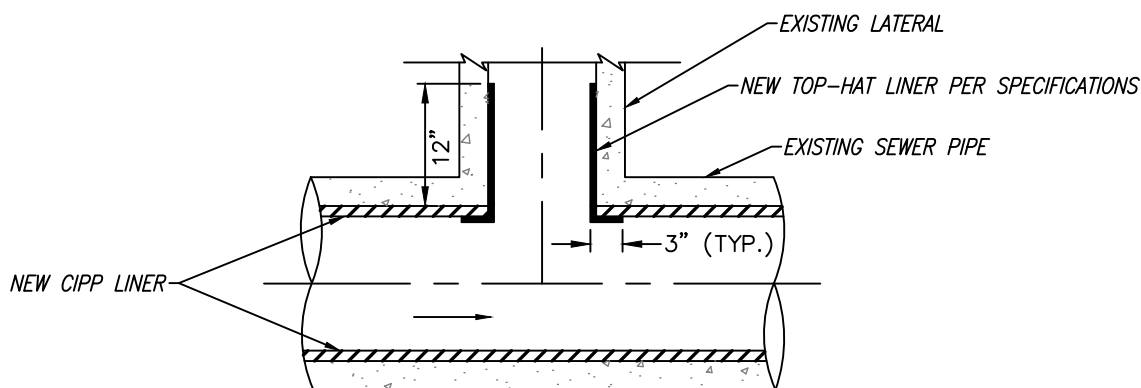
**COLLECTION SYSTEM
CONSTRUCTION STANDARDS**

**CIPP (CURED-IN-PLACE-PIPE)
CIPP THROUGH**

REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	28



UNLINED MANHOLE, CIPP TERMINATION, W/ OR W/OUT INTERSECTING SEWER



TOP HAT LINER AT LATERALS

NOTES:

1. SEAL ALL INTERFACES BETWEEN CUT CIPP AND CONCRETE WITH FLEXIBLE SEALANT PER SPECIFICATIONS.
2. FILL VOID BETWEEN CIPP LINER AND HOST PIPE WITH EPOXY MANHOLE LINER MATERIAL TO A MAXIMUM DEPTH OF 8-INCHES OR DEPTH OF VOID, WHICHEVER IS SMALLER.
3. EXISTING INTERSECTING SEWER PIPE, SEE CIVIL PLAN VIEW DRAWINGS FOR PIPE SIZE, (TYP).

