

Olivehurst Public Utility District



Agenda Item Staff Report

Meeting Date: June 20th, 2019

Item description/summary:

Consider changing language in Standard 5 and Details 5-15, 5-16, 5-19, 5-20, and 7-01 of OPUD's Specifications and Details to better suit the current needs and operations of the District.

Currently, manholes being installed in Plumas Lake are not being required to line the inside and outside with waterproofing materials that prevent manhole decay/I&I. There is language in the details that allows for OPUD to request them to be lined, but as a default they are not required to. The changes proposed would require all new manholes to be lined inside and out everywhere in the District. Further, the changes include the option for OPUD to request PVC to be installed instead of VCP for gravity sewer mains. In areas of Plumas Lake, this would be beneficial to both OPUD and contractors due to easier installation and long-term maintenance in the soil types present in Plumas Lake. We are also requesting a change in spec for the PLC and software being installed in new Lift Stations to better suit future maintenance and troubleshooting.

Fiscal Analysis:

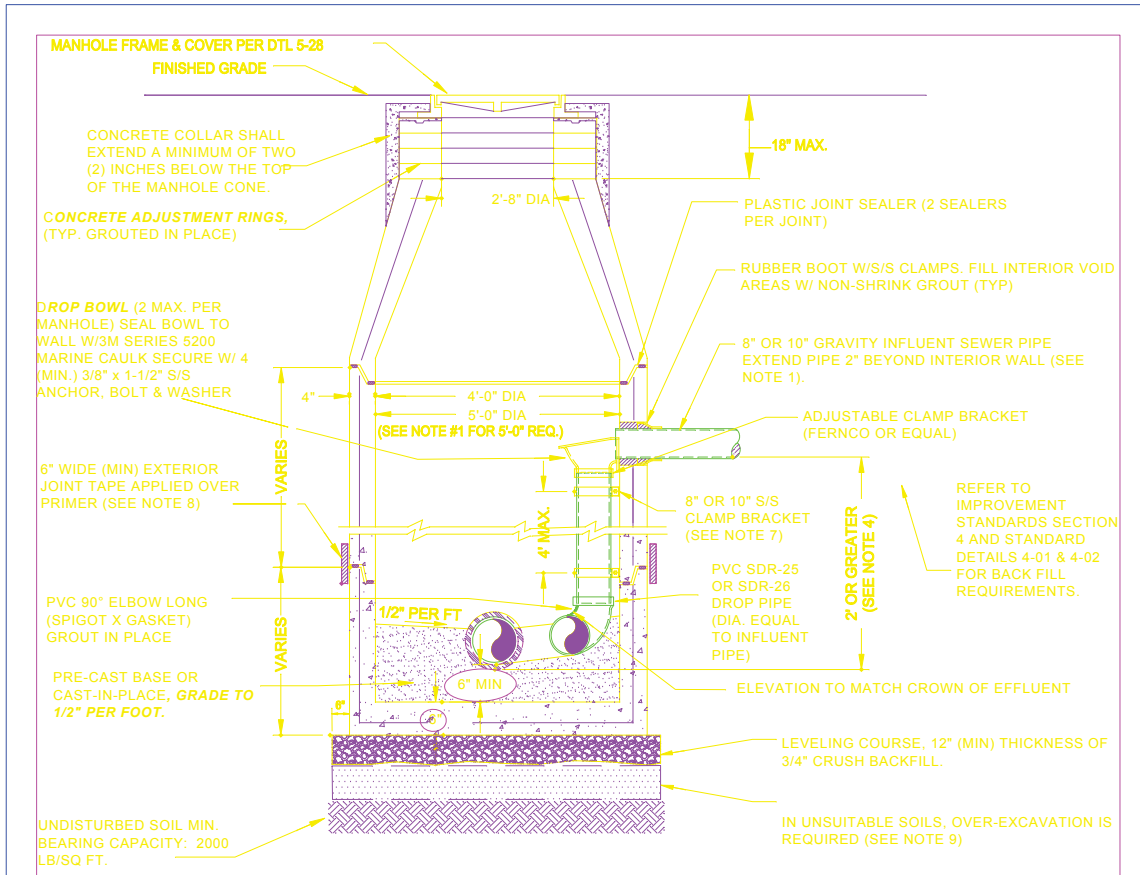
N/A

Sample Motion/Staff Recommendation:

Move to approve changes in Standard 5 and Details 5-15, 5-16, 5-19, 5-20, and 7-01 of OPUD's Specifications and Details.

Prepared by:

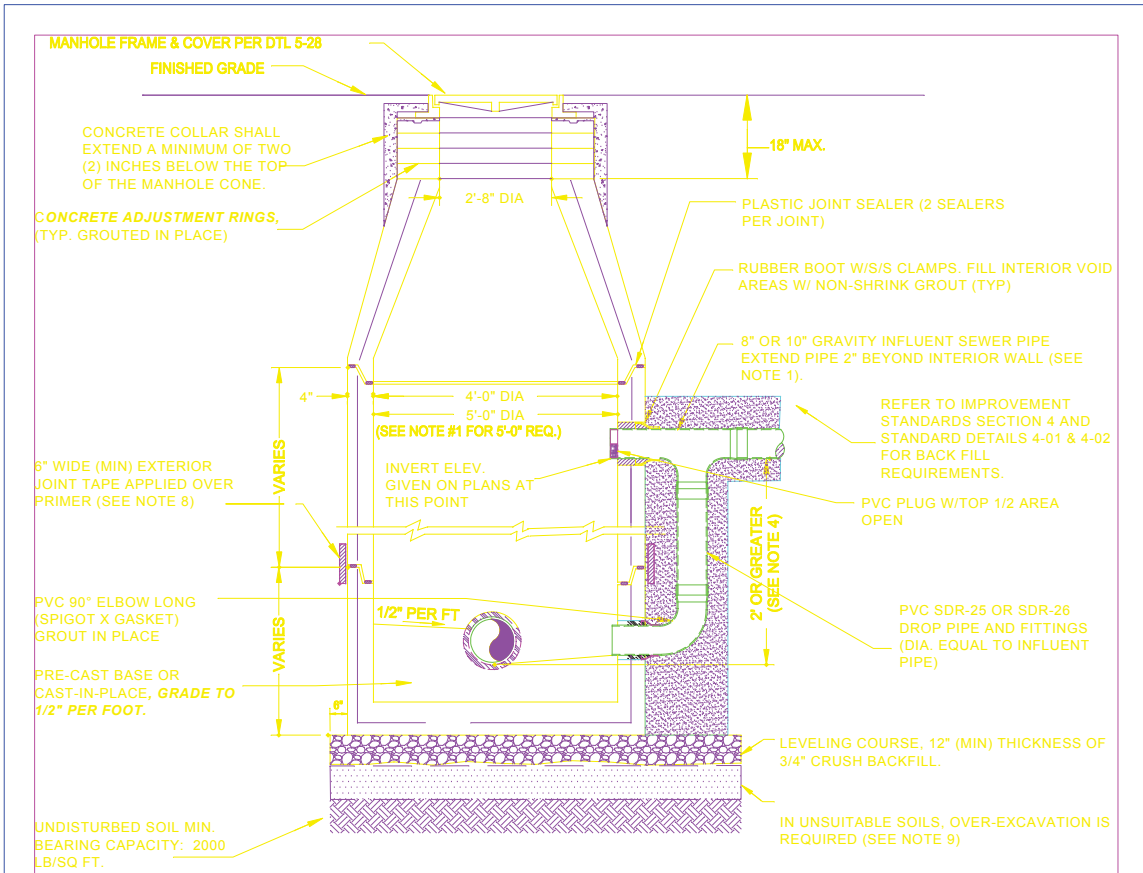
Christopher Oliver, Public Works Engineer



