Design and Construction Standards

Included are the design and construction standards and specifications for sewer repair in the City of Pacifica.

SECTION IX.

GENERAL SPECIFICATIONS

SECTION IX-A - CONSTRUCTION STANDARDS

IX-A1. MATERIALS OF CONSTRUCTION

The sections that follow establish the specific material requirements for sewer pipe products, manholes, and other miscellaneous sewer appurtenances.

IX-A1-1. Sewer Pipe and Fittings

Unless otherwise approved by the Engineer, sewer pipe shall be limited to DIP, PVC pipe or HDPE pipe.

IX-A1-1.02. Ductile Iron Pipe ("DIP")

All DIP and fittings for sewer work shall conform to the requirements of ANSI Standards A21.50 and/or A21.51 as they apply to Ductile Iron Pipe. All main and trunk sewer DIP and fittings shall be of sufficient thickness to withstand the depth of cover shown on the plans. There are no special lining or coating requirements; however, bituminous material coated or concrete coated and/or lined pipe conforming to the requirements of ANSI Standard A21.4 may be used.

All DIP shall be shown on construction drawings by type and thickness class designations herein and as provide in these Specifications.

a. Bell and spigot joint assemblies shall conform to the requirements of Federal Specification WW-P-421c, Section 3.1.2 as it applies to TYPE II, Grades B or C pope.
b. Standardized mechanical joint assemblies shall conform to the applicable requirements of ANSI Standards for the pope specified and ANSI Standard A21.11.
c. Lead caulked joint assembles will not be permitted.
d. No joint will be required immediately outside of structure bases for all DIP installations.
e. DIP may be installed without use of foundation bedding material where trench bottom provides solid bearing for the full length of pope between bell holes, and where such installation otherwise meets the requirements of Specifications.

IX-A1-1.02. Polyvinyl Chloride Pipe ("PVC" Pipe)

PVC pipe and fittings for sizes 4-inch through 12-inch shall meet the requirements of ASTM D3034, SDR 26, cell classification 12454-B or 12454-C. PVC pipe and fittings for sizes 18-inch through 27-inch shall meet the requirements of ASTM F679, Wall T-I, cell classification 12454-C.

Bell and spigot joints shall meet the requirements of ASTM D3212 with integral bell push-on type elastomeric gasket joints. Field cut joints and connections to other piping materials shall be made with a mechanical compression joint composed of: a heavy duty synthetic rubber sealing component; two (2) Type 316 stainless steel clamps; Type 305 stainless steel nuts and bolts; and an adjustable stainless steel shear ring. Grouted connections to cast-in-place concrete manhole bases shall be made with a rubber ring water stop.

Pipe fittings having either spiral or concentric external reinforcing ribs will not be acceptable.

Installation of PVC pipe shall meet the requirements of ASTM D2321. All field cut PVC pipe shall be beveled and lubricated before joining.

IX-A1-1.03. ABS Wall Pipe

ABS solid wall pipe shall be allowed upon specific approval of the Engineer for four (4) inch residential side sewers. ABS pipe and fittings shall conform to ASTM D2751 with an SDR minimum value of 26.

IX-A1-1.04. HDPE Pipe and Fittings

HDPE pipe shall conform to ASTM F714-94, "Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter," or ASTM D3035-93 "Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter."

HDPE pipe shall have a Plastic Pipe Institute (PPI) material designation of PE 3408, a cell classification of PE 345434C per ASTM D3350, and have an established hydrostatic design basis of 1600 psi at 73 degrees F.

All HDPE fittings shall be manufactured from the same resin type, grade, and cell classification as the pipe, and shall be fully pressure rated.

IX-A1-2. Manholes

This section covers the materials of construction for standard, drop, shallow, and sampling/metering manholes. All manholes shall be constructed of precast reinforced concrete concentric cone sections with a minimum access opening of

twenty-four (24) inches. Eccentric cones may be used upon specific approval by the Engineer. Material specifications are as follows:

Manhole Component	Material Specification
Concrete	Materials, handling, finishing, and curing as specified in concrete Section I-D10-1. Manhole bottom shall be Class B concrete.
Precast Sections	Circular precast concrete, ASTM C478 except as modified. Vacuum tested.
Medium thickness	Six (6) inches.
Reinforcement	As indicated on Drawings S-2, S-3 and S-4.
Openings	Circular with surfaces grooved or roughened to improve mortar bond.
Mortar	Commercial strength non-shrink grout.
PVC Pipe Waterstop	1 inch Geargrip Adapter, polyisoprene material, 40 Durometer, ASTM 361.
Gaskets	
Mastic	Fed Spec SS-S-210.
Plastic	Fed Spec SS-S-00210.
Coal Tar Paint	Carboline "Bitumastic Super-Service Black," Porter "Tarmastic 103," Tnemec "450 Heavy Tnemecol," or equal.
Asphalt Varnish	Fed Spec TT-V-51.
Coatings	ASTM A 48, Class 35B or better with asphalt varnish coating applied at the foundry.
Manhole Frame and Covers	Phoenix Iron Works "P1090," Clay and Bailey "No. 2008BV," Neenah "R-1736S," or equal. Dimensions shown in Std Dwg SS-5.
Manhole Steps	Prohibited.
Brick Manholes	Not Allowed.

The manhole cover and its seat in the frame shall be machined so that the cover will sit evenly and firmly in the frame and shall be match-marked. Manhole lids shall be stamped "Sanitary Sewer" as shown on City Standard Drawings. Where the Engineer deems necessary for heightened protection of the public or its facilities, PAMREX hinged manhole frame and locking cover, or approved equal, may be required.

If castings arrive on the job without a foundry coating, one (1) coat of coal tar paint shall be applied. Before painting, all castings shall be thoroughly cleaned and properly supported. All loose rust shall be removed by wire brushing. Castings shall

not be handled until the paint is dry and hard. The coating shall not become brittle when cold or sticky when hot.

Rejection of a 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 twelve (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.

When manholes are constructed in natural or manmade drainage courses or flood channels, the manhole covers shall be watertight and shall be fitted with a composition gasket and bolted down with eight (8) stainless steel cap screws. To further alleviate infiltration, all interior concrete surfaces including the manhole shafts shall have at least one (1) coat of primer and two (2) coats of protective coating (Amercoat 64 primer, and Amercoat 320 protective coating, or approved equal). In other undeveloped areas above the high water level, bolt-down vandal-proof manhole covers shall be used.

IX-A1-3. Saddle Fittings

Saddle fittings used for connecting new lateral sewers to existing mains shall be wye branched and shall be fabricated of a material approved by the Engineer. The wye saddle shall consist of a flange component necessary for preventing the fitting from protruding into the main.

IX-A2. INSTALLATION OF SEWER PIPE AND APPURTENANCES

IX-A2-1. Pipe and Fittings

Sewer pipe laying shall proceed upgrade with the spigot ends of bell and spigot pipe pointing in the direction of flow.

Sewer pipe entering and leaving manholes or other structures shall have a joint installed not less than twenty-four (24) inches but not more than four (4) feet from the manhole base.

In all cases, flexibility of joints in or at the manhole base shall be preserved to prevent damage to the pipe by differential settlement.

IX-A2-2 Manholes

Standard, drop, and shallow manholes shall be constructed in accordance with the City Standard Drawings. All materials for precast manhole sections shall conform to the requirements set forth in Section IX-A1-2.

Manholes shall not be located in easements with steep slopes. However, when manhole is required under special circumstances to be installed in steep slopes, the standard, drop, and shallow manholes shown in City Standard Drawings may be installed subject to the approval of the Engineer. Use of manholes in steep slopes shall be reviewed by the Engineer on a case-by-case basis.

IX-A2-2.01. Assembly of Precast Sections

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 or mastic sealing gasket. If the 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 mastic is used, it shall be first approved by the Inspector and shall be placed to provide a tight joint.

The top cone section shall be set at such an elevation that not more eighteen (18) inches height of entrance or manhole throat is present with the manhole cover at finish grade.

IX-A2-2.02. Manhole Base and Channels

Sewer lines shall first be laid as a whole pipe through manholes. After the manhole floor and walls have been set, the top half of the piping within the manhole shall be carefully cut off to within one (1) inch longitudinally of the inside wall of the pre-cast section and the sides mortared to form a smooth channel as indicated on City Standard Drawings unless otherwise shown on the Improvement Plans or directed by the Engineer.

Unless otherwise required by the Engineer, the width of the opening at the top of base block shall be the inside diameter of the pipes in the manhole.

In the manholes where the pipe cannot be laid through, the pipes shall be joined by smooth curves, worked to conform with the lower halves of the pipe.

In angle point manholes and in junction manholes, the pipes shall be joined by smooth curves, warped to conform with the lower halves of the pipe. In all cases, the upper portion of the manhole channel from the midpoint of the pipes in the manhole to the top of the base block shall be constructed vertically.

The manhole channel shall be completed in the original pour, unless otherwise directed by the Engineer.

IX-A2-2.03. Adjustments to Street Grade During Construction

The Contractor shall set the transition section after the finished street elevation is known. The Contractor shall coordinate the fitting of entrance sections, frames, 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.

Frames and covers shall be installed on top of manholes to positively prevent all infiltration of surface or ground water into manholes. Frames shall be set in a bed of mortar with the mortar carried over the flange of the ring as shown on City Standard Drawings. On sloping finish grade, frames and covers shall be installed as shown on City Standard Drawings unless otherwise shown on the Improvement Plans or directed by the Engineer..

Manholes located in unimproved easements or undeveloped areas not subject to vehicular traffic shall be provided with wire mesh reinforced concrete encasement. In addition, a marker post shall be erected not more than four (4) feet from the center of the manhole. The post shall be provided with the necessary identification marks as required by the Engineer.

IX-A2-2.04. Adjustment to Street Grade After Construction

The Contractor shall be required to make any adjustments in the manhole cover sections during the one-year guarantee period if there is additional paving work. This work consists of removing and replacing the manhole frame and the grade rings. Adjustments shall be accomplished by excavating as necessary, lifting off the frame and grade rings as directed, thoroughly cleaning the frame's bottom bearing surface, coating it with asphalt paint similar to the original coating, removing the old mortar from the manhole cone and grade rings, and replacing the existing frame and grade rings to the new grade as specified for new manholes.