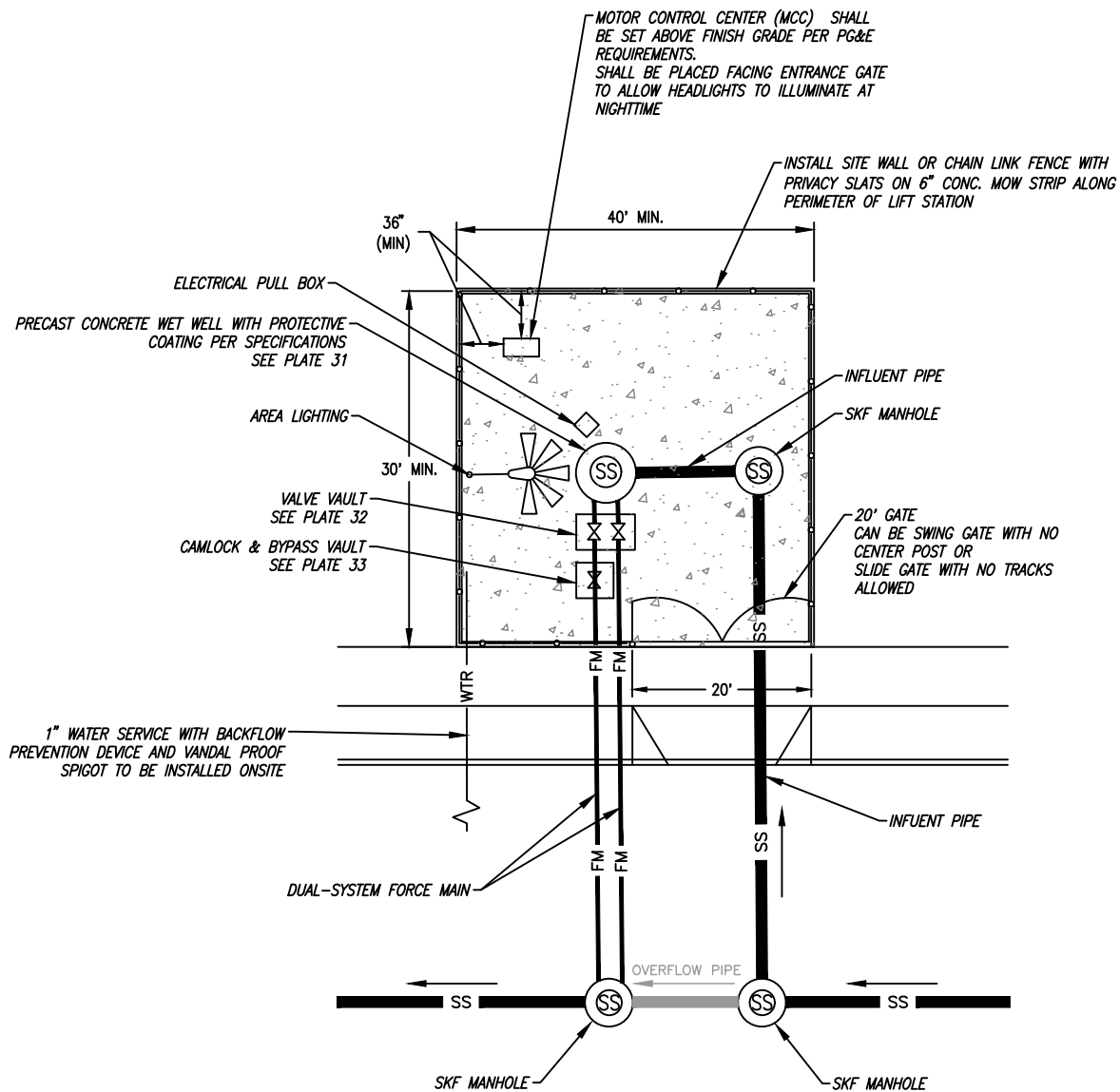


**SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT**

**COLLECTION SYSTEM
CONSTRUCTION STANDARDS**

**CIPP (CURED-IN-PLACE-PIPE)
CIPP TERMINATING**

REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	29

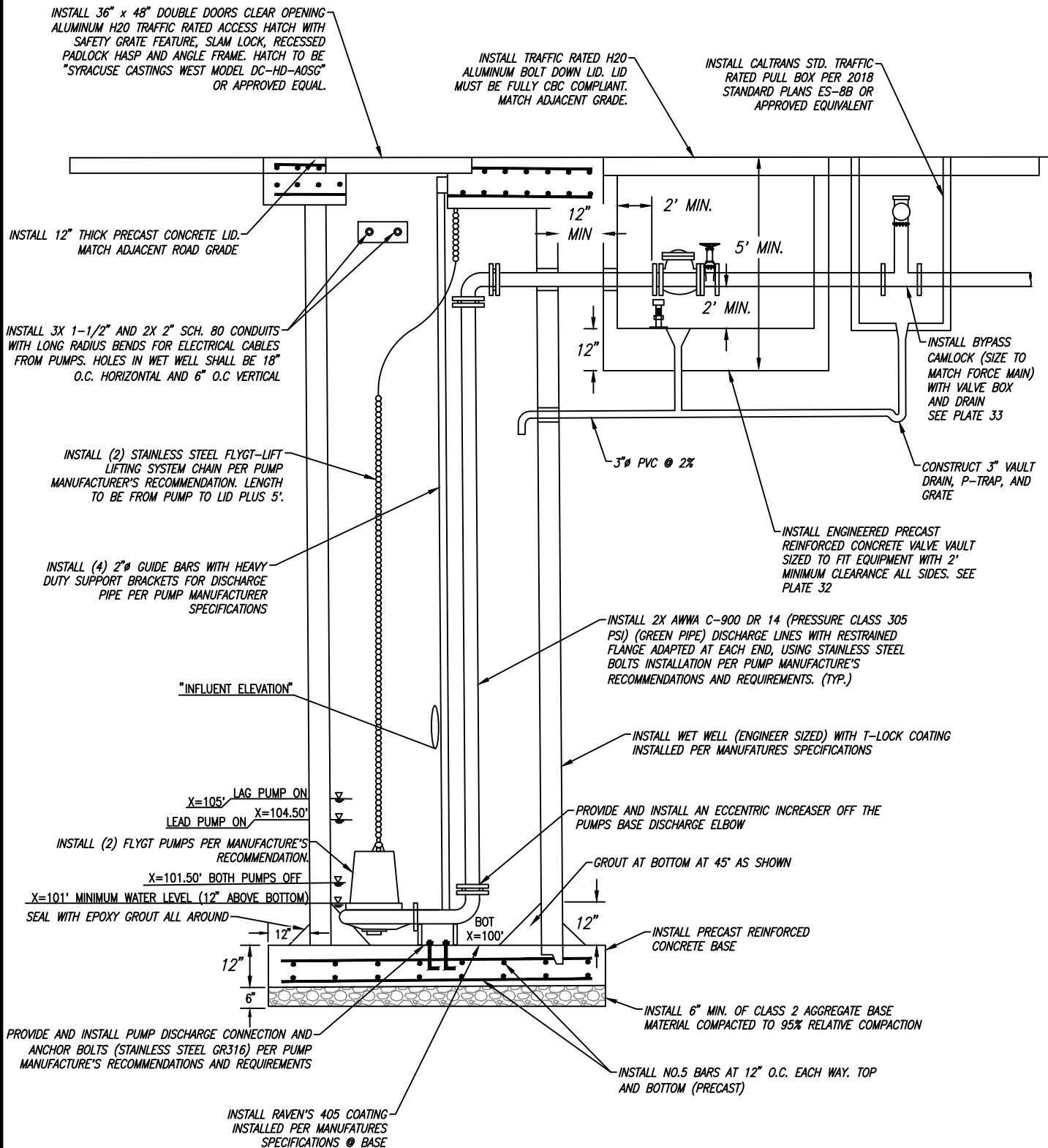


SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT

COLLECTION SYSTEM
CONSTRUCTION STANDARDS

LIFT STATION – TYPICAL SITE PLAN

REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	30



INSTALL:
INFLUENT LINE SHALL NOT BE DIRECTLY OVER THE PUMPS
UNLESS NO OTHER OPTION IS AVAILABLE.