NOTES:

1. THE STANDARD ASSEMBLY IS FOR 8" OR 10" GRAVITY INFLUENT LINES ONLY. NO DROPS ALLOWED FOR FORCE MAINS. MAXIMUM OF 2 INSIDE DROP BOWLS PER MANHOLE. A 5'-0" DIA. MANHOLE (4" MIN THICK WALLS) IS REQUIRED IF TWO INSIDE DROPS ARE CONSTRUCTED WITH ONE OR BOTH BEING 10" SIZE. DROP BOWL BY RELINER OR APPROVED EQUAL REQUIRED. THE INSIDE DROP FOR AN 8" HIGH-LINE SHALL BE CONSTRUCTED SIMILAR TO ABOVE.
2. PRECAST MANHOLE SECTIONS TO BE MANUFACTURED IN ACCORDANCE WITH THE LATEST EDITIONS OF A.S.T.M. C-478 WITH 4000 LB. CONC., TYPE II CEMENT. ALL LIFTING HOLES AND OUTSIDE INSERTS SHALL BE FILLED WITH NON-SHRINK GROUT.
3. THE DISTRICT REQUIRES THE APPLICATION OF TWO COATS OF BITUMINOUS WATERPROOFING MATERIAL TO THE INTERIOR AND EXTERIOR OF THE MANHOLE AND THE INTERIOR OF ADJUSTMENT RINGS.
4. TYPE "B" MANHOLE MUST BE USED FOR 2' OR GREATER INFLUENT PIPE DROPS.
5. THE DROP BOWL ASSEMBLY SHALL BE INSTALLED PRIOR TO APPLICATION OF SPECIALTY LINING MATERIAL.
6. A TYPE "C" MANHOLE SHALL BE UTILIZED WHEN THREE OR MORE (2' OR GREATER) DROPS ARE INVOLVED OR WHEN INFLUENT PIPES AREA LARGER THAN 10" IN SIZE.
7. ADJUSTABLE CLAMPING BRACKET (MIN. 2 PER DROP BOWL ASSY). 1-1/2" WIDE, 11 GA. W/ 3/8" DIA. 18-8 PINCH BOLTS AND NUTS. SECURE TO M/H WALL WITH (2) 3/8" X 1" BOLT, ANCHOR & WASHER PER BRACKET ASSY. ALL 304 OR 316 STAINLESS STEEL MATERIALS.
8. ALL MANHOLE JOINTS BELOW THE TOP CONE SECTION SHALL INCLUDE A 6" WIDE (MIN) EXTERIOR JOINT TAPE (W/PRIMER). TAPE ON THE CONE SECTION IS OPTIONAL.
9. IN SILTS, CLAY OR HIGHLY ORGANIC SOILS (FINE-GRAINED SOILS INCLUDING SOIL GROUPS ML, CL, OL, MH, CH, OH AND PT) THE SOILS SHALL BE OVER-EXCAVATED AN ADDITIONAL 24" (AT A MIN.) AND BACKFILLED WITH AASHTO CLASS A-3 SOIL (COMPACTED TO 95%, ASTM D1557) OR OVER-EXCAVATE AN ADDITIONAL 12" (AT A MIN.) AND BACKFILL WITH GRANULAR BACKFILL.

.	.	.	OLIVEHURST PUBLIC UTILITY DISTRICT
.	.	.	DROP CONNECTION TYPE "B" MANHOLE
6-19	CHANGED LANGUAGE IN NOTE 3	CNO	Garry E. Laughlin District Engineer 5-6-2005 DATE
5-05	NEW DETAIL	SCD	
DATE	REVISIONS	BY	

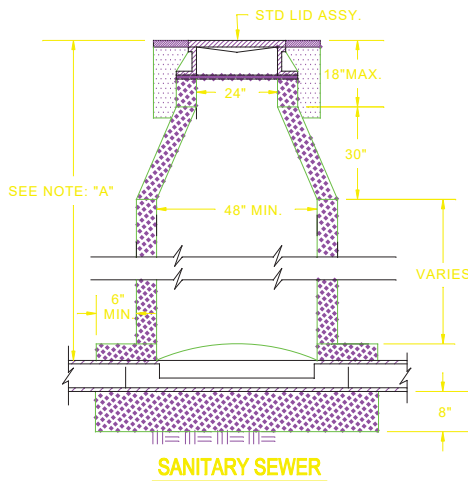


NOTES:

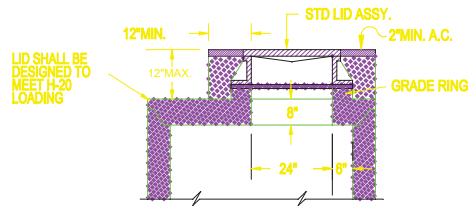
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8. ALL MANHOLE JOINTS BELOW THE TOP CONE SECTION SHALL INCLUDE A 6" WIDE (MIN) EXTERIOR JOINT TAPE (W/PRIMER). TAPE ON THE CONE SECTION IS OPTIONAL.
9. IN SILTS, CLAY OR HIGHLY ORGANIC SOILS (FINE-GRAINED SOILS INCLUDING SOIL GROUPS ML, CL, OL, MH, CH, OH AND PT) THE SOILS SHALL BE OVER-EXCAVATED AN ADDITIONAL 24" (AT A MIN.) AND BACKFILLED WITH AASHTO CLASS A-3 SOIL (COMPACTED TO 95%, ASTM D1557) OR OVER-EXCAVATE AN ADDITIONAL 12" (AT A MIN.) AND BACKFILL WITH GRANULAR BACKFILL.