IX-A2-2.05. Manhole Collar

All manhole collars shall be poured only after the frame has been centered over the manhole shaft. Unless otherwise specified by the Engineer, in unpaved areas a concrete collar shall be poured around the frame and shaft so as to securely anchor the frame to the shaft. In paved areas, concrete shall be poured around the manhole frame and shaft in lieu of rock base to a point two (2) inches below the rim unless otherwise required by the City or other public agency having jurisdiction.

IX-A2-2.06. Manholes with Drop Connections

When a drop connection is shown on the Improvement Plans, it shall be included as part of the manhole construction. The drop shall be made with approved fittings outside the manhole shaft. The lower pipe shall be constructed into the base block by the channeling procedures, as detailed in Section IX-A2-2.02. The lower fittings shall be encased in CDF.

After the manhole shaft is in place, the upper pipe run shall be constructed through the precast wall (flush with the inner wall). The space between the pipe and the precast section shall be mortared to a watertight condition. This pipe and drop shall then be encased in concrete to the point where the upstream sewer trench is of normal width and depth.

IX-A2-2.07. Pipe Stubout on Future Connections

Lateral sewer and sewer main connection stubouts shall be provided in manholes where shown on the Improvement Plans. The connection stubouts shall be placed in the manhole base and protrude one (1) foot outside the base. All stubouts shall be furnished with a watertight plug capable of withstanding all internal or external pressures without leakage. All plugs shall be adequately braced to prevent blowoffs.

IX-A2-2.08. Flexible Pipe Connections to Manholes

All PVC lateral sewers and all PVC sewer mains entering 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.

IX-A2-2.09. Manhole Protection

During construction, particular care must be taken to protect the manhole from damage and to keep rock, dirt, and debris from getting into the sewer. After the sewer pipe through the manhole has been broken out and channel finished, a close fitting board cover shall be placed over channel and covered with building paper. A temporary metal plate cover, of adequate strength, close fitting, and well secured, shall be placed over the manhole opening until the frame and cover are permanently installed. Manholes in undeveloped areas, which are above finish grade as required, shall be secured with wire mesh and concrete.

IX-A2-3. Cleanouts

Cleanouts shall consist of a wye branch fitting of the same diameter as the side sewer and installed so the open end of the wye branch is directed to facilitate cleaning. The riser from the wye branch shall be brought to finish grade.

IX-A2-4. Lateral Sewers

The Contractor shall install only those lateral sewers shown on the Improvement Plans or called for in writing by the Engineer. Workmanship shall be equal to that specified for the street sewers. No lateral sewer shall be covered until the Engineer has recorded its location.

The Contractor shall mark the location of all lateral sewers with the letter "S" at least two (2) inches (50 mm) high engraved into the curb at the time of curb installation. For laterals in vacant lots or where no concrete curbs exist, Contractor shall furnish and place 2" x 2" x 12" 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.

Unless otherwise shown on the Improvement Plans, lateral sewers shall be installed from the street sewer to the lot line in accordance with the City Standard Drawings unless otherwise shown on the Improvement Plans or directed by the Engineer. and plugged at the lot line in preparation for the leakage test. Laterals shall consist of factory-made standard wye branch or tee fittings with ends to suit the street sewer pipe, tilted 30 degrees 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 embedded on all sides and shall be plugged with a watertight plug until the side sewer is constructed.

IX-A2-4.01. Deep Lateral Sewers

Lateral sewers shall not slope more steeply than 45 degrees. Lateral sewers sloping more than 30 degrees, but less than 45 degrees, shall be cradled in concrete. Lateral sewers sloping 30 degrees or less shall be bedded and laid to the same standards as street sewers, without need for cradling in concrete. Vertical chimneys shall not be allowed.

IX-A2-4.02. Backflow Protection

Where the Contractor's work includes backflow devices on private property, as specifically called for on the Improvement Plans, such devices are to be placed in well-drained locations near the premises being protected, with unobstructed access for observation and repair.

IX-A2-4.03. Abandonment

Lateral sewers to be temporarily abandoned shall be plugged at property line or as directed by the Engineer. Lateral sewers to be permanently abandoned shall be plugged at the sewer main.

IX-A3. CONNECTIONS WITH EXISTING CITY FACILITIES

General locations where new sewer mains and lateral sewers are to connect to existing sewer mains shall be shown on the Improvement Plans. It shall be the responsibility of the Contractor to determine the exact location and depth of the existing sewers prior to the installation of any sewer pipe.

IX-A3-1. Connection of New Sewer Main to Existing Sewer Facilities

Connection of new sewer mains to existing lines shall be made at existing manholes or by constructing a new manhole over the point of connection or by removing an existing rodding inlet or plug.

Where the connection is to be made into an existing manhole, the Contractor shall make the connection by breaking through the manhole base, cutting a rough channel through the manhole shelf to the existing channel, installing the new pipe with a water stop if PVC sewer, finishing a new channel within the manhole, and repairing any damage to the structure. Where the connection is to be made by constructing a new manhole on an existing sewer, the manhole and new connection shall conform to details as shown in City Standard Drawings unless otherwise shown on the Improvement Plans or directed by the Engineer. The existing sewer shall not be broken until immediately before the cleaning and flushing operation commences.

Where the connection is to be made at a removed rodding inlet or plug, an air test fitting shall be installed at the connection of new and existing pipelines installed in preparation for testing as directed by the Engineer.

Approved mechanical expanding type temporary plugs shall be installed in each of the following cases.

1. If there is an existing manhole at the beginning of a new system, a plug shall be installed in the new pipe at the existing manhole and another plug installed on the downstream side of the first manhole upstream in the new system pipeline.

2. If the Contractor constructs a new manhole at the beginning of a new system and an existing pipe is in the new manhole, a plug shall be installed on the downstream sides of the first two (2) manholes upstream from the existing manhole.

3. If the new system begins at an existing rodding inlet or stub, a plug shall be installed on the downstream sides of the first (2) two manholes upstream from the beginning of the new system.

4. Temporary plugs shall be installed in the open ends of sewer lines while adjusting, repairing, or pouring the top blocks on rodding inlets or similar structures.

All temporary plugs shall be installed, secured, and removed in the presence of the Inspector. Temporary plugs shall remain intact until immediately prior to the beginning of the cleaning and flushing operation. Premature removal of the plug may result in the Contractor being required to clean existing downstream sewer mains. In case of neglect or refusal by the Contractor to perform such cleaning, the District shall execute the work and bill the Contractor or the Contractor's surety for costs incurred.

IX-A3-2. Connection of New Lateral Sewer to Existing Sewer Facilities

Where wyes or tees were previously installed on the main sewer, the lateral sewer shall be connected to the wye or tee as provided for the particular connection. Lateral connections to existing manholes shall be as detailed on City Standard Drawings unless otherwise shown on the Improvement Plans or directed by the Engineer.

New wye branch or tee fittings shall be installed when a connection shall be made to an existing sewer main without previously installed connection fittings. A new connection fitting shall be of the same size and type of material as the main line. The Contractor shall be responsible for all necessary bypass pumping to maintain sewer service while connecting fittings and laterals are installed. All Work shall conform to City Standard Drawings unless otherwise shown on the Improvement Plans or directed by the Engineer.

Tapping and saddle installation shall only be used upon approval of the Engineer for cases where disruption of existing sewer service is unavoidable. Tapping and saddles shall be tap-tite or approved equal. Tapping and saddle connections shall be made as follows:

Excavation to permit a minimum of three (3) inches of concrete under the main and six (6) inches on the sides shall be made. The exterior of the sewer main shall then be cleaned thoroughly around its entire outside circumference, and twelve (12) inches each way measured from the center of the saddle. An opening shall then be cut in the barrel of the main sewer pipe and carefully trimmed to permit a snug fit for the spigot end of the saddle. Care shall be taken that no fragments of pipe are allowed to remain in the main sewer. The saddle shall then be installed as shown on City Standard Drawings unless otherwise shown on the Improvement Plans or directed by the Engineer. After this operation is complete and before any pipe is connected to the saddle, the Work must be inspected and approved by the Inspector. Following this approval, concrete shall be poured into the excavated area around the pipe to completely encase the main to the lip of the saddle bell.

IX-A3-3. Joining Pipes of Different Materials

When pipes of different materials are joined together, the joint shall be made as directed by the Engineer. Joining pipes of different materials between manholes shall not be permitted. The same type of pipe material shall be used between manholes.

IX-A4. TESTING, CLEANING, AND TELEVISION INSPECTION

Testing, cleaning, and television inspection requirements shall be as follows. Upon successful completion of testing, access to manholes must be maintained at all times.

IX-A4-1. Testing

All completed sewer mains, force mains, and lateral sewers shall be tested by and at the expense of the Contractor in the Inspector's presence prior to acceptance of Work and prior to connection to the house sewer. The conditions under which testing shall be performed shall be as follows:

1. After all proposed Work, including mains, manholes, laterals, and connections, has been completed.
2. After the installation of all other underground utilities.
3. In improved areas, after the roadway base rock has been placed and compacted.
4. In unimproved areas, after the backfill is satisfactorily compacted.
5. After access to all manholes has been provided.

IX-A4-2. Air Testing

Unless otherwise required, all sewer testing shall be performed by the air testing procedure, which is described as follows:

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 five (5) psi from a source regulated by an adjustable pressure control valve and measured by a sensitive pressure gauge calibrated from zero (0) to no more than ten (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 1.0 psig from at least 3.5 psig. 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.

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 ground water, determine the backpressure due to ground water submergence and increase all gauge pressures in the test by that amount. If a test pressure greater than eight (8) psig results, air testing shall not be used, and exfiltration testing will be required.

IX-A4-2.01. Air Loss Time Tables

Tables 1 and 2 contain the specified minimum times required for a 1.0 psig pressure drop from a starting pressure of at least 3.5 psig. Table 1 shall be used for DIP sewers. Table 2 shall be used for PVC sewers.

