SECTION 33 33 00

SANITARY SEWERAGE UTILITIES

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work specified in this Section shall include:

1. Constructing 12-inch, 15-inch, 18-inch, and 21-inch diameter bell and spigot type extra strength vitrified clay pipe (VCP) on crushed rock bedding wrapped in geotextile fabric.
2. Clean and televise inspection of existing main sewers prior to lining with cured-in-place liner.
3. Lining existing 8-inch, 10-inch, 12-inch,14-inch and 21-inch inside diameter sewer pipe.
4. Cleaning and mortaring manholes.
5. Constructing cast-in-place or precast concrete manholes and catch basins.
6. Constructing 6-inch or 8-inch diameter side sewer connections.
7. Constructing 10-inch diameter VCP culverts.
8. Constructing side sewer vent and air trap assemblies.
9. Televising existing active side sewers and culverts, and locating and televising unknown connections in the field to verify whether connections are active.
10. Repair, replacement or construction of 6-inch or 8-inch diameter side sewers and 10” diameter VCP culverts.
11. Plugging and filling existing sewer facilities with slurry grout as indicated on contract plans.
12. Abandoning, removing, and disposing existing sewers and related structures, where indicated on contract plans.
13. Performing post-construction TV inspections of newly lined or constructed main sewers, side sewers, and culverts.
14. Furnishing and installing cast iron water traps for existing catch basins to remain, including cleanout caps within the contract limits.
15. Furnishing and installing connections to and between sewers, structures, and culverts.
16. Furnishing and installing detectable warning tape for trench restoration after backfilling and prior to pavement restoration per detail on contract plans.
17. Temporary restoration of pavement inside sewer trench as necessary per excavation regulations.
18. Reconstructing pavement inside the sewer T-trench limit with 8-inch thick concrete base.
19. Reconstructing pavement inside the sewer T-trench limit with 10-inch thick concrete base.
20. Restoration of pavement per excavation regulations.
21. Furnish and install all trench excavation, shoring and bracing conforming to applicable safety orders as specified; and de-water as necessary.
22. Bypassing sewer flow from main sewers, side sewers, and culverts during construction.
23. Supporting San Francisco Water Department (SFWD) facilities within the sewer trench.

24. Performing necessary work due to unforeseen conditions related to sewer and drainage work.
25. At conclusion of work, cleaning existing catch basins located within contract limits.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Other contract documents, including Drawings, Relevant Sections of the SFDPW Standard Specifications and these Specifications apply to the work specified herein.

B. Division 1, General Requirements.

C. Section 01 55 26 – Traffic Control.

D. Section 31 23 33 – Trenching and Backfilling.

E. Section 31 23 34 – Pavement Cutting and Excavation.

F. Section 32 12 16 – Asphalt Paving.

G. Section 01 41 28 – Protection of Existing Water and AWSS Facilities.

H. Section 33 01 30.63 – Sewerage System Mortar Rehabilitation.

I. Section 33 01 30.73 – Cured-In-Place Liner Pipe.

1.03 REFERENCES

A. Department of Public Works Standard Specifications, November 2000.

B. ANSI/ASTM C12 - Practice for Installing VCP Lines.

C. ANSI/ASTM C-425 - Compression joints for VCP and fittings.

D. San Francisco Plumbing Code & California Plumbing Code.

E. San Francisco Public Works Code.

1.04 SUBMITTALS

The Contractor shall provide six (6) copies of the following:

A. Certified report of the actual test results for VCP Extra Strength pipes meeting the requirements of ASTM C700 for approval by City Representative in accordance with the requirements of Section 305.05 of the SFDPW Standard Specifications.

B. Certified report of the actual test results for precast components of concrete manholes meeting the requirements of ASTM C-478 for approval by City Representative in accordance with the requirements of Section 310 of the SFDPW Standard Specifications.

C. Certified report for manhole frame and cover meeting the requirements of ASTM A-48 for approval by City Representative.

D. Certified report for cast-iron water trap for catch basin including cleanout cap meeting the

requirements of ASTM A-48 for approval by City Representative.