.	.	.	OLIVEHURST PUBLIC UTILITY DISTRICT
.	.	.	DROP CONNECTION TYPE "C" MANHOLE
6-19	CHANGED LANGUAGE IN NOTE 3	CNO	Garry E. Laughlin District Engineer 5-6-2005
5-05	NEW DETAIL	SCD	
DATE	REVISIONS	BY	APPROVED _____ DATE _____

5-16



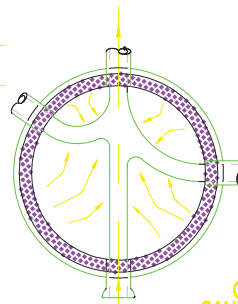
SANITARY SEWER



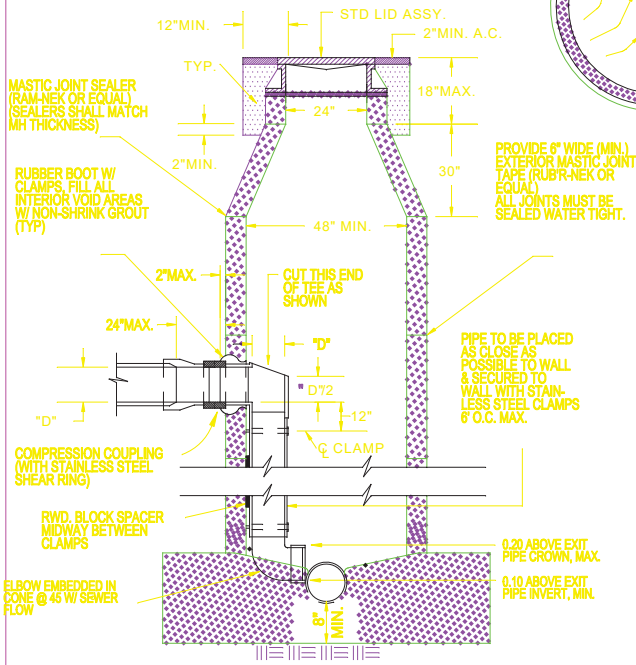
SHALLOW MANHOLE DETAIL
(FOR PIPES WITH LESS THAN 4' COVER)

NOTES:
A) FOR PIPES WITH LESS THAN 4' COVER USE THE SHALLOW MANHOLE DETAIL.

- DROP INLET NOTES:**
1. ALL INSIDE DROP PIPING TO BE P.V.C.
 2. CEMENT ALL JOINTS.
 3. DROP CONNECTION PIPE AND FITTINGS TO BE SAME SIZE AS LATERAL.
 4. CLAMPS TO BE 1-1/2" x 12 ga. STAINLESS STEEL ANCHORED TO M.H. WALL WITH 2 1/2" STAINLESS STEEL WEDGE OR EPOXY SET.
 5. USE DROP CONNECTION WHENEVER INVERT OF CONNECTING SEWER IS 2'-0" OR MORE ABOVE M.H. INVERT.

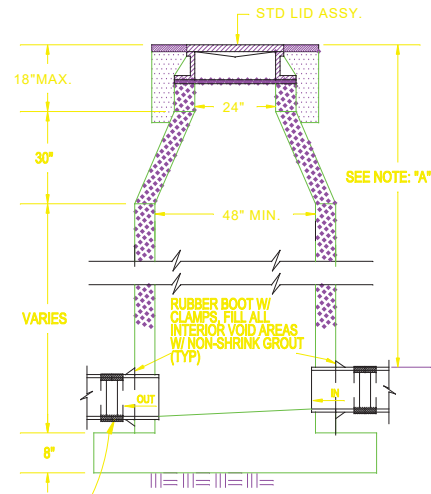


CHANNELIZATION FOR SANITARY SEWER MANHOLES



SANITARY SEWER
(INSIDE DROP)

COMPRESSION COUPLING (WITH STAINLESS STEEL SHEAR RING)



CAST-IN-PLACE

INSIDE BOTTOM SHALL BE WET BRUSHED SMOOTH

NOTES:

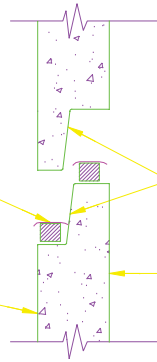
1. OPUD WILL REQUIRE AN APPROVED BITUMASTIC BE APPLIED TO THE ENTIRE EXTERIOR OF ANY MANHOLE TO LIMIT ANY INFILTRATION OF GROUND WATERS.
2. INTERIOR JOINTS AND LIFT HOLES OF ALL MANHOLES SHALL HAVE A NON-SHRINK GROUT APPLIED W/ A WET BRUSH SMOOTH FINISH
3. ALL MANHOLES SHALL BE INSPECTED BY OPUD PRIOR TO ANY BACKFILL BEING PLACED
4. ANY AND ALL MANHOLES WITH ANY GROUND WATER INFILTRATION SHALL NOT BE ACCEPTED BY OPUD AND MUST BE REPAIRED.

			OLIVEHURST PUBLIC UTILITY DISTRICT	
			TYPICAL MANHOLES	
6-19	CHANGED LANGUAGE IN NOTE 1	CNO	Garry E. Laughlin District Engineer	
5-05	FORMERLY STD. DTL. NO. SS-5	SCD		
DATE	REVISIONS	BY	APPROVED	5-6-2005 DATE

5-19

ALL JOINTS IN THE SEWER MANHOLE SHAFT SHALL BE THOROUGHLY CLEANED AND SEALED WATERTIGHT WITH A PREFORMED JOINT SEALANT GASKET MATERIAL CONFORMING TO ASTM DESIGNATION: C923. KENT-SEAL, RAM-NEK OR APPROVED EQUAL. THE JOINT SEALANT GASKET MATERIAL SHALL MATCH THE MANHOLE WALL THICKNESS

INSIDE WALL

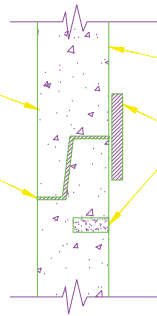


PREPRIMED JOINT SURFACES

OUTSIDE WALL

JOINT ASSEMBLY DETAIL

INSIDE WALL



OUTSIDE WALL

EXCESS JOINT SEALER SHALL BE TRIMMED FLUSH TO INSIDE SURFACE. ALL MANHOLES SHALL HAVE THE INSIDE SEALED PRIOR TO ANY TESTING BY APPLYING AN APPROVED GROUT WHICH MEETS OR EXCEEDS ASTM CL107 GRADE B, AND AASHTO T260, MIXED TO A PLASTIC CONSISTENCY. ALL LIFT HOLES AND ALL VISUAL IMPERFECTIONS TO THE INSIDE SURFACE, INCLUDING JOINTS SHALL BE SEALED AND BRUSHED TO A SMOOTH FINISH WITH A WET BRUSH.