TABLE 1. DIP SEWER

MINIMUM TIME (MINUTES) FOR A 1.0 PSIG PRESSURE DROP FOR SIZE AND LENGTH OF SEWER

Pipe Diameter, Inches	Length of Line, ft.							
	0 to 100	101 to 150	151 to 200	201 to 250	251 to 300	301 to 350	351 to 400	401 to 500
6	1	1-1/4	1-1/2	2	2-1/4	2-1/2	2-3/4	3-1/2
8	1-3/4	2	2-1/2	3	3-3/4	4-1/4	5	6
10	2	2-3/4	3-1/2	4-1/4	4-3/4	5-1/4	6	7-1/2
12	2-1/4	3	4	4-3/4	5-1/2	6-1/4	7-1/4	9
15	3	3-3/4	4-3/4	5-1/2	6-1/4	7-1/4	8-1/2	10-1/2
18	3-3/4	4-1/2	5-1/4	6	7-1/4	8-1/2	9-1/2	12

TABLE 2. PVC SEWER

MINIMUM TIME (MINUTES-SECONDS) FOR A 1.0 PSIG PRESSURE DROP FOR SIZE AND LENGTH OF SEWER

Pipe Dia., In.			Min Time			Length for Min Time, ft.			Time for Longer Length sec.		
4	3:46	597	.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:3
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:4
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:1
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:5
	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:4

IX-A4-3. Air Test Failure

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. To locate the section of sewer that fails the air test, the various methods that may be used include remote cameras, adjustable low pressure air devices, or the filling of the line with water by plugging the inlet of the downstream manhole and maintaining at least a two (2) foot (0.6 m) 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 in order to meet the test requirements. All defective portions shall be exposed and repaired or replaced, including defective bedding, to the satisfaction of the Inspector.

IX-A4-4. Water Exfiltration Test

In special cases, a water exfiltration test may be required as described below. 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 point four (4) feet (1.2 m) above the invert at the center of the upper manhole, or in the presence of ground water, four (4) feet (1.2 m) above the average adjacent ground water level. The allowable leak shall be computed as follows over a period of at least a one-hour test:

E = 0.00002 LDEH
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 ground water present, upper manhole water surface and ground water at lower manhole).

IX-A4-5. Testing Deflection of PVC Sewer Pipe

The inside diameter of an installed section of PVC sewer pipe shall not be allowed to deflect more than five (5) percent. All PVC pipe main sewers shall be checked by means of a pipe deflection gauge. The pipe deflection shall be checked in the presence of the Inspector after the placement of all trench backfill and prior to surface restoration.

The pipe deflection gauge shall be fabricated to permit passage through installed sections of pipelines within the specified maximum five (5) percent deflection of the base inside diameter of the PVC pipe. Any section(s) of plastic pipe that does not permit deflection gauge passage will not be accepted and said section(s) shall be properly repaired or replaced and rechecked as directed by the Engineer.

Re-rounding through the use of a vibratory machine will not be permitted.

IX-A4-6. Testing of Manholes

- The test shall be conducted prior to paving.
- All lift holes shall be filled with non-shrink grout.
- All pipe inlets and outlets in the manhole shall be plugged sufficiently secure to hold against vacuum pressure.
- The rubberized test plate shall be placed on the cone after potential leaks on the top of the cone have been sealed.

- A vacuum of ten (10) inches of mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop to nine (9) inches. Following are the minimum test times for respective manhole barrel inside diameters:

Test Times	Inside Diameter
60 seconds	48-inch
75 seconds	60-inch
90 seconds	72-inch

If a manhole fails the test, repairs shall be made with non-shrink grout. Retesting shall proceed until passing test is conducted.

IX-A4-7. Cleaning

Upon satisfactory completion of the testing 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 finished in a thoroughly first-class manner.

A hydraulically propelled ball shall be used to clean the entire system of new sewers. Those sections, which cannot be visually inspected by mirroring between manholes, will be cleaned only in the presence of an Inspector. Prior to the beginning of this work, excessive amounts of debris shall be removed by the Contractor.

Solid material washed into the lowest manhole(s) shall be removed from the system. The standard sand trap between the new work and the District system shall be removed only after all phases of the work have been approved after final inspection.

IX-A4-8. Television Inspection

Upon completion of sewer cleaning by the Contractor, all sewer main lines shall be television inspected by the City prior to acceptance. Prior to TV inspection, the Contractor shall thread ¼-inch nylon rope from structure to structure. The cost of television inspection shall be included in the sewer inspection fees per City Code and collected in advance. If it is necessary to television inspect sewer lines more than once, additional fees shall be collected in advance.

IX-A5. ABANDONMENT OF SANITARY MAIN AND MANHOLES

This item shall govern the abandonment of sanitary sewer mains and manholes required on the plans to be abandoned. Generally, sanitary sewers over twelve inches (12") in diameter and all abandoned sanitary sewer manholes are to be filled with a cementious low strength material. The sanitary sewer facility shall be abandoned in accordance with the specifications herein outlined and in conformity with the limits shown on the plans. Abandoning of sanitary sewer lines and manholes shall not occur until all existing sanitary sewer services have been transferred to another line and directed by the Engineer.

IX-A5-1. Materials

Materials for abandonment of sanitary sewer pipe and manholes shall be:

Sanitary Sewer Pipe: A cement based grout shall be used to fill the void of the existing sanitary sewer main. The grouting material must have a strength of at least 100 PSI and shall have flow characteristics appropriate for filling a sanitary sewer. The grout mix designed and method of installation shall be approved by the Engineer prior to beginning operation.

Manholes: The sanitary sewer manhole shall be filled to the top of the remaining concrete structure with the same material used to abandon the sanitary sewer line. **862.3**

IX-A5-2 Construction

Abandonment of sanitary sewer lines shall be accomplished by installing the grout material with sufficient pressure and in numerous locations. The method of installation shall be able to meet the requirement of completely filling the existing sanitary sewer line and any voids adjacent to the sanitary sewer line. The method shall adequately provide for the removal and legal disposal of the existing sewer materials in the system. The method shall provide for the release of air. When intermediate points are required to be constructed for the abandonment of the system, they shall be a part of the abandonment project process.

Pipes smaller than fifteen inches (15") in diameter, are generally not required to be grouted unless required by the plans. Pipes to be abandoned shall be grouted only if required by the plans and payment as per these specifications is provided. The concrete structure of the manhole shall be removed to a depth of two feet (2') under proposed subgrade or finished ground elevation.

IX-A6. TRENCHING AND BACKFILLING

All trenching and backfilling shall conform to the provisions in Section 19, "Earthwork", of the Standard Specifications and these Specifications and Improvement Plans.

The Contractor will notify adjacent property owners of the work schedule and necessary access restrictions.

IX-A6-1 Trenching

In general a trench is defined as an excavation in which the depth is greater than the width of the bottom of the excavation. Trench shall include excavation for appurtenant structures including but not limited to, manholes, pipes, transition structures, junction structures, vaults, valve boxes, catch basins, trust blocks, and boring pits.

The Contractor shall verify the location of existing underground utilities before trenching.

Existing Portland cement concrete pavement and bituminous pavement to be removed for installation of a pipeline before being broken and removed, shall be neatly sawn along the edges of the area to be removed to a depth of one-and-one-half (1-1/2) inches, with a concrete pavement saw. This shall be in straight lines parallel to the trench.

Except by permission of the Engineer, the maximum length of open trench shall be 200 feet or the distance necessary to accommodate the amount of pipe installed in a single day, whichever is the greater. The distance is the collective length at any location, including open excavation, pipe laying and appurtenant construction and backfill which has not been temporarily resurfaced.

No excavations shall remain open longer than is necessary to perform the work. If, in the opinion of the Engineer, the Contractor is not pursuing the work with diligence, the Engineer may require an excavation to be backfilled and protected with temporary paving or covered with steel traffic plates, even though that particular installation is not complete. No additional payment will be made for this additional work.

At the close of work each day, all open trenches shall be backfilled or covered with steel traffic plates and full access to all roads and driveways shall be provided.

The trench shall be excavated to a depth required to allow for placement of bedding material.

Where the bottom of the trench at sub-grade is found to be unstable or to include ashes, cinders, all types of refuse, vegetable or other organic material or large pieces or fragments of inorganic material which in the judgement of the Engineer should be removed, the Contractor shall excavate and remove such unsuitable material to the width and depth ordered by the Engineer. Before the pipe is laid, the sub-grade shall be made by backfilling and compacting two (2) inch layers with material as specified on the typical trench section detail on the plans.

When either ground water or surface run-off is encountered, the Contractor shall furnish, install, maintain, and operate all necessary pumps, materials and equipment to keep excavation reasonably free from water until the laying and jointing of the pipe, pouring of concrete and placing of bedding material has been completed, inspected and approved, and all danger of flotation and other damage is removed. Water pumped from the trench excavation shall be disposed of in a manner subject to the approval of the Engineer.

Excavated material from trenches located within paved areas shall be immediately loaded into trucks and hauled off and disposed of outside the public right-of-way. No excavated material shall be placed or stored within the public right-of-way unless otherwise allowed by the Engineer.

Surplus excavated material shall become the property of the Contractor and shall be disposed of outside the street right-of-way and water, sewer, or storm drain easements in accordance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right-of-Way," of the Standard Specifications. All excavated material shall be removed from the project site concurrent with the excavation operations. Hydrants under pressure, valve pit covers, valve boxes, curb stop boxes, fire and police call boxes, or other utility controls shall be left unobstructed and accessible until the work is completed. Gutters and drainage channels shall be kept clear at all tunes. All excavated material shall be piled in a manner which will not endanger the work and which will avoid obstructing sidewalks and driveways.

Excavation for pipes shall be by open trench unless otherwise specified, or shown on the plans, or permitted by the Engineer. No excavated material will be allowed to be stockpiled overnight in or adjacent to public right-of-ways. .

The Contractor shall make his own arrangements for a staging area for the temporary stockpiling of material and equipment storage. The Contractor will not be allowed to use public streets or property for such purpose.

Prior to using any private property, the Contractor shall submit to the Engineer a written release from the property owner absolving the City of any and all responsibility in connection with the use of such property in accordance with Section 7-1.13 "Disposal of Material Outside the Highway Right of Way" of Standard Specifications.

IX-A6-1.01 Trench Plates:

Trench Plates shall be used for temporary cover of trenches and other excavations.

When the backfilling of trenches and excavations cannot be completed in the same day within a paved street section or within the concrete curb and gutter and sidewalk area, trench plates shall be required and the following conditions shall apply:

- The plates shall be of steel construction capable of supporting H20 loading.
- The plates shall have a skid resistant surface
- The plates must extend beyond the edge of trench wall to adequately support the traffic loads on it. In no case shall the plates extend less than twelve (12) inches beyond the trench wall.
- Each plate must be fully supported around the perimeter to prevent wobbling or rocking.
- The plates shall be secured to prevent any movement.
- Trenches and excavations shall be adequately shored and braced to withstand highway traffic loads.
- Temporary paving or cold-mix asphalt concrete (cutback) shall be placed and continuously maintained around all outside edges of the trench plates until removal of the plates.