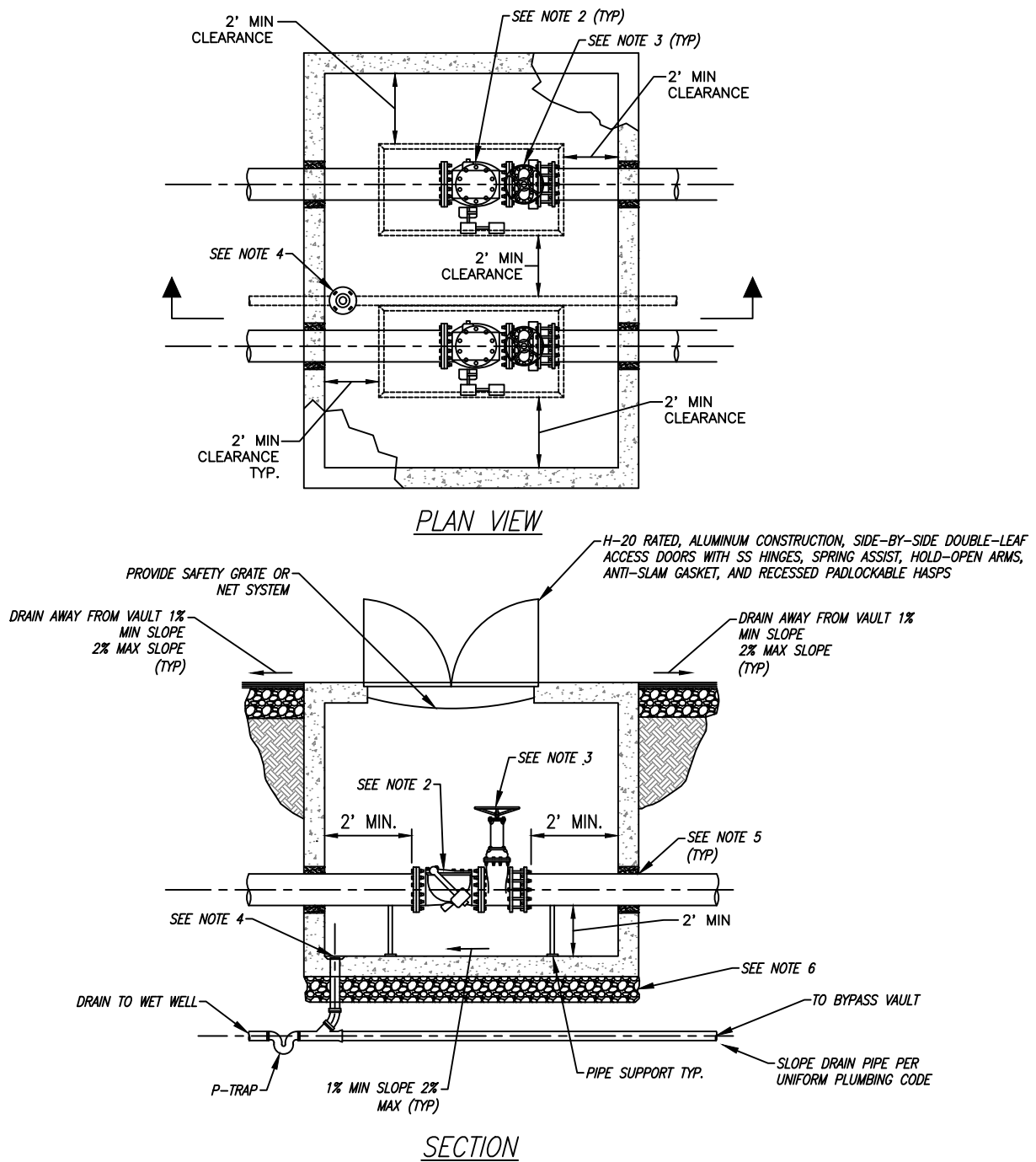


SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT

COLLECTION SYSTEM
CONSTRUCTION STANDARDS

LIFT STATION – TYPICAL WET WELL

REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	31



NOTES:

1. CONCRETE WALLS MUST BE FINISHED WITH NON-SHRINK GROUT AT PIPE PENETRATIONS.
2. AWWA C508 FLGxFLG SWING CHECK VALVE WITH LEVER AND COUNTERWEIGHT (SHALL BE DEZURIK OR APPROVED EQUAL)
3. AWWA C500 FLGxFLG DOUBLE DISC GATE VALVE WITH NRS AND HANDWHEEL (SHALL BE DEZURIK OR APPROVED EQUAL)
4. VAULT DRAIN 3 INCH DIAMETER, LENGTH AS REQUIRED
5. PIPE PENETRATIONS MUST BE SEALED WITH TYLOX MIB BOOT CONNECTORS OR APPROVED EQUAL.
6. BEDDING THICKNESS MUST BE PER GEOTECHNICAL RECOMMENDATION.