ALL MANHOLES SHALL HAVE THE OUTSIDE OF ALL JOINTS AND OTHER OPENINGS (INCLUDING ALL PIN LIFT HOLES AND ALL VISUAL IMPERFECTIONS TO THE OUTSIDE SURFACE) SEALED BY THE APPLICATION OF AN APPROVED FLEXIBLE SIX (6) INCH MINIMUM MASTIC TAPE MATERIAL, (HENRY - RUB'R-NEK OR APPROVED EQUAL). THE JOINT TAPE SHALL BE APPLIED PRIOR TO THE PLACEMENT OF ANY BACKFILL MATERIAL AND PRIOR TO ANY TESTING. A BITUMASTIC MATERIAL SHALL BE APPLIED AROUND ALL PIPE PENETRATIONS OF THE MANHOLE TO PROVIDE A WATERTIGHT SEAL.

COMPLETED JOINT DETAIL

NOTES:

1. THE DISTRICT REQUIRES THE APPLICATION OF A LAYER (APPROXIMATELY 1/8" THICK) OF A WATERPROOFING BITUMASTIC MATERIAL TO THE ENTIRE EXTERIOR SURFACE OF ANY MANHOLE PRIOR TO BACKFILLING.
2. THE DISTRICT REQUIRES THE APPLICATION OF AN INTERIOR COATING SUCH AS: TAMMS-HEY'DI, KOESTER NB1, TEGRAPROOF, OR XYPEX, TO SEAL THE INTERIOR SURFACE OF ANY MANHOLE TO LIMIT THE INFILTRATION OF GROUND WATER.

.	.	.	OLIVEHURST PUBLIC UTILITY DISTRICT	
.	.	.		MANHOLE JOINTS
.	.	.		
6-19	CHANGED LANGUAGE IN NOTES 1&2	CNO	Garry E. Laughlin District Engineer	
5-05	NEW DETAIL	SCD		
DATE	REVISIONS	BY	APPROVED	

5-20

5-6-2005
DATE

GENERAL SEWER LIFT STATION REQUIREMENTS:

- 1 ALL SANITARY SEWER LIFT STATION SYSTEM DESIGN, MATERIALS, INSTALLATION, AND TESTING SHALL BE PER THE CURRENT OPUD IMPROVEMENT STANDARDS.

WET WELL STORAGE, CAPACITY, AND SIZE:
 A) NO SANITARY SEWER MAIN LINE PIPE STORAGE WILL BE ALLOWED.
 B) ACTUAL WET WELL STORAGE CAPACITY IN ALL CASES SHALL BE ADEQUATE TO CARRY THE DESIGN FLOW FROM THE ENTIRE TRIBUTARY AREA, EVEN THOUGH SAID AREA MAY NOT LIE WITHIN THE PROJECT BOUNDARIES. IT SHALL BE CALCULATED SO AS TO PROVIDE FOR AT LEAST THE MINIMUM DESIGN STORAGE MULTIPLIED BY TWO (2) PLUS A MINIMUM OF ONE (1) FOOT BELOW LOWEST GRAVITY INLET.
 C) THE MINIMUM WET WELL SIZE SHALL BE EIGHT (8) FEET IN DIAMETER UNLESS OTHERWISE APPROVED BY THE DISTRICT ENGINEER.
- 3 THE PUMPS SHALL BE VAUGHN SUBMERSIBLE CHOPPER PUMPS, EQUIPPED WITH 3-PHASE ELECTRIC EXPLOSION PROOF MOTOR AND RAIL SYSTEM.

MOTOR CONTROL PANEL SHALL BE A TOUCHSCREEN PANEL EQUIPPED WITH A DIGITAL LEVEL AND PROGRAMMABLE CONTROLLER. THE DISTRICT MUST RECEIVE A COPY OF THE PROGRAMMING SOFTWARE FOR TROUBLESHOOTING AND DIAGNOSTIC NEEDS. THE PANEL SHALL BE FURNISHED WITH AN ALARM LIGHT (EXTENDED ABOVE THE ENCLOSURE AND VISIBLE FROM THE STREET), REMOTE ALARM TRANSMITTERS, AND AUDIBLE ALARM AS DIRECTED BY THE DISTRICT.
- 4 THE INTERIOR OF ALL WET WELLS SHALL BE PROPERLY CLEANED AND DRIED AND SHALL HAVE ONE OF THE FOLLOWING APPLIED AND / OR INSTALLED PER THE MANUFACTURER'S WRITTEN INSTRUCTIONS AND SPECIFICATIONS:
 A. AMERON T-LOCK MATERIAL.
 B. ADDITIONAL PROTECTIVE COATING SHALL BE:
 a) MODIFIED UNSATURATED POLYESTER COATING APPLIED IN MULTI-LAYERS WITH A MINIMUM COATING THICKNESS OF 125 MIL.
 b) SPRAY APPLIED AMINE CURED EPOXY COATING APPLIED IN MULTI-LAYERS WITH A MINIMUM COATING THICKNESS OF 40 MIL.
 C. ALL PROTECTIVE COATINGS SHALL BE WHITE IN COLOR.
- 5 ALL LIFT STATION WET WELLS SHALL HAVE A **SPARK TEST** PERFORMED OVER THE ENTIRE SURFACE OF THE WET WELL TO VERIFY THAT NO HOLES AND / OR ANY DEFECTS EXIST. THE CONTRACTOR SHALL COORDINATE WITH THE DISTRICT AND HAVE THE DISTRICT ENGINEER AND / OR INSPECTOR PRESENT DURING THE TESTING.
- 7 A **GENERATOR** SHALL BE DESIGNED TO BE A QUIET OPERATING, LOW EXHAUST EMISSIONS, DUTY RATED-STANDBY POWER SYSTEM WITH A SELF-CONTAINED FUEL SUPPLY.

 THE SEWER LIFT STATION SYSTEM SHALL BE PROVIDED WITH AN ODOR CONTROL VENTILATION SYSTEM, WHICH CONSISTS OF REPLACEABLE FILTER DEVICE(S), DESIGNED TO PROPERLY VENT THE WET WELL ASSEMBLY AND LIMIT THE ESCAPE OF ALL OBNOXIOUS SEWAGE GASES AND ODORS. THE DIVERSION OF ODOR TO THE VENTILATION PIPING SHALL BE ACHIEVED BY POSITIVE FLOW FROM A MECHANICAL FAN (500 CFM, OR AS DIRECTED BY THE DISTRICT ENGINEER).
- 8 **WATER SUPPLY** SHALL BE PROVIDED ON-SITE BY PROVIDING A DISTRICT APPROVED WATER PIPE.
- 10 **PERIMETER WALLS** SHALL CONSIST OF AN ENGINEERED MASONRY WALL WITH A LOCKABLE GATE ASSEMBLY.
- 11 **LIFT STATION SITE** SHALL HAVE A DISTRICT APPROVED HARD ALL WEATHER FINISH SURFACE.