IX-A6-2 Backfilling

Backfill material and compaction shall conform to requirements shown on the Trench Sections as shown on the Improvement Plans and as directed by Engineer. Backfill shall be replaced around exposed existing utilities to the same conditions as existed prior to excavation.

Bedding material shall provide a uniform and continuous bearing and support for the pipe at every point between bell holes or joints unless otherwise shown on the plans, except that it will be permissible to disturb and otherwise damage the finished surface over a maximum length of eighteen inches near the middle of each length of pipe by the withdrawal of pipe slings or other lifting tackle. Any part of the bottom of the trench excavated below the specified grade shall be backfilled with approved material thoroughly compacted as directed by the Engineer. The finished grade of the bedding material shall be prepared accurately by means of hand tools.

Permanent pavement shall be placed to the finish grade on the same work day temporary pavement is removed. Testing, backfilling, compacting to the required relative compaction, and placing of temporary pavement shall be performed immediately after placing pipe.

IX-A6-2.01 Mechanically Compacted Backfill

Backfill shall be mechanically compacted by means of tamping rollers, sheepsfoot rollers, pneumatic tire roller, vibrating rollers, or other mechanical tampers. All such equipment shall be of a size and type approved by the Engineer. Impact-type pavement breakers (stampers) will not be permitted.

Permission to use specific compaction equipment shall not be construed as guaranteeing or implying that the use of such equipment will not result in damage to adjacent ground, existing improvements, or improvements installed. The Contractor shall make its own determination in this regard.

Material for mechanically compacted backfill shall be placed in lifts which, prior to compaction, shall not exceed 12 inches in thickness. The Contractor is responsible to achieve the required compaction in such a manner that the pipe is not damaged.

In the pipe zone where pipe embedment material is specified for trench backfill material, jetting or jetting and hand-directed mechanical compaction is required, with the maximum thickness of each layer of backfill not exceeding 6 inches before compaction.

Mechanically compacted backfill shall be placed in horizontal layers of thickness (not exceeding those specified above) compatible to the material being placed and the type of equipment being used. Each layer shall be evenly spread, moistened (or dried, if necessary) and then tampered or rolled until the specified relative compaction has been attained.

Testing for relative compaction shall be performed by the City as outlined in Section 6-3 "Testing" in the Standard Specifications. At least three tests will be performed for each run of new pipe construction between manholes. All testing is performed at Contractor's expense.

Relative compaction of trench backfill materials shall conform to the requirements shown on the Typical Trench Section" as shown on the plans and shall be done concurrently with pipe installation and placement of backfill materials.

IX-A6-2.02 Backfill Material

IX-A6-2.02.1 Intermediate and Final Backfill Material

General

Intermediate and Final Backfill Material shall be Aggregate base Class 2 and shall conform to the provisions of Section 26, "Aggregate Bases", of the Caltrans Standard Specifications.

Requirements of the Special Provisions and other portions of the Contract Documents apply to the work of this Section as fully as though repeated herein.

A Certificate of Compliance shall be required for the aggregate provided.

See Special Conditions as they relate to work conditions.

Provide a minimum of 48 hours notice to Owner before initiating work.

At all times, keep work open to inspection by Owner.

Aggregate Products

Provide materials as shown herein, and as described in Section 26 of the Caltrans Standard Specifications.

MATERIAL SIZE

1-1/2" (37.5 mm) maximum			¾" (19 mm) maximum	
Sieve Size	**Operating Range**	**Contract Compliance**	**Operating Range**	**Contract Compliance**
2" (50.0 mm)	100	100	—	—
1-1/2"(37.5 mm)	90–00	87-100	—	—
1"(25.0 mm)	—	—	100	100
¾" (19.0 mm)	50–5	45-90	90-100	87-100
3/16"(4.75 mm)	25–5	20-50	35-60	30-65
600 µm	10–5	6-29	10-30	5-35
75 µm	2–9	0–2	2-9	0-12

QUALITY REQUIREMENTS

Tests	Operating Range	Contract Compliance
Resistance (R-value)	—	78 min
Sand Equivalent	25 min.	22 mi.
Durability Index	—	35 min

*See Section 26-1.02A of the Caltrans Standard Specifications.

Placement of Aggregate

At the time aggregate base is spread it shall have a moisture content sufficient to obtain the required compaction. Aggregate shall be placed in 6" (15cm) lifts, to the thickness shown on the plans.

The relative compaction of each layer of compacted base material shall not be less than 95 percent.

IX-A6-2.02.2 Initial Backfill and Pipe Bedding Material

Initial Backfill and Pipe Bedding Material shall meet the following grading requirements. A minimum of one gradation report shall be submitted per day for material delivered to the site or as directed by the Engineer.

A. Sieve Analysis – CTM 202

Sieve Size	Percentage Passing
1/2"	100
3/8"	99
#4	40
#8	8
#16	2
#30	1
#50	1
#100	0

B. Sand Equivalent – CTM 217
Sand Equivalent = 97

IX-A7. SHORING

The Contractor shall furnish and install sufficient shoring, sheeting, and bracing to insure the safety of workmen and the public, protect the work, and proteck existing facilities. Attention is directed to Section 5-1.02A, "Trench Excavation Safety Plans," and Section 7-1.01E, "Trench Safety," of the Standard Specifications, and to the applicable provisions of Sections 6422, 6423, and 6424 of the Labor Code of the State of California and these Specifications. The current CAL/OSHA trench shoring regulations shall be used as a guide for minimum shoring requirements.

The Contractor shall be required to provide drawings and/or calculations by a registered engineer to the Engineer a minimum of five (5) working days prior to

beginning excavation for specially designed bracing and shoring of an excavation where required by CAL/OSHA or the Contractor's Trench Safety Plan

When close sheeting is required, it shall be so driven so as to prevent adjacent soil from entering the trench either below or through such sheeting. Where sheeting and bracing are used, the trench width shall be increased accordingly.

The Engineer reserves the right to order the sheeting driven to the full depth of the trench or to such additional depths as may be required for the protection of the work. Where the soil in the lower limits of a trench has the necessary stability, the Engineer, at his/her discretion, may permit the Contractor to stop the driving of sheeting at some designated elevation above the trench bottom. However, the granting of permission by the Engineer shall not relieve the Contractor in any degree from his full responsibility for the work.

Sheeting and bracing which have been ordered left in place must be removed for a distance of three (3) feet below the established street grade or the existing surface of the street, whichever is lower. Trench bracing, except that which must be left in place, may be removed when the backfilling has reached the respective levels of such bracing. Sheeting, except that which has been left in place, may be removed after the backfilling has been completed or has been brought up to such an elevation as to permit its safe removal. Sheeting and bracing may be removed before jetting the trench, but only in such manner as will insure the adequate protection of the completed structures and adjacent underground or surface structures, and prevent the disturbance of the adjacent ground. If the trench shields or any other type of sheeting system is needed under current CAL-OSHA regulations, the Engineer reserves the right to require using and installing the trench shields or other type of shoring system for the protection and safety of the workers.

IX-A8. PAVEMENT REPLACEMENT AND TEMPORARY PAVEMENT

Pavement replacement and temporary pavement shall be "TYPE A" and shall conform to the provisions in Section 39 "Asphalt Concrete" of the Standard Specifications, Standard Details and these Specifications.

Asphalt concrete shall be produced from quality virgin materials. The spreading and compacting requirements in Sections 39-6.02, "Spreading," and 39-6.03, "Compacting," of the Standard Specifications will not apply.

The asphalt concrete shall conform to the following requirements:

- Asphalt concrete shall be produced at a central mixing plant.
- Aggregate shall conform to the 1/2 inch maximum, medium grading specified in Section 39-2.02, "Aggregate," of the Standard Specifications.

- The amount of asphalt binder to be mixed with the aggregate shall be between 4 percent and 7 percent by weight of the dry aggregate.

- Spreading and compacting shall be performed by methods that will produce an asphalt concrete surfacing of uniform smoothness, texture, and density.

- Asphalt concrete shall be compacted to relative compaction of not less than 95 percent.

IX-A8-1 Temporary Pavement

Temporary pavement 1" thick shall be placed in all trenches over compacted untreated base which is placed to 1" below finish pavement in the trench area at all locations where existing pavement has been removed and final pavement replacement is not done.

Temporary pavement and base in all trenches shall be removed before final pavement replacement.

Temporary Pavement shall be done as shown on the plans or as directed by the Engineer as incidental work and no additional payment will be made therefore.

IX-A8-2 Pavement Replacement

All asphalt concrete used for pavement replacement shall be Type "A" with 1/2" maximum medium aggregate grading, conforming to Section 39 of the Standard Specifications.

All aggregate base used in connection with replacement of flexible pavement shall be Class 2, 3/4-inch maximum conforming to Section 26 of the Standard Specifications.

After compaction of trench backfill has been approved by the City Engineer, the Contractor shall square the edges of the existing pavement and apply paint binder in accordance with Section 39-4 of the Standard Specifications. Paint binder shall be applied to a distance of 3 inches outside the sawcut edge of asphalt. Asphalt Concrete shall then be installed to the depth and width shown on the plans. The finished surface shall be true to the existing grade and free from open cracks or joints. Asphalt concrete shall be compacted flush to existing grades and not "humped".

When the total compacted thickness of asphalt concrete is 3 inches or less, the asphalt concrete shall be spread and compacted in one layer unless otherwise shown on the Improvement Plans or directed by the Engineer. All other asphalt concrete thicker than 3 inches shall be spread and compacted in layers that are no more than 2 inches compacted thickness.

IX-A9. PAVEMENT DELINEATION

IX-A9-1 Thermoplastic Traffic Strips and Pavement Markings

Thermoplastic traffic stripes and pavement markings shall conform to Sections 84-1 and 84-2 of the Standard Specifications. The Contractor will perform the required layout for all stripes and markings and shall be considered as incidental work with no additional compensation. All stripes and markings shall conform to the Caltrans Standard Drawings.

IX-A9-2 Pavement Markers

Pavement markers shall conform to Section 85 of the Standard Specifications and shall be installed in accordance with Caltrans Standard Drawings. The Contractor will perform the required layout for all pavement markers and shall be considered as incidental work with no additional compensation.

IX-A9-3 Temporary Reflective Overlay Pavement Markers

The lane lines, center lines, stop bars and pedestrian crossings shall be delineated with temporary reflective raised pavement markers placed at longitudinal intervals of not more than 24 feet apart after paving. Temporary pavement markers shall be the same color as the lane line center line, stop bars, pedestrian crossings and pavement markers to be replaced. Temporary reflective raised pavement markers shall be the following:

Temporary overlay markers (Types Y and W) manufactured by Davidson Plastics, 18726 East Valley Highway, Kent, Washington 98032, telephone (206) 251-8140, or equal.