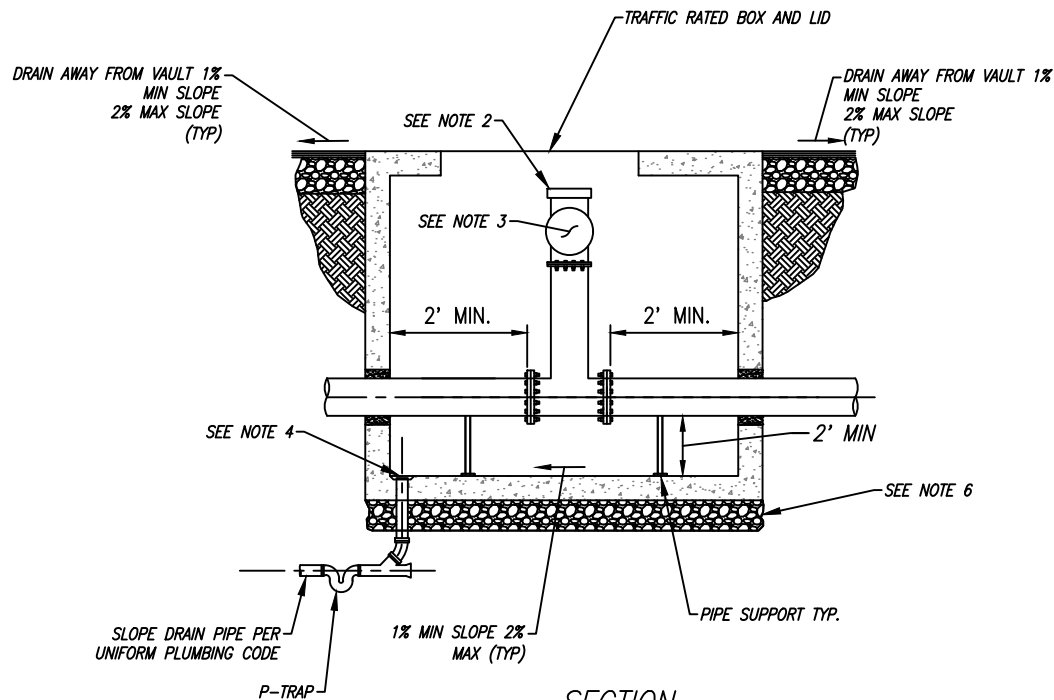


**SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT**

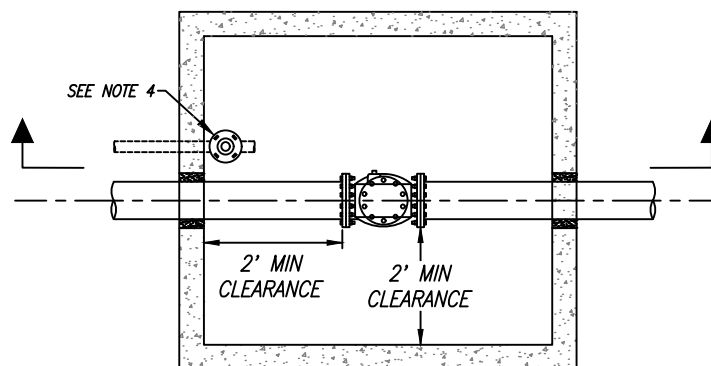
**COLLECTION SYSTEM
CONSTRUCTION STANDARDS**

LIFT STATION – TYPICAL VALVE VAULT

REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	32



SECTION



PLAN VIEW

NOTES:

1. CONCRETE WALLS MUST BE FINISHED WITH NON-SHRINK GROUT AT PIPE PENETRATIONS.
2. CAM LOCK QUICK COUPLING, SIZE TO MATCH FORCE MAIN PIPE (SHALL BE PROFLOW DYNAMICS OR APPROVED EQUAL)
3. AWWA C500 FLGxFLG DOUBLE DISC GATE VALVE WITH NRS AND HANDWHEEL (SHALL BE DEZURIK OR APPROVED EQUAL)
4. VAULT DRAIN 3 INCH DIAMETER, LENGTH AS REQUIRED
5. PIPE PENETRATIONS MUST BE SEALED WITH TYLOX MIB BOOT CONNECTORS OR APPROVED EQUAL.
6. BEDDING THICKNESS MUST BE PER GEOTECHNICAL RECOMMENDATION



**SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT**

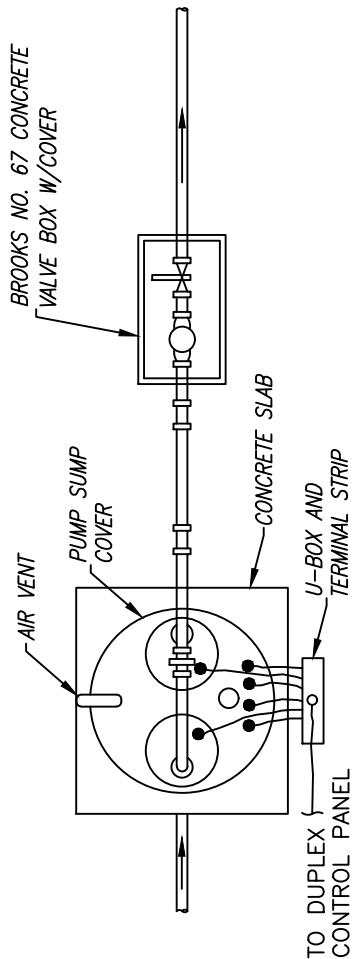
**COLLECTION SYSTEM
CONSTRUCTION STANDARDS**

LIFT STATION – CAM LOCK BYPASS

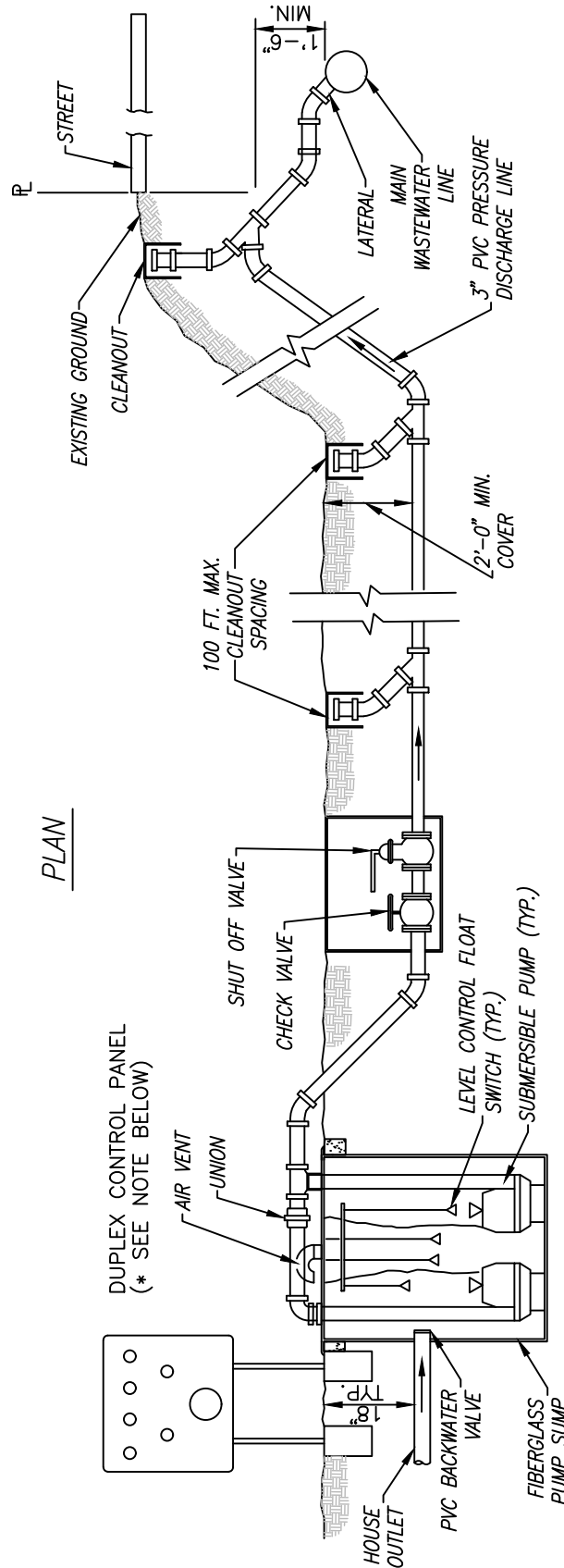
REVISIONS:	SEP. 2026	SCALE:	NOT TO SCALE
ADOPTED:	9/10/2026	PLATE NO.	33