			OLIVEHURST PUBLIC UTILITY DISTRICT
			GENERAL LIFT STATION REQUIREMENTS
6-19	CHANGED NOTE 4	CNO	Garry E. Laughlin District Engineer APPROVED _____ DATE 5-6-2005
5-05	NEW DETAIL	SCD	
DATE	REVISIONS	BY	

7-01

SECTION 5
GRAVITY SEWER SYSTEM CONSTRUCTION

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SECTION 5

GRAVITY SEWER SYSTEM CONSTRUCTION

5.1 GENERAL: Construction, furnishing and installation of Sewer Mains and appurtenances shall be in accordance with these Improvement Standards and Standard Details, as directed by the District Engineer, and National Clay Pipe Institute Standards.

5.2 DESIGN CRITERIA:

5.2.1 ENGINEERED CALCULATIONS shall be provided based on the following and the applicable provisions of the current adopted County of Sacramento Public Works Agency, Improvement Standards, or as directed by the District Engineer:

A. DESIGN FLOW CRITERIA: Design to the minimum criteria without consideration to the actual project conditions does not guarantee plan approval. Design flow shall be calculated using the average of the upstream service area. Refer to the current adopted County of Sacramento Improvement Standards and Standard Construction Specifications and as directed by the District Engineer for the following:

- a) Area Served (by each Phase of construction and Ultimate)
- b) Development Density (Equivalent Single family Dwelling unit - ESD)
- c) Flow Generation (310 gpd/ESD).
- d) Infiltration (1200 gpd/Acre).
- e) Peaking factors (Refer to County of Sacramento Improvement Standards Section)
- f) Velocity Criteria (Refer to County of Sacramento Improvement Standards Section)
- g) Hydraulic Grade Line (Refer to County of Sacramento Improvement Standards Section)
- h) Friction Factor (n=0.013)

B. PIPE CAPACITY, SLOPE, VELOCITY, AND SIZE:

- a) Capacity in all cases shall be adequate to carry the design flow from the entire tributary area, even though said area may not lie within the project boundaries.
- b) Slope and Velocity shall be per the Manning's formula.
- c) The minimum size collector shall be eight (8) inches in diameter unless otherwise approved by the District Engineer.

C. GROUNDWATER REQUIREMENTS:

- a) A geotechnical report shall be required for all Sewer improvements in high groundwater areas.

5.3 MATERIALS: Gravity Sanitary Sewer Systems shall be as specified herein:

5.3.1 GRAVITY MAIN SEWER lines shall be Districts choice of **Vitrified Clay Pipe (VCP)** or **PVC-SDR** (or comparable) and fittings shall be extra strength unglazed, bell and spigot pipe and shall conform to ASTM designation C-700. PVC fittings must conform to applicable ASTM standards. The pipe joints shall be of the mechanical compression type, conforming to ASTM designation C-425. Gravity main sewer lines required to be Ductile Iron shall be ANSI A21.51.

5.3.2 GRAVITY SEWER LATERAL lines shall be **Vitrified Clay Pipe (VCP)** Wye or Tee connection to the main line. ABS (SDR 23.5) conforming to ASTM designation D 2751 shall be coupled to the VCP using a District-approved coupling once the lateral pipe invert is five (5) feet below finish grade. Gravity sewer lines required to be Ductile Iron shall be ANSI A21.51. (Rev. 8/05 by GEL)

- 5.3.3 **ALL BURIED METAL PARTS** shall be Ductile Iron, Brass, Bronze, Copper or Stainless Steel. All buried nuts and bolts for flanges and couplings shall be Type 304 stainless steel, and Core ten "T" bolts.
- 5.3.4 **ALL PIPE CONNECTORS** shall be made of a flexible Neoprene-EPDM material resistant to ozone, weathering, aging, and chemicals, including but not limited to acids, alkalis, animal and vegetable fats, oils and petroleum products. Each connector shall have series 304 stainless steel bands and screw assemblies.
- 5.3.5 **LOCATING DEVICES** shall consist of the following:
- A. Marking tape shall be a minimum of six (6) inches wide, green in color, marked "**BURIED SEWER BELOW**" and shall be placed in all lateral service trenches, twelve (12) inches above the pipe, installed from the main line to the service clean out to grade. Marking tape is also required over any main line which has less than five (5) foot of cover to finish grade. The District shall approve all marking tape prior to installation.
- 5.3.6 **SUBSTITUTION** proposals shall include sufficient information needed for a comparison with the specified product, the projected cost difference between the specified product and substitution product, and shall include the estimated cost for the District Engineer's time to review and provide acceptance or rejection of said substitution product(s).
- A. Any product(s) Substitution proposed by the Contractor / Developer to be included in the construction shall be submitted for review by the District Engineer a minimum of **five (5) working days** prior to the projected installation date.
- 5.3.7 **ACCEPTANCE OF MATERIALS** shall be subject to strength and quality testing in addition to inspection of the completed product. Acceptance of installed piping systems shall be based on inspection and leakage tests as specified hereinafter.

5.4 **INSTALLATION OF SANITARY SEWER:**

- 5.4.1 **MAIN LINE** pipe shall be **Vitrified Clay Pipe (VCP)**, laid in a trench excavated to the lines and grades established by the Design Engineer, which have been reviewed, approved and signed by the District Engineer. The recommended practice for installing VCP shall be per ASTM C12 (Refer to the current NCPI, Clay Pipe Engineering manual). The maximum deflection per foot of VCP shall be per ASTM C425.
- A. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe. The pipe shall have a minimum three (3) inches (as measured under the bell of the pipe) of three-quarter (3/4) inch crushed rock bed, carefully shaped to fit the bottom of pipe before the pipe is lowered into the trench.
- ◆ **Vitrified Clay Pipe (VCP)** shall have holes carefully excavated so that no part of the load is supported by the bells or coupling. Consolidation of material around and under the bell and couplings during bedding and back filling should be avoided, refer to the NCPI, Clay Pipe Engineering manual.
- B. All pipe joints, boots and connectors shall be clean and lubricated during assembly to provide a leak free connection.
- C. The three-quarter (3/4) inch crushed rock shall extend to the pipe spring line and shall be shovel sliced to provide uniform and even support of the entire section of pipe. All VCP shall be covered with a minimum of twelve (12) inches of three-quarter (3/4) inch crush over the top or as directed by District Engineer.
- D. When the separation between VCP sewer main and any other utility is between six (6) inches and twelve (12) inches, ductile iron pipe with compression couplers shall replace the VCP for a minimum of twenty-four (24) inches each side of the crossing with a two (2) sack slurry placed between utilities. In no case shall the clearance be less than six (6) inches.

5.4.2 **SERVICE LATERAL** pipe shall be **Vitrified Clay Pipe (VCP)** main line connection Wye or Tee and laid in a trench excavated to at least a minimum slope of one-quarter (1/4) inch per foot. ABS shall be coupled to the VCP lateral once the pipe invert is five (5) feet below finish grade. The top of the pipe shall be a minimum of eighteen (18) inches below the road subgrade or treated soil section, or as directed by the District Engineer. In no case shall the top of the lateral be less than thirty-two (32) inches below any finish grade.