Temporary pavement makers shall be placed in accordance with the manufacturer's instructions.

Temporary lane line or center line delineation consisting entirely of temporary pavement markers placed on longitudinal intervals of not more than 24 feet, shall be maintained by the Contractor until 14 days after the acceptance of the paving unless removal prior to that time is approved by the Engineer.

All temporary reflective overlay pavement markers shall be removed when, as determined by the Engineer, the temporary lane line and center line delineation conflicts with the permanent pavement delineation or with a new traffic pattern and is no longer required for the direction of public traffic.

Layout shall be performed by the Contractor and shall be considered incidental work with no additional compensation.

SECTION X.

TECHNICAL SPECIFICATIONS

1. **Manholes**

General:

Manholes shall conform to Sections IX-A1-2, IX-A2-2 of these Specifications.

Payment:

Manholes installations, satisfactorily done, complete in place as shown on the plans or as directed by the Engineer, including all work, labor, materials, equipment, tools and incidentals necessary to complete the work shall be paid for at the unit price bid under the Bid Item "Manholes".

2. **10-Inch Sanitary Sewer**

General:

10-Inch Sanitary Sewer shall conform to Sections IX-A1-1, IX-A2-1 and IX-A3 of these Specifications. 10-Inch Sanitary Sewer shall be SDR-26 Polyvinyl Chloride Pipe unless otherwise shown on the plans or as directed by the Engineer.

Payment:

10-Inch Sanitary Sewer installations, satisfactorily done, complete in place as shown on the plans or as directed by the Engineer, including all work, labor, materials, equipment, tools and incidentals necessary to complete the work shall be paid for at the unit price bid under the Bid Item "10-Inch Sanitary Sewer".

3. **Abandon Existing 6-Inch Sanitary Sewer**

General:

Abandon Existing 6-Inch Sanitary Sewer shall conform to Section IX-5 of these Specifications.

Payment:

Abandon Existing 6-Inch Sanitary Sewer, satisfactorily done, complete in place as shown on the plans or as directed by the Engineer, including all

work, labor, materials, equipment, tools and incidentals necessary to complete the work shall be paid for at the unit price bid under the Bid Item "Abandon Existing 6-Inch Sanitary Sewer".

4. **Manhole (Tie To Existing Line)**

General:

Manhole (Tie To Existing Line) shall conform to Sections IX-A1, IX-A2 and IX-A3 of these Specifications, Improvement Plans and as directed by the Engineer.

Payment:

Manhole (Tie To Existing Line) satisfactorily done, complete in place as shown on the plans or as directed by the Engineer, including all work, labor, materials, equipment, tools and incidentals necessary to complete the work shall be paid for at the unit price bid under the Bid Item "Manhole (Tie To Existing Line)".

5. **Reconnect Existing Lateral**

General:

Reconnect Existing Lateral shall conform to Sections IX-A1, IX-A2 and IX-A3 of these Specifications, Improvement Plans and as directed by the Engineer.

Payment:

Reconnect Existing Lateral satisfactorily done, complete in place as shown on the plans or as directed by the Engineer, including all work, labor, materials, equipment, tools and incidentals necessary to complete the work shall be paid for at the unit price bid under the Bid Item "Reconnect Existing Lateral".

6. **Asphalt Concrete (Type A)**

General:

Asphalt Concrete (Type A) shall conform to Section IX-A8 of these Specifications as described herein. Removal of pavement traffic markers, debris, dirt, dust or any other material on the existing pavement which would affect the finished overlay shall be done by the Contractor as incidental work and no payment shall be made therefore.

Payment:

Asphalt Concrete (Type A) satisfactorily done, complete in place as shown on the plans or as directed by the Engineer, including all work, labor, materials, equipment, tools and incidentals necessary to complete the work shall be paid for at the unit price bid under the Bid Item "Asphalt Concrete (Type A)"

7. **Final and Intermediate Backfill (Aggregate Base Class II)**

General:

Final and Intermediate Backfill (Aggregate Base Class II) shall conform to Section IX-A6-2 of these Specifications as described herein and as shown in the Improvement Plans or as directed by the Engineer.

Payment:

Final and Intermediate Backfill (Aggregate Base Class II) satisfactorily done, complete in place as shown on the plans or as directed by the Engineer, including all work, labor, materials, equipment, tools and incidentals necessary to complete the work shall be paid for at the unit price bid under the Bid Item "Final and Intermediate Backfill (Aggregate Base Class II)".

8. **Initial Backfill and Pipe Bedding**

General:

Initial Backfill and Pipe Bedding shall conform to Sections IX-A6-2 of these Specifications as described herein and as shown in the Improvement Plans or as directed by the Engineer.

Payment:

Initial Backfill and Pipe Bedding satisfactorily done, complete in place as shown on the plans or as directed by the Engineer, including all work, labor, materials, equipment, tools and incidentals necessary to complete the work shall be paid for at the unit price bid under the Bid Item "Initial Backfill and Pipe Bedding".

9. **Trench Excavation**

General:

Trench Excavation shall conform to Sections IX-A6-1 of these Specifications as described herein and as shown in the Improvement Plans or as directed by the Engineer.

Payment:

Trench Excavation satisfactorily done, complete in place as shown on the plans or as directed by the Engineer, including all work, labor, materials, equipment, tools and incidentals necessary to complete the work shall be paid for at the unit price bid under the Bid Item "Trench Excavation". Paid quantity for Trench Excavation shall be no more than the total quantity paid for the backfill and bedding materials. Any excess will be incidental work and no additional payment will be made thereof.

10. **Trench Shoring**

General:

Trench Shoring shall conform to Sections IX-A7 of these Specifications as described herein or as directed by the Engineer.

Payment:

Trench Shoring satisfactorily done, complete in place as shown on the plans or as directed by the Engineer, including all work, labor, materials, equipment, tools and incidentals necessary to complete the work shall be paid for at the unit price bid under the Bid Item "Trench Shoring".

11. **Pavement Delineation**

General:

Pavement Delineation shall to Section IX-A9 of these Specifications as described herein and as shown in the Improvement Plans or as directed by the Engineer.

Payment:

Pavement Delineation satisfactorily done, complete in place as shown on the plans or as directed by the Engineer, including all work, labor, materials, equipment, tools and incidentals necessary to complete the work shall be paid for at the unit price bid under the Bid Item "Pavement Delineation".

12. **Replace Existing Street Monument**

General:
Replace Existing Street Monument shall conform to these Specifications as described herein and as shown in the Improvement Plans or as directed by the Engineer.

Payment:

Replace Existing Street Monument satisfactorily done, complete in place as shown on the plans or as directed by the Engineer, including all work, labor, materials, equipment, tools and incidentals necessary to complete the work shall be paid for at the unit price bid under the Bid Item "Replace Existing Street Monument".

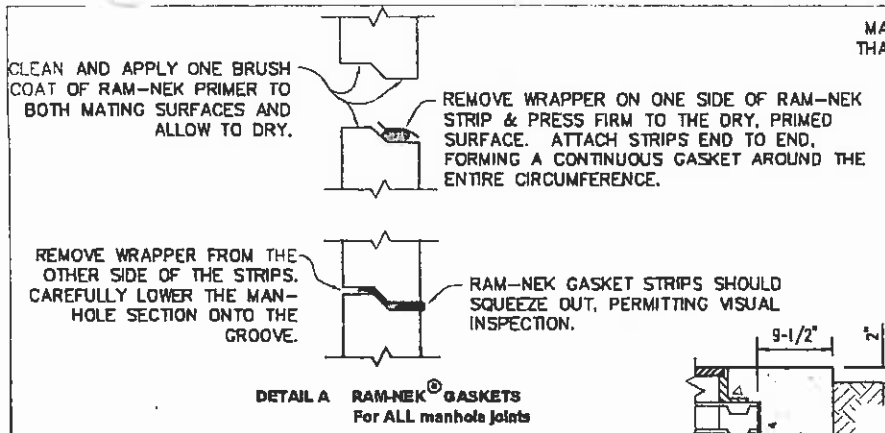
13. **Testing, Cleaning and Television Inspection**

General:

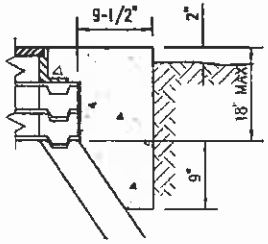
Testing, Cleaning and Television Inspection shall to Section IX-A4 of these Specifications as described herein and as directed by the Engineer.

Payment:

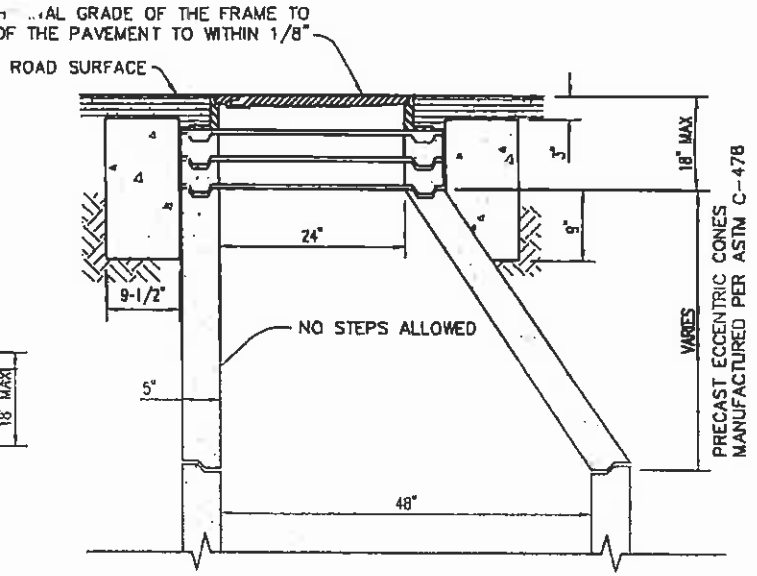
Testing, Cleaning and Television Inspection satisfactorily done, complete in place as shown on the plans or as directed by the Engineer, including all work, labor, materials, equipment, tools and incidentals necessary to complete the work shall be considered as incidental work with no additional compensation.