E. Side sewer connection detail.

F. Mechanical shear band repair coupling with external stainless-steel band to be used for all 6-inch, 8-inch, and 10-inch diameter VCP pipe to pipe connections and for larger VCP main sewer repairs.

G. Detectable warning tape for sewer trench.

PART 2 - PRODUCTS

2.01 MATERIALS

A. VCP extra strength pipes used in this contract shall be in accordance with the applicable requirements of Sections 305 and 306 of the SFDPW Standard Specifications.

B. Mechanical shear band repair couplings with external stainless-steel bands used for VCP connections shall meet or exceed ASTM Specification C425. Pipe to pipe deflections cannot exceed allowable tolerances per manufacture recommendations to ensure watertight seal and achieve the required structural strength. Per SFDPW Standard Specifications, **no angled pipe cutting, or mitered joints** will be permitted for making VCP to VCP pipe connections. VCP elbows and fittings shall be utilized where directed in the contract documents, SFDPW Standard plans, or when directed by the City Representative.

C. VCP main sewers and fittings for pipe diameter 12-inch and larger shall be of bell and spigot type unless directed by City Representative.

D. Manholes shall be constructed of precast Concrete Sections in accordance with ASTM Designation C478 or cast in place in accordance with the applicable requirements of Section 303 of the SFDPW Standard Specifications and in accordance with SFDPW Standard Drawings 87,181, 87,182. Manhole frame and cover shall be in accordance with SFDPW Standard Drawing 87,190.

E. Geotextile fabric shall be AASHTO M288, Class 2, Non-Woven.

F. Cast iron water trap for catch basin shall be in accordance with SFDPW Standard Drawing 87,194 meeting the requirements of ASTM A-48. Cleanout cap for cast iron water trap shall be “T” cone expandable cleanout plug S-802 of ETCO Specialty Products, Inc. from Groeniger and Co. or approved equivalent.

G. Catch basin shall be constructed of Class 6-3500-1½ concrete precast sections in accordance with the applicable requirements of Section 304 or cast in place in accordance with the applicable requirements of Section 303. Concrete catch basin shall be constructed in accordance with SFDPW Standard Drawings 87,187, 87,188, and details on SW-dwgs.

H. Side Sewer connection shall be Tap-Tite Fitting manufactured by Tap-Tite Co., Tap-N-Tee Sewer Connector manufactured by Flex Connection Inc. dba Joints, Twistee Sewer Saddle manufactured by Mission Rubber Co. or approved equal.

I. Cast Iron side sewers used in this contract shall be in accordance with applicable requirements set forth by the Department of Building Inspection (DBI).

J. Detectable warning tape shall be 6-inch wide 5-MIL thick green metallic warning tape with words “CAUTION: BURIED SEWER”.

K. Mortar Material shall be as specified in Section 33 01 30.63 of these Specifications

L. Hydraulic Cement shall be premixed Portland cement based hydraulic cement consisting of Portland cement, graded silica aggregates, special plasticizing and accelerating agents. It shall not contain chlorides, gypsum, plasters, iron particles or gas forming agents, or promote the corrosion of steel it may come in contact with. It shall be formulated at the factory and supplied in factory sealed and labeled pre-measured containers, which shall contain the complete quantity of materials required for this work. Invert patch compound shall be sued to fill minor voids and cracks, to bring substrates up to profile, to provide watertight seals at invert, lateral line and house connections. The fast setting hydraulic cement patch is designed to be troweled or knead applied and capable of providing a watertight seal when cured and shall conform to the following specifications:

Property	ASTM Test	Result
Set Time	ASTM C-191-92	3 – 5 min
Compressive Strength	ASTM C-109-91	
1 Hour		700 psi
1 Day		2,000 psi
28 Days		5,500 psi

PART 3 - EXECUTION

3.01 EXAMINATION

A. The Contractor shall verify that trench is ready to receive work and excavations, dimensions and elevations are as indicated on drawings.