- A. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe. The pipe shall have a minimum four (4) inches (as measured under the bell or coupling of the pipe) of clean sand bedding, carefully shaped to fit the bottom of pipe before the pipe is lowered into the trench.
- B. When the separation between sewer service lateral and any other utility is between six (6) inches and twelve (12) inches, Ductile Iron pipe with compression couplers shall replace the pipe for a minimum of twenty-four (24) inches each side of the crossing with a two (2) sack slurry placed between utilities. In no case shall the clearance be less than six (6) inches.

5.5 **MANHOLES**: Manholes for sanitary sewers shall be constructed of a pre-cast reinforced concrete base, or cast-in-place reinforced concrete base. All manhole barrels, risers, concentric cones, flat tops and grade rings shall be pre-cast reinforced concrete and shall conform to ASTM Designation: C478 with the additional requirement that the cement used shall be Type V sulfate resistant. Sewer manhole sections shall be manufactured without the provision for steps. Joints for the barrel section shall be tongue and groove. Manholes shall conform to these Improvement Standards and Standard Details.

5.5.1 Refer to Section 8, Force Mains, of these Improvement Standards for special finish requirements of Force Main receiving manholes (transition manholes from force main to gravity).

5.5.2 **PRE-CAST** reinforced concrete bases, barrels, tapered sections, concentric cones, flat tops, and grade rings, sections shall conform to the Caltrans Standard Specifications except as herein provided.

- A. The pre-cast base shall be placed on a minimum of four (4) inches of three-quarter (3/4) inch crush rock bed.

5.5.3 **CAST-IN-PLACE** reinforced portions of manholes shall be constructed of Class A concrete as specified in Section 90 of the State Specifications. Bar reinforcing steel shall be furnished and installed in accordance with Section 52 of the State Specifications. **The District recommends the use of pre-cast manhole bases with flexible boot connectors for all Sanitary Sewer manholes.**

- A. The base thickness and reinforcement shall be as designed by the Design Engineer.
 - a) For manholes extending to a finish depth of fourteen (14) feet, a minimum of eight (8) inches with a minimum of one (1) mat of number four (#4) reinforcement bars each way.
 - b) For manholes extending to a finish depth of greater than fourteen (14) feet, a minimum of twelve (12) inches with a minimum of two (2) mats of number four (#4) reinforcement bars each way.
- B. The bottoms of manholes, as shown on the plans, shall be neatly shaped to match the pipe inflow and outflow and shall be brushed to a smooth finish with a wet brush.
- C. All work shall be cured for a minimum period of ten days (or as directed by the Design Engineer) after being placed and shall be protected from injury.
- D. **All cast-in-place bases shall be inspected during construction, shall be properly cured, and accepted by the District Engineer before the stacking of any barrels or cones.**

5.5.4 **CAST-IN-PLACE SADDLE MANHOLES** shall be reinforced concrete and the top half of the pipe shall be removed after the base has properly cured.

5.5.5 No pipe shall project more than 0.17 feet into a manhole (except for drop inlet pipes) and in no case shall the bell of a pipe be built into the wall of a manhole or structure.

- 5.5.6** Each pipe shall have a resilient connection to the manhole conforming to ASTM C923 such as KOR-N-SEAL, A-LOK, or equal.
- 5.5.7** All joints in the sewer manhole shaft shall be thoroughly cleaned and sealed watertight with a preformed joint sealant gasket material conforming to ASTM Designation: C923. Kent-Seal, Ram-Nek or approved equal. The joint sealant gasket material shall match the manhole wall thickness.
- 5.5.8** The inside and outside of all sewer manholes shall be sealed as needed to provide a watertight environment and pass the required vacuum testing as specified hereinafter.
- A.** All manholes shall have the outside of all joints and other openings (including all pin lift holes and all visual imperfections to the outside surface) sealed by the application of an approved flexible six (6) inch minimum mastic tape material, (Henry – RUB’R-NEK or approved equal). The joint tape shall be applied prior to the placement of any backfill material and prior to any testing. A bitumastic material shall be applied around all pipe penetrations of the manhole to provide a watertight seal.
 - B.** Subject to groundwater conditions, the District may require the application of a layer (approximately 1/8” thick) of a waterproofing bitumastic material to the entire exterior surface of any manhole prior to backfilling.
 - C.** All manholes shall have the inside sealed prior to any testing by applying an approved grout which meets or exceeds ASTM CL107 Grade B, and AASHTO T260, mixed to a plastic consistency. All lift holes and all visual imperfections to the inside surface, including joints shall be sealed and brushed to a smooth finish with a wet brush.
 - D.** Subject to ground water conditions, the District may require the application of an interior coating such as: Tamms-HEY’DI, Koester NB1, Tegraproof, or Xypex, to seal the interior surface of any manhole to limit the infiltration of ground water.
- 5.5.9** **The District shall not accept any manholes with any ground water infiltration. Further, the Contractor shall, at no cost to the District, repair any manhole which develops any water infiltration problem after testing for a minimum period of not less than one (1) year after all subdivision improvements are accepted or as directed by the District.**
- 5.6** **BACKFILLING:** Backfilling shall be brought up to subgrade prior to testing. Completing backfill prior to testing shall be per Section 4 of these Improvement Standards. In no case shall there be any placement of permanent pavement prior to successful completion of the test. It shall be the responsibility of the Contractor to locate and repair at his own expense any defective joints, fitting or leaks, until the results of the tests are satisfactory.
- 5.7** **TESTING AND CLEANING OF SEWER LINE:** The sanitary sewers shall be tested between manholes or between manholes and cleanouts by the following method. All testing, except for Vacuum testing, shall be done after all utilities within the roadways (sanitary sewer, storm drain, water, and dry utilities) have been trenched, backfilled and subbase of the roads has been achieved. Tests for final acceptance shall be made in the following order.
- 5.7.1** Contact a minimum of two (2) Working Days prior to any and all testing and / or observations to schedule an inspection Vacuum test and acceptance of the Sanitary Sewer manholes and lines.
 - 5.7.2** Clean and Ball Flush or Hydro-Vac all manholes and sewer lines to be accepted, as needed. All construction debris shall be removed from the lines and manholes before any testing or Closed Circuit Television (CCTV).
 - 5.7.3** Low-pressure test of VCP shall be only between accepted manholes and all laterals directly out of the accepted manholes.
 - 5.7.4** CCTV all sewer mains, manholes and view all laterals from main line (the District shall be present during testing). Additional CCTV of any lateral services shall be as directed by the District.

5.7.5 Additional cleaning and / or Ball Flushing shall be required of all manholes and sewer lines to remove all construction debris prior to the final acceptance of the project.