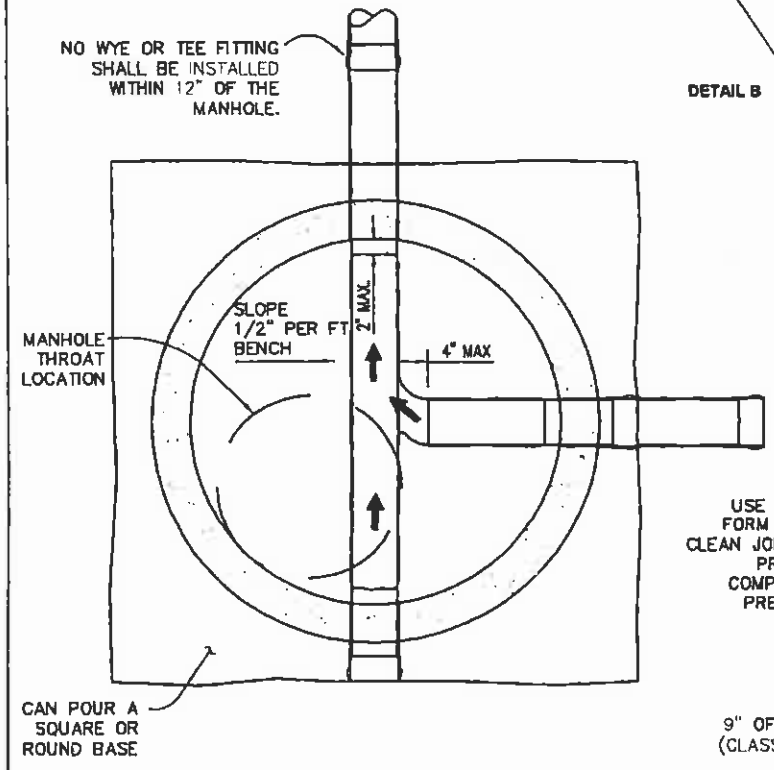
DETAIL A **RAM-NEK® GASKETS For ALL manhole joints**



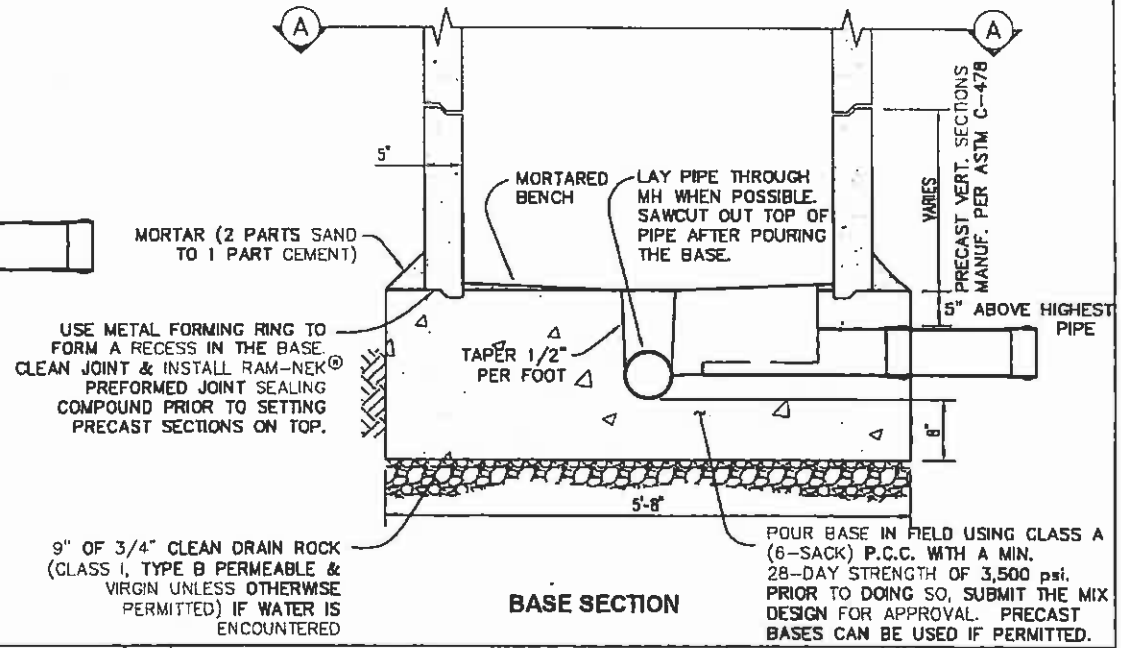
DETAIL B **COLLARS IN UNPAVED AREAS**



UPPER MANHOLE SECTION (ROTATED 45 DEGREES)



BASE SECTION A-A



BASE SECTION

CITY OF PACIFICA
PUBLIC WORKS / ENGINEERING DIVISION

DESIGNED BY:
DRAWN BY: KTL 2-13-01
CHK'D BY:
APPROVED BY:

REV.	DATE	DESCRIPTION	BY

REVISIONS

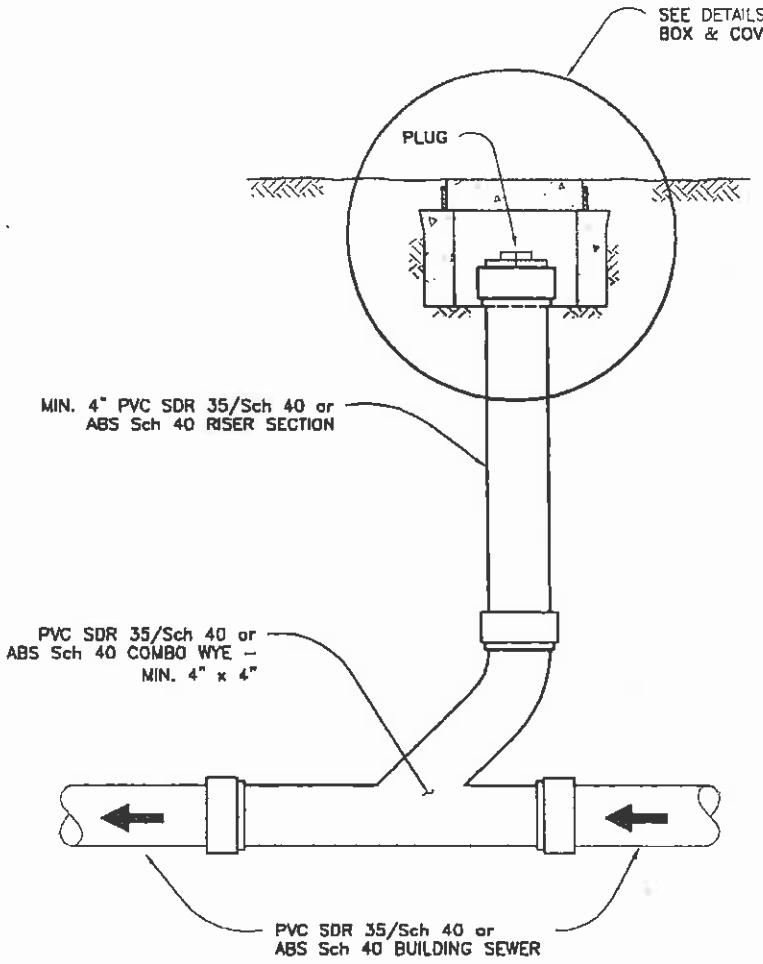
STANDARD MANHOLE

FOR 17" OR SMALLER LINES

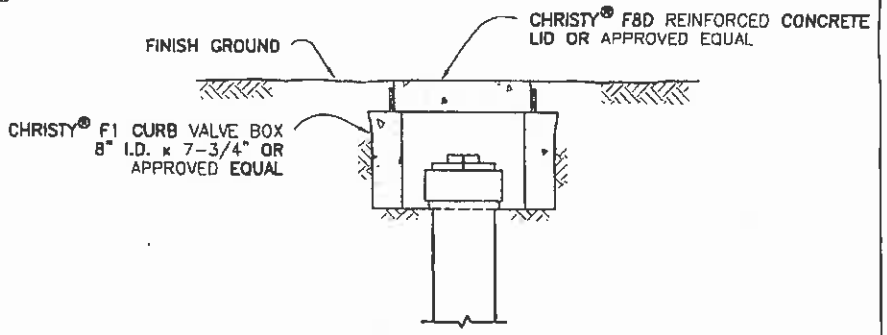
STANDARD SEWER DETAILS

SCALE: NONE

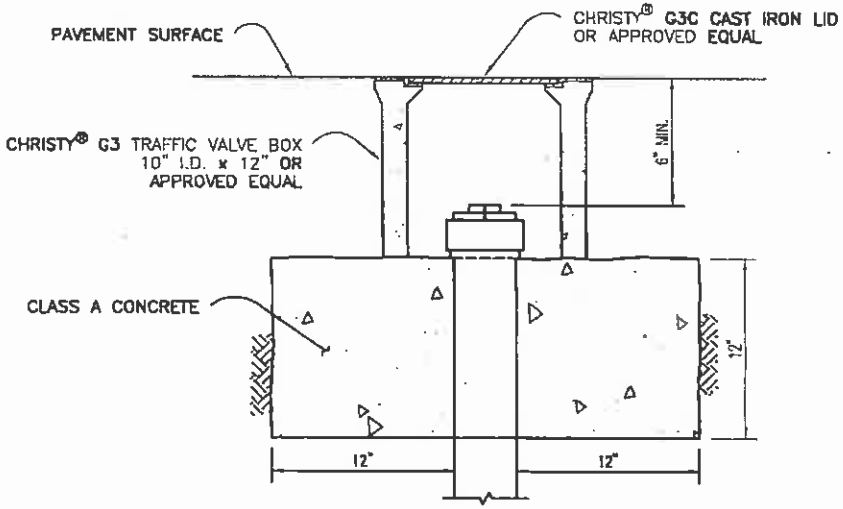
PLAN NO.



CLEANOUT RISER



DETAIL A CLEANOUT RISER IN UNPAVED, NON-TRAFFICKED AREAS



DETAIL B CLEANOUT RISER IN PAVED, TRAFFICKED AREAS

CITY OF PACIFICA PUBLIC WORKS / ENGINEERING DIVISION	**STANDARD CLEANOUT**	**STANDARD SEWER DETAILS**
DESIGNED BY: DRAWN BY: KTL 2-13-01 CHK'D BY: SH APPROVED BY: SH	REVISIONS REV. DATE DESCRIPTION BY	SCALE: NONE PLAN NO.