NOTES:

1. THE EQUIPMENT SHOWN ON THIS PLAN 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 DISTRICT. INSPECTION OF ON-SITE WORK WILL BE BY THE BUILDING & SAFETY DEPARTMENT.



PLAN



ELEVATION

- * WITH NEMA IV ENCLOSURE IF INSTALLED OUTDOORS OR
NEMA 1 ENCLOSURE IF INSTALLED INDOORS.



SELMA-KINGSBURG-FOWLER
COUNTY SANITATION DISTRICT

COLLECTION SYSTEM
CONSTRUCTION STANDARDS

PRIVATE PUMPING SYSTEMS

REVISIONS: SEP. 2026 SCALE:
ADOPTED: 9/10/2026 NOT TO SCALE
PLATE NO. 34

APPENDIX

SELMA-KINGSBURG-FOWLER COUNTY SANITATION DISTRICT



Sewer Work Request Form

Purpose of Work:

☐ New Construction

Inspection

Maintenance

Emergency Repair

☐ Other: _____

Contact Information:

Contact Name

Phone Number

Email Address

1.

2.

3.

Shutdown Details:

1. Location of Sewer Main (City; Streets):

2. Sewer Manhole ID Numbers (If applicable)

3. Location of Sewer Pump Station (If applicable)

4. Shutdown Start Date and Time:

Date: _____ Time: _____

Shutdown End Date and Time:

Date: _____ Time: _____

SELMA-KINGSBURG-FOWLER COUNTY SANITATION DISTRICT



5. Duration of Shutdown (Estimate):

Hours/Days

6. Reason for Shutdown:

Temporary Bypass:

1. Will there be a temporary bypass system in place?

☐ Yes

☐ No

2. If yes, please provide details of the bypass system:

Safety and Precautions:

1. Has the area been properly barricaded and secured?

☐ Yes

☐ No

2. Will traffic flow be impacted?

☐ Yes

☐ No

If yes, please describe (attach approved traffic control plan from city):

3. Public Notification (If Applicable):

☐ Notice Sent to Residents/Businesses

Signs Posted

Other: _____

SELMA-KINGSBURG-FOWLER COUNTY SANITATION DISTRICT



Additional Comments or Special Instructions:

Submitted By:

Name: _____

Signature: _____

Date: MM/DD/YYYY _____

Approval:

Reviewed/Approved By:

Name: _____

Signature: _____

Date: MM/DD/YYYY _____

This form must be completed and submitted at least three (3) business days prior to the planned work. Please ensure all required fields are completed to obtain approval to proceed.

* Provide copies of any required City and County documentation for this project (e.g., encroachment permits).

** Submit pre- and post-CCTV inspections performed for this project to SKF. All inspections shall reference the appropriate District SMH numbers.