5.8 **VACUUM TESTING OF MANHOLES:** All Sanitary Sewer manholes shall be Vacuum tested per ASTM C1244-93 and meet the following requirements prior to acceptance. If the sewer manhole fails the test, the manhole shall be repaired by the Contractor and re-tested. The District may also require any manhole to be re-tested using this method if there is reason to suspect that the sewer manhole has been disturbed during any construction operation or if ground water infiltrates into the manhole. In order to prepare a sewer manhole for this test, the following shall be accomplished:

5.8.1 **NO BACKFILL** shall be placed around any manhole until the outside surface of the manhole is inspected and accepted by the District.

5.8.2 All lift holes, connections and inside and outside joints shall be sealed watertight. All grout placed on any of the inside surfaces of the manhole shall be brushed to a smooth finish with a wet brush.

5.8.3 The manhole must be drained of all liquids. No amount of water shall be allowed inside of the manhole during the vacuum test.

5.8.4 All pipes entering the manhole shall be plugged, taking care to securely brace the plug from being drawn into the manhole.

5.8.5 The test plate shall be installed and sealed in accordance with the manufacturer's recommendations.

5.8.6 A vacuum of ten (10) inches Hg (mercury) shall be drawn, the valves closed, and the vacuum pump shut off.

5.8.7 With the valves closed, the time shall be measured for the vacuum to drop to nine (9) inches Hg (mercury). The minimum test time to drop one (1) inch Hg shall be not less than sixty (60) seconds.

The manhole shall pass if the time is greater than the times listed in the following Table 5.7-1 for particular manhole sizes or as directed by the District Engineer.

Table 5.7-1	
Minimum Vacuum Pass Times	
Manhole Size (Inches)	Minimum Time to drop to 9" Hg (seconds)
48	60
54	67
60	75
72	90
84	105
96	120

5.8.8 The Contractor shall supply the vacuum equipment, plugs, acceptable oil filled gauge and a minimum of one spare gauge, along with any necessary ladders or catwalks and safety equipment to provide the inspector with access to view the test gauge. In addition, the District may compare the Contractor's gauge with a District-owned gauge at any time.

5.9 **LOW PRESSURE AIR TEST:** The gravity sewer piping shall be tested in accordance with the current adopted National Clay Pipe Institute Low Pressure Air Test for Sanitary Sewers (Procedures and Tables). All mains and service laterals shall be tested and passed, including service laterals connected directly to a manhole. The minimum duration of time for passage of any segment of the sewer system shall be as indicated within the aforementioned tables, but never less than thirty (30) seconds.

- 5.9.1** The maximum reach to be tested shall be the reach between two consecutive vacuum tested and accepted manholes.
- 5.9.2** The Contractor shall supply the compressor, plugs, necessary piping, and acceptable oil filled gauge and a minimum of one spare gauge, along with any necessary ladders or catwalks and safety equipment to provide the inspector with access to view the test gauge. In addition, the District may compare the Contractors gauge with a District-owned gauge at any time.
- 5.10 CLEANING AND BALL FLUSHING:** Prior to testing and before the sewer lines are acceptable for CCTV, they shall be cleaned, ball flushed, and / or Hydro-Vac removing all foreign matter from all lines and manholes to the satisfaction of the District Engineer. Suitable traps shall be placed in the manholes during cleaning to intercept large material. Such material shall be removed from the line prior to any CCTV.
- 5.11 CLOSED CIRCUIT TELEVISION INSPECTION:** After completely cleaning and flushing all lines, introduce approximately twenty (20) gallons of water, thirty (30) minutes to one (1) hour prior to CCTV. The water is to be introduced at each of the first manholes to have CCTV inspected. The first manhole shall be the highest invert manhole within each area being CCTV inspected. It shall follow the slope downstream to the final manhole within the area. Except at intersecting manholes, the inspection shall again go to the highest invert manhole and proceed to the intersecting manhole before proceeding downstream. The following shall apply to CCTV unless directed otherwise by the District Engineer:
- A.** The Contractor shall contact to schedule with District, a minimum of two (2) Working Days prior to the CCTV to coordinate and have the District Engineer and / or Inspector present during all times of the CCTV recording.
 - B.** The Contractor / Developer shall submit a resume from the CCTV Company for review and acceptance prior to any CCTV. The Contractor / Developer shall supply the CCTV services as required to achieve acceptance of the final pipeline and include said cost within their original bid or as directed by the contract or the District Engineer.
 - C.** The current adopted County of Sacramento requirements for Closed Circuit Television (CCTV) operations shall apply, unless otherwise directed by the District.
 - D.** The CCTV shall be recorded on the format, and printed as specified by the District Engineer. CCTV Company shall have on site during the session all the equipment needed to record, and print all reports, (this shall include but not be limited to, extra printer cartridges and paper, along with extra blank devices of the format required by the District). Only one (1) day and / or project shall be placed on any recording device, and all reports shall be delivered to the District before the end of each workday of CCTV, but no later than two (2) working days, unless otherwise directed by District Engineer.
 - E.** Camera equipment shall have adjustable illumination, and be in solid state color with a pan and tilt, and have adjustable focal distance. It shall be fitted with a target sized per Table 5.11-1 below to a maximum of one (1) inch in outside diameter or as directed by the District Engineer for all pipes. The center of the one (1) inch target shall be of a contrasting color, highly visible during the CCTV recording. The target shall be attached to the front of the camera and in full view at all times. The target attachment rod shall be sized, constructed, and connected to the camera equipment in a manner, which limits the obstruction of the view.
 - F.** Begin recording with a view of the inside of each manhole as viewed from the top of the manhole looking in.
 - G.** Lower the equipment into the manhole. Equipment set footage shall be noted from the centerlines of the manhole to the focal point in the direction of equipment travel. The camera shall travel at a speed not to exceed thirty-two (32) feet per minute or as directed by the District. The Contractor shall verify accuracy of all CCTV footage counters.

- H.** The equipment shall slow down and stop to pan as needed to view, identify and document each of the following:
- a) Inside each service connection.
 - b) Joint separation or Offset joint.
 - c) Damage joint seals.
 - d) Alignment problem.
 - e) Cracked or damaged pipe, including lined or point repaired pipe.
 - f) Debris in the line and/or laterals.
 - g) Identifiable all sags or high points which exceeds Table 5.11-1.
 - h) Root intrusion.
 - i) Inflow or Infiltration.
- I.** If the Camera fails to pass through the line because of a blocked section, the inspection shall be temporarily suspended. The Contractor shall clear the obstruction as directed by the District, and then re-started from the beginning or resume the inspection, as directed by the District. The finished Inspection Report shall run from centerline of manhole to centerline of manhole without any blockage.
- J.** Additional CCTV of the service laterals is as directed by the District.