PERMITS:

1. THE PROPERTY OWNER SHALL APPLY FOR THE APPROPRIATE PERMITS PRIOR TO ENGAGING IN ANY SEWER WORK. WORK ASSOCIATED WITH HOUSE SEWERS SHALL BE GOVERNED BY A PLUMBING PERMIT WORK ASSOCIATED WITH LATERAL SEWERS SHALL BE GOVERNED BY AND ENCROACHMENT PERMIT.

2. THE PROPERTY OWNER OR HIS AGENT SHALL SUBMIT, ALONG WITH HIS PERMIT APPLICATION(S), A DRAWING THAT ILLUSTRATES THE EXTENT OF THE WORK. IN THE CASE OF SEWER PROJECTS FOR SINGLE-FAMILY HOMES, THE FOLLOWING INFORMATION MUST BE CLEARLY INDICATED OR CONVEYED BY THE DRAWING.

   A. HOMEOWNER'S NAME, ADDRESS, AND TELEPHONE NUMBER ON THE TOP RIGHT HAND CORNER OF THE PORTRAIT ORIENTATION OF THE DRAWING;

   B. CONTRACTOR'S NAME, ADDRESS, TELEPHONE NUMBER, FAX NUMBER, AND CONTRACTOR'S LICENSE NUMBER ON THE BOTTOM RIGHT HAND CORNER OF THE PORTRAIT ORIENTATION OF THE DRAWING;

   C. PLAN VIEW SHOWING THE APPROXIMATE LOCATION, AS MEASURED FROM TWO PROPERTY CORNERS, OF THE LOT LINES, BACK OF SIDEWALK, FACE OF CURB, BUILDING WALL, CLEANOUTS, & ALIGNMENT OF THE BUILDING SEWER;

   D. PROFILE VIEW SHOWING ROUGHLY THE VERTICAL RELATIONSHIP BETWEEN THE PROPOSED SEWER INVERT & THE GROUND SURFACE, THE SIZE, LENGTH, & SLOPE OF THE SEWER, PIPE MATERIAL, & PIPE CLASS.

   THE PROPERTY OWNER OR HIS AGENT SHALL NEATLY MARK UP THIS DRAWING WITH THE ACTUAL CONSTRUCTED FEATURES AND SUBMIT A LEGIBLE COPY OF THIS "AS-BUILT" DRAWING TO THE CITY AT THE COMPLETION OF THE PROJECT.

   THE CITY WILL REQUIRE THE PROPERTY OWNER TO SOLICIT THE ASSISTANCE OF A LICENSED CIVIL ENGINEER TO PREPARE & SUBMIT PLANS FOR SEWER PROJECTS THAT ARE PROPOSED FOR DEVELOPMENTS OTHER THAN SINGLE-FAMILY HOMES.

3. UPON RECEIVING A PERMIT APPLICATION FOR SEWER WORK PROPOSED FOR A SINGLE-FAMILY RESIDENCE & WITHIN THE HOMEOWNER'S PROPERTY, THE CITY WILL REVIEW THE DRAWING, MARK IT UP WITH COMMENTS, AND FORWARD IT TO THE CONTRACTOR WITHIN SEVEN (7) WORKING DAYS OF THE RECEIPT DATE. (THE REVIEW PROCESS MAY BE DIFFERENT FOR SEWER WORK PROPOSED IN PUBLIC RIGHT-OF-WAYS AND NON-SINGLE FAMILY RESIDENCES.)

   A. IF THE WORDS "APPROVED" APPEAR ON THE DRAWING, THE CONTRACTOR MAY PROCEED WITH THE SEWER WORK.

   C. IF THE WORDS "NOT APPROVED" APPEAR ON THE DRAWING, THE CONTRACTOR MUST REVISE THE DRAWING, RE-SUBMIT IT FOR REVIEW, AND AWAIT FURTHER COMMENTS.

BONDS, AGREEMENTS, & LICENSES:

CONTRACTORS THAT WILL BE PERFORMING WORK WITHIN THE PUBLIC RIGHT-OF-WAY (i.e., REQUIRING AN ENCROACHMENT PERMIT) SHALL COMPLY WITH THE FOLLOWING REQUIREMENTS:

   A. POSSESS EITHER A CLASS "A" GENERAL ENGINEERING CONTRACTOR LICENSE, A C-34 PIPELINE LICENSE, OR A C-42 SANITATION SYSTEMS LICENSE;

   B. PROCURE A BUSINESS LICENSE FROM THE CITY'S FINANCE DEPARTMENT;

   C. POST A REFUNDABLE CASH BOND IN THE AMOUNT OF $500. THIS DEPOSIT WILL BE RETAINED UNTIL AFTER FINAL ACCEPTANCE OF THE WORK AND WILL BE REFUNDED ONLY UPON WRITTEN APPLICATION.

ENGINEERING REQUIREMENTS:

1. MINIMUM SIZE AND SLOPE
   THE MINIMUM SIZE OF A BUILDING SEWER THAT IS PROPOSED FOR A SINGLE-FAMILY RESIDENCE SHALL BE 4-inches NOMINAL DIAMETER, WITH A MINIMUM SLOPE OF 2% UNLESS OTHERWISE APPROVED. THE MINIMUM SIZE AND SLOPE FOR A BUILDING SEWER THAT IS PROPOSED FOR A DEVELOPMENT THAT IS NOT A SINGLE-FAMILY RESIDENCE SHALL BE DETERMINED BY A LICENSED CIVIL ENGINEER WORKING IN BEHALF OF THE PROPERTY OWNER.

2. PIPE MATERIALS AND JOINTS
   HOUSE SEWERS SHALL BE CONSTRUCTED USING ONE OF THE FOLLOWING MATERIALS LISTED BELOW, WITH THE CORRESPONDING TYPE OF JOINT. THE PIPE MATERIAL AND JOINT SHALL CONFORM WITH THE CORRESPONDING REFERENCE SPECIFICATION THAT IS LISTED.

PIPE	CLASS	REFERENCE	JOINTS
ABS	Schedule 40	ASTM D2751, D2235/F545	SOLVENT CEMENT
PE	SDR 35 SDR17	ASTM D2239, D3035 ASTM D3408	BUTT FUSION, ASTM D3261
PVC	SDR35/ Schedule 40	ASTM D3034 ASTM D3033	BUTT FUSION ELASTO. GASKET, ASTM F477/D3212

PVC SDR 35, HDPE SDR 35 OR HDPE SDR 17 ARE THE ONLY TYPES OF PIPES ALLOWED FOR USE AS SEWER LINES WITHIN CITY RIGHT-OF-WAY.

3. CONNECTIONS TO MAIN SEWERS
   CONNECTIONS TO MAIN SEWERS SHALL BE DONE BY ONE OF TWO METHODS, TO BE SPECIFIED BY THE CITY IN THE PLAN REVIEW COMMENTS.
   A. METHOD A - CONTRACTOR SHALL REPLACE A SECTION OF THE MAIN SEWER WITH A PVC SDR 35 OR HDPE WYE. THE PVC WYE AND MAIN SEWER SHALL BE JOINED USING MISSION MR02 66 ARC COUPLING, OR APPROVED EQUALS. WHEN USING PVC SDR35, A PVC SDR35 TO SCH. 40 BUSHING SHALL BE GLUED ONTO THE ENDS OF THE PIPE WHERE CONNECTION TO CLAY IS MADE. THIS WILL ENSURE THE UNIFORM TIGHTENING OF THE COUPLING. DONUT-SHAPED RINGS SHALL NOT BE USED FOR COMPRESSION SEALING OF JOINTS. WHEN A WYE IS CUT INTO EXISTING CLAY PIPE THE CONNECTION SHALL BE TO A FULL LENGTH OF CLAY PIPE. THE JOINT BETWEEN THE PVC WYE AND PVC LATERAL SEWER SHALL BE OF THE PUSH-ON, ELECTROMETRIC GASKET TYPE
   B. METHOD B - CONTRACTOR SHALL CONTRACT WITH TAP-TITE WORKS, INC., WHO WILL PERFORM THE ACTUAL WORK OF TAPPING INTO THE MAIN SEWER.

4. OTHER CONNECTIONS:
   WHEN JOINING ANY 4" PLASTIC PIPE TO 4" CAST IRON PIPE A MISSION MR56 44 ARC COUPLING, OR EQUALS, SHALL BE REQUIRED. WHEN JOINING ANY 4" PLASTIC PIPE TO 4" VCP (CLAY) PIPE A MISSION MR02 44 ARC COUPLING OR EQUALS SHALL BE REQUIRED. WHEN PVC SDR 35 IS USED A PVC SDR35 TO SCH. 40 BUSHING SHALL BE GLUED ONTO THE ENDS OF THE PIPE WHERE CONNECTIONS TO OTHER TYPES OF PIPE ARE MADE TO ENSURE THE UNIFORM TIGHTENING OF THE COUPLING. WHEN JOINING PVC SDR35 TO ABS SCH. 40, A RIGID TYPE OF REDUCER COUPLING MUST BE GLUED USING A MULTI-PURPOSE ABS TO PVC CEMENT.

5. CLEANOUTS
   CLEANOUTS SHALL CONSIST OF A 45 DEG. WYE OF THE SAME SIZE AND TYPE AS THE BUILDING SEWER, BROUGHT UP TO GRADE LEVEL. THE TOP OF WHICH SHALL BE PROVIDED WITH A REGULATION CLEAN-OUT, 4" MIN. IN SIZE WITHIN A SIDEWALK BOX AND REMOVABLE COVER

   CLEANOUTS SHALL BE PROVIDED AT THE FOLLOWING LOCATIONS:

   A. AT THE POINT OF CONNECTION TO THE BUILDING DRAIN;
   B. AT A POINT WITHIN 2 feet OF THE HOMEOWNER'S PROPERTY LINE, IF ONE DOES NOT ALREADY EXIST;
   C. AT ANY SINGLE TURN GREATER THAN 45 DEG. ;
   D. AT INTERVALS ALONG THE BUILDING SEWER WHERE THE ACCUMULATIVE TOTAL OF DEFLECTION FROM THE POINT OF CONNECTION TO THE MAIN SEWER OR FROM ANOTHER CLEANOUT EXCEEDS 45 DEG. ;
   E. AT INTERVALS NOT TO EXCEED 100 feet ALONG THE BUILDING SEWER;
   F. AT ANY LOCATION DESIGNATED BY THE CITY. THIS INCLUDES HAVING TO INSTALL A CLEANOUT WITHIN THE PUBLIC RIGHT-OF-WAY, IN WHICH CASE THE PROPERTY OWNER SHALL BE RESPONSIBLE FOR MAINTAINING AND REPAIRING THE PORTION OF THE BUILDING SEWER FROM THE BUILDING DRAIN TO THE SAID CLEANOUT IN THE PUBLIC RIGHT-OF-WAY.

REPAIR OF EXISTING BUILDING & PUBLIC SEWERS:

1. "SPOT" REPAIRS ARE DEFINED AS THOSE THAT ARE MADE AT A SINGLE LOCATION ALONG AN EXISTING SEWER, WITHOUT HAVING TO REPLACE A SUBSTANTIAL LENGTH OF THE SEWER. SUCH REPAIRS WILL NOT BE ALLOWED UNLESS OTHERWISE APPROVED BY THE CITY.

2. IN NO CASE WILL A SPOT REPAIR BE MADE ON AN EXISTING SEWER THAT IS NOT MADE OF ABS, PVC, OR PE PIPE MATERIALS.

INSPECTION:

NO PORTION OF ANY PIPE OR STRUCTURE CAN BE BACKFILLED WITHOUT PRIOR INSPECTION & APPROVAL FROM THE CITY.

CITY OF PACIFICA
PUBLIC WORKS / ENGINEERING DIVISION

DESIGNED BY:
DRAWN BY: KTL 2-13-01
CHK'D BY:
APPROVED BY:

REV.	DATE	DESCRIPTION	BY

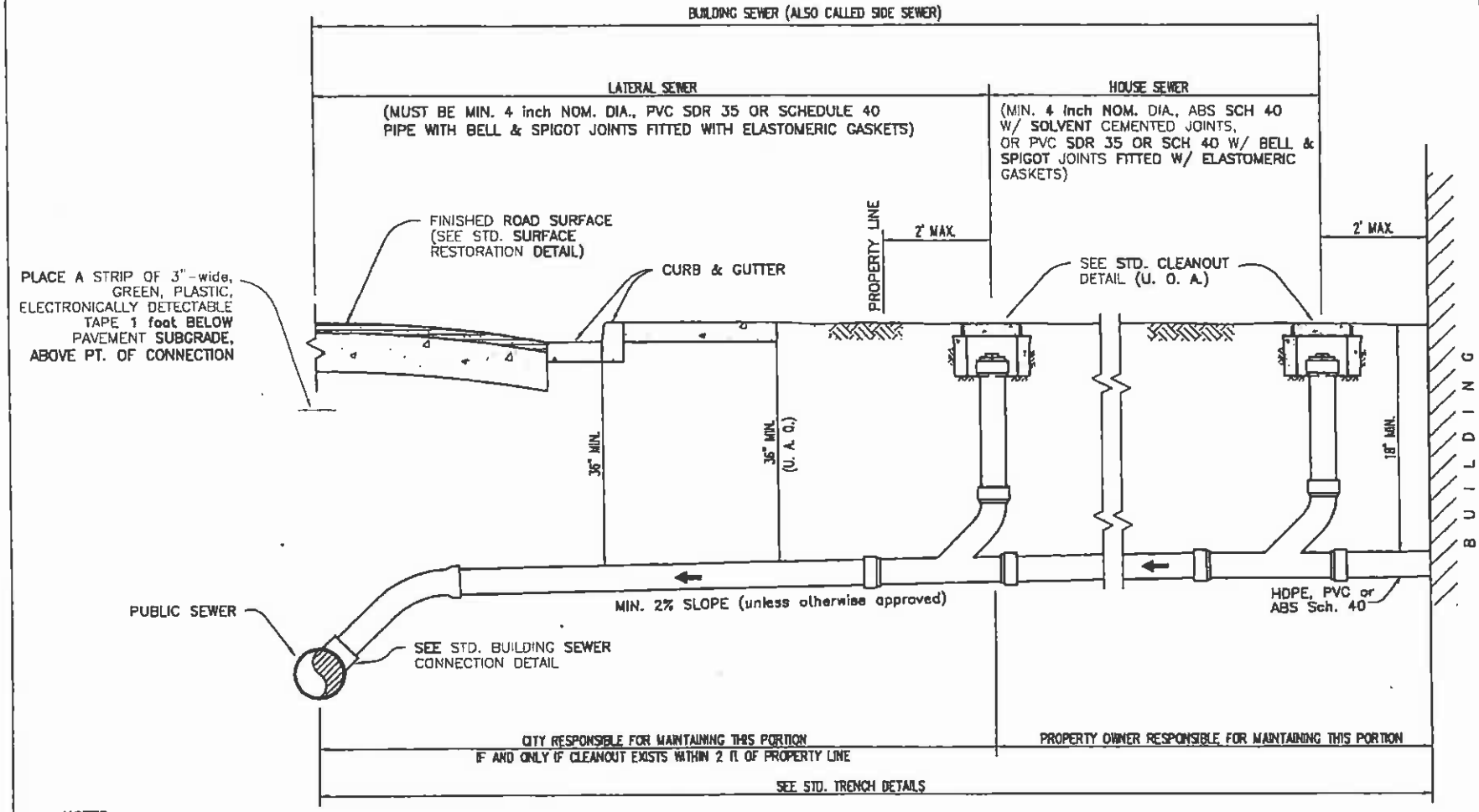
REVISIONS

BUILDING SEWER NOTES

STANDARD SEWER DETAILS

SCALE: NONE

PLAN NO.



NOTES:

1. (U. O. A.) UNLESS OTHERWISE APPROVED
2. ALL SIDEWALK CLEAN-OUT SHALL BE RELOCATED 2' BEHIND PROPERTY LINE

CITY OF PACIFICA
PUBLIC WORKS / ENGINEERING DIVISION

DESIGNED BY:
DRAWN BY: KTL 2-13-01
CHK'D BY: SH
APPROVED BY: SH

REV.	DATE	DESCRIPTION	BY

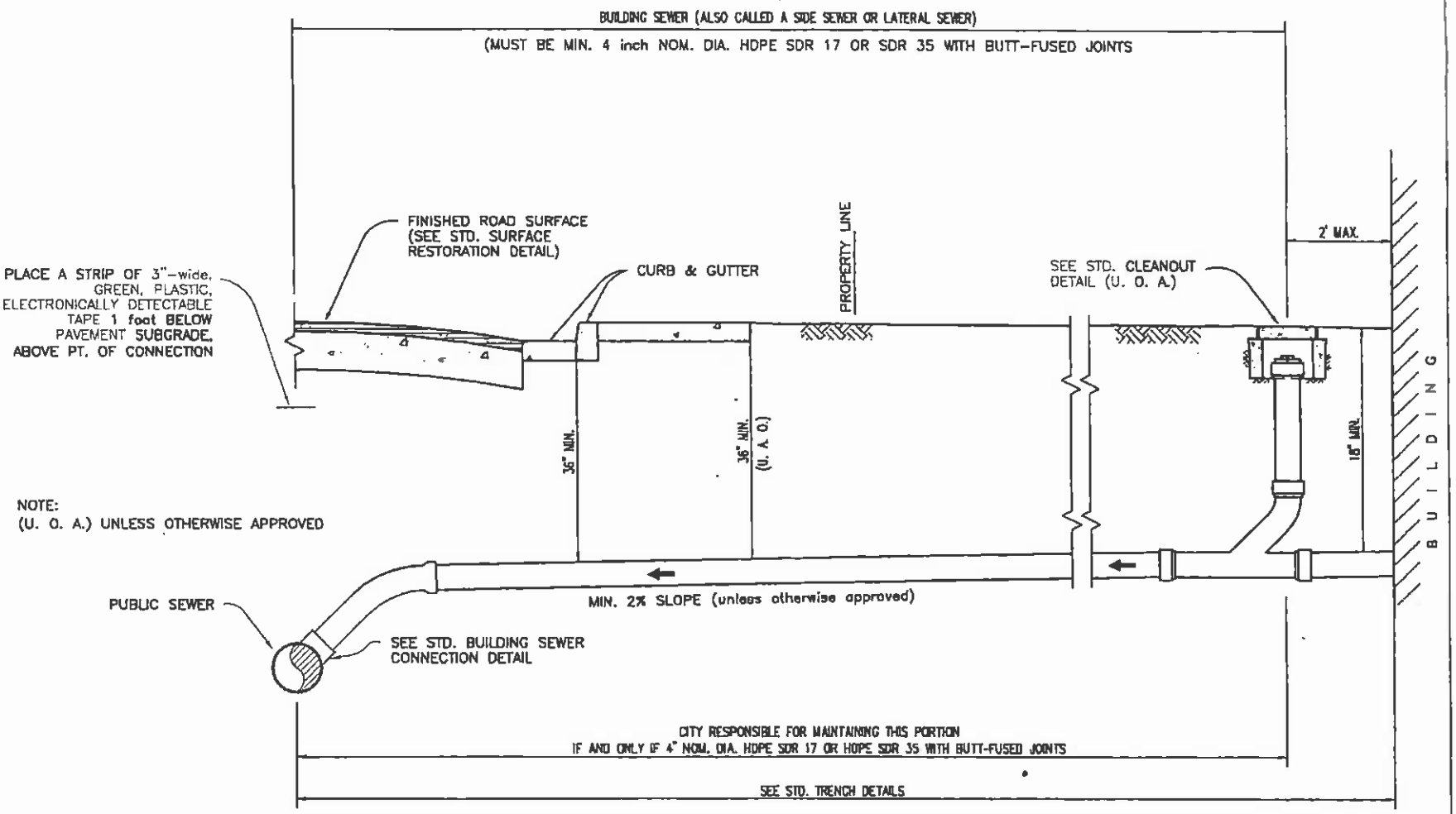
REVISIONS

BUILDING SEWER LATERAL - PVC SDR 35 OR SCH 40

STANDARD SEWER DETAILS

SCALE: NONE

PLAN NO.



NOTES:

1. (U. O. A.) UNLESS OTHERWISE APPROVED

CITY OF PACIFICA
PUBLIC WORKS / ENGINEERING DIVISION

DESIGNED BY:
DRAWN BY: KTL 2-13-01
CHK'D BY: SH
APPROVED BY: SH

REV.	DATE	DESCRIPTION	BY

REVISIONS

BUILDING SEWER LATERAL- HDPE SDR 35 BUTT FUSED

STANDARD SEWER DETAILS

SCALE: NONE

PLAN NO.