5.12 PIPELINE ACCEPTANCE CRITERIA: All new and rehabilitated pipelines shall be inspected in accordance with the requirements of this Section 5, or as directed by the District Engineer. The recorded CCTV shall be delivered to the District upon completion of the inspection, but in no case no later than two (2) working days after. The CCTV recording shall become the property of the District. The District shall review the CCTV inspection records and printout within ten (10) working days and will notify the Contractor if:

5.12.1 The review revealed a satisfactory installation, or if the review revealed deficiencies.

- A.** The following deficiencies in sanitary sewer installation that are identified by the Inspector and / or by television inspection shall be corrected by the contractor at no cost to the District:
- a) Excess joint separation.
 - b) Excessive Offset of joints.
 - c) Excess joint deflection of more than the manufacturer's recommendation.
 - d) Cracked or damaged pipe, including liner pipe.
 - e) Debris in line and /or laterals.
 - f) Identifiable sags or high points for the section tested is more than 1/20 the pipes inside diameter to a maximum of one inch as specified in the following Table 5.11-1:

Table 5.11-1	
Inside Diameter	Maximum Sag or High Point
Inches	Inches
4	1/4
6	3/8
8	1/2
10	1/2
12	5/8
15	3/4
18	7/8
21 or Greater	1

- 5.12.2** All other criteria as set by OPUD Standard Specifications and/or Special conditions shall apply as directed by District Engineer.
- 5.12.3** The Contractor / Developer will be notified by the District of any deficiencies revealed by the Inspector or by the television inspection that will require repair. The Contractor / Developer has the option to request a meeting with the District Engineer to review the CCTV report.
- 5.12.4** Upon completion of the required corrective actions, the sewer will be re-televised in accordance with this Section. This process shall be repeated until the review of the recorded television inspection reveals a satisfactory installation.
- 5.12.5** **REFERENCE POINTS** information file indicating the location of all manholes and main line COTG shall be submitted to the District for acceptance as one of the following:
- A.** GPS reference file (file format shall be as directed by the District),
 - B.** Red noted set of plans indicating the approximate depth to the top and a minimum of three (3) reference point items that are all protected from damage and / or loss during the construction.
- 5.12.6** **NOTE:** The District will issue a letter to the Contractor, Developer, and Yuba County Public Works only after Construction Acceptance of all Sewer and Water facilities for the specific portion of the project or its entirety and the District has accepted the RP information provided by the Contractor. All letters of Acceptance made relative to any project does not relieve the Contractor / Developer from compliance with the requirements of the District or of any other agency having jurisdiction.

5.13 **CONNECTION TO EXISTING FACILITIES:**

- 5.13.1** The Contractor / Developer shall be responsible for providing the District with a preliminary observation report showing the basic condition of the sewer system downstream of the proposed point of connection, as directed by the District.
- 5.13.2** When improvement plans require connection to an existing facility which will require bypassing or storage of existing flows, a note shall be placed on the plans which provides an estimate of the existing flow to be bypassed (in gpm), or the time between which the flow may be stopped. The note shall also require the contractor to contact the District at least two (2) working days prior to initiating the bypass/stoppage operation so the temporary facilities and equipment can be evaluated for adequacy. Where operation will be accomplished on a major trunk or interceptor, submittal of a work plan for review may be required prior to initiation of the operation.
- 5.13.3** New Sanitary Sewer facilities will not be allowed to be put into service until written authorization is obtained from the District.

- 5.13.4** During all phases of construction, Contractors, Developers and Owners shall be held responsible for controlling and preventing the introduction of any infiltration, drainage, construction debris, or hazardous materials (including, but not limited to paints, solvents, petroleum products) of any quantity into any portion of the District's facilities by means of plugs and / or trapping devices.
- A.** The Developer / Contractor and / or Owner shall be responsible for installation, inspections, maintenance, and cleaning of all plugs, trapping devices, and associated equipment. All devices shall be inspected not less than a minimum of once a week.
 - B.** The Developer / Contractor and / or Owner shall be responsible for the sizing of all plugs and trapping devices to fit properly within each of the sewer channels of all manholes leaving all construction zones.
 - C.** All plugs and trapping devices shall be provided with all necessary restraining and safety devices needed to limit movement.
 - D.** All plugs and trapping devices shall remain in place until otherwise directed by the District and shall only be removed in the presence of the District.
 - ◆ Examples of some items, which have been found in the past, include: Drainage water with excess silts, sediments, and rocks, Plastic tarp, Building Paper, Building insulation, Wood, Stucco, Paint, and Plumbing products. These items tend to become lodged within a manhole or even in the main line between the manholes, all of which cause blockage within the system. Such items have also been found in sewer lift station facilities.
- 5.13.5** All associated costs, fees, and fines for the removal and / or cleaning of all infiltration, drainage, construction debris, or hazardous materials from the system will be billed directly to the Developer, Contractor, and / or Owner responsible for allowing them to enter the system. These costs will include, but may not be limited to, Sewage Pump truck, Hydrovac truck, or other cleaning and inspection equipment, as well as the associated costs for the District to observe the cleaning. It will also include all incurred repairs of associated with any debris reaching a Lift Station or Waste Water Treatment Facility, damaged equipment.

5.14 REHABILITATION OF EXISTING FACILITIES:

- 5.14.1 PRE-REHABILITATION CCTV INSPECTION.** The report shall be clearly labeled as "Pre-Rehabilitation CCTV Inspection". During the Pre-Rehabilitation CCTV Inspection, the camera shall stop at all significant observations to ensure a clear and focused view of the pipe condition. At a minimum, the report shall contain the following:
- A.** A clear view of a minimum of 75% of the pipe wall.
 - B.** A list of "significant observation", including, but not limited to: services, blockages, cracks, roots, material deposits and / or debris, offsets, infiltration, changes of materials and any structural decay.
- If the camera cannot pass through the entire section of pipeline (blockage, etc.), the Contractor shall reset the equipment at the downstream manhole and attempt to inspect the section of pipe from the opposite direction. If the camera again fails to pass through the blocked section, the video inspection shall be temporarily suspended and the District notified. The Contractor shall clear the obstruction as directed by the District, and then resume the inspection. The finished Inspection Report shall run from centerline to centerline of manhole.
- 5.14.2 MATERIALS.** All proposed products, methods and material shall be considered on a case by case basis and shall be submitted to the District for approval prior to placement. All products, materials, and workmanship shall be provided with guarantee and warranty as directed and approved by the District (Refer to Section 9 of these Standards).
- A.** Broken, cracked or damaged pipes shall be repaired only as directed and approved by the District. When acceptable, an approved sealant material shall be injected from the inside of the pipe to the exterior to stop infiltration. Once infiltration has been stopped, an approved liner sleeve material shall be installed.

- B.** All installation work shall be per the manufacturer's written product specification and shall be performed by the manufacturer's certified / authorized representative.
- 5.14.3 REHABILITATION TESTING AND ACCEPTANCE** shall be in accordance with these Improvement Standards, for new construction or as directed by the District.