3.02 PREPARATION

A. The Contractor shall clean existing sewers with high velocity hydro cleaning equipment before excavation work.

All high-velocity sewer cleaning equipment shall be truck-mounted for ease of operation. The equipment shall have a minimum of 500 feet of one inch ID high pressure hose with a selection of cleaning nozzles.

The equipment shall have a minimum working pressure of 1,000 pounds per square inch. The nozzles shall be capable of producing a scouring action from 15 to 45 degrees in all size lines designated to be cleaned.

All sludge and dirt shall be flushed downstream within the sewer system and shall not cause line stoppage due to heavy accumulation. Sludge, dirt, sand, or other solids shall not be removed from the sewer system unless directed by the City Representative. In order to prevent heavy accumulation, the Contractor may need to flush the downstream sewer segments up to maximum of two downstream blocks and/or as directed by the City Representative.

B. The Contractor shall hand trim excavations to required elevations. Correct over-excavation with crushed rock.

C. The Contractor shall remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

3.03 BEDDING

A. Bedding shall be crushed rock as specified in Section 31 23 33 of these Specifications and shown in the contract plans.

B. Bedding material shall be placed as shown on the contract plans. Care should be taken to completely fill all spaces under the haunches.

3.04 MANHOLES

A. Manholes shall be constructed in accordance with SFDPW Standard Drawings 87,181, 87,182 at the locations shown on the Contract Drawings. Ladder rungs shall be omitted.

B. Construction of manholes shall be in accordance with Section 310 of the SFDPW Standard Specifications. Manholes elected by Contractor to be cast-in-place shall be constructed in accordance with the applicable requirements of Section 303 of the SFDPW Standard Specifications.

C. Concrete base of new manholes shall have reinforcing steel, be allowed to set overnight at the minimum time, and shall not be subjected to any load on the same day the concrete base was poured. No. 4 steel reinforcement is required in concrete base for Standard Drawing 87,181.

D. All new or salvaged manhole frames and covers to be used on new manholes shall be in accordance with the SFDPW Standard Drawing 87,190 or as directed by the City Representative.

E. Maximum distance between the pavement and top of the manhole cone shall be 15” or as directed by the City Representative otherwise.

F. Side sewer connections to the manhole shall not be more than 12” higher than the manhole invert.

3.05 INSTALLATION OF MAIN SEWER

A. The Contractor shall have available at all times either (1) a transit and rod or (2) a sewer laser beam instrument suitable for transferring elevations from established points to the sewer work and drainage work. The spirit level, taut string, and/or straight edge will not be acceptable for sewer construction work.

B. HDPE main sewer shall be installed in accordance with the requirements of Section 322 of the SFDPW Standard Specifications.

C. Lay pipe to slope gradients noted on the contract drawings, unless conform elevation conflicts with slope, in which case, conformance to existing elevation takes precedence.

D. The Contractor shall not use soil mounds or any blocking to bring the pipe to grade. Contractor shall not apply pressure to the top of the pipe, such as with a backhoe bucket,

to push the pipe down to grade.

E. Refer to Section 31 23 33 for trenching, backfill, bedding and compaction requirements.

F. The Contractor shall furnish and install detectable warning tape as indicated in detail on contract plans.

3.06 INSTALLATION OF POLYETHYLENE PIPE BY PIPE BURSTING

A. General

This is a system for bursting and replacing underground pipes without excavation. This is a process whereby a pneumatically operated percussive mole is driven through an existing pipe, shattering it as it progresses and forcing the broken pipes into the surrounding soil. A passage large enough to take a pipe of similar or greater diameter is thereby created.

B. Excavation and Backfill of Pits

All earthwork for working pits for installing HDPE shall be done in accordance with the following:

1. Dimension of pits shall be of necessary size, shape and depth as required for sheeting and bracing and for proper performance of the work.
2. Pits shall be dug with minimum length and width dimensions and to the depth necessary for installation of HDPE. The pit shall be kept dry at all times. Where the bottom is not firm, a layer of crushed rock shall be placed on the bottom to provide working surface. Where a utility goes through a pit, it shall be adequately supported and protected.
3. Pits shall be adequately shored to support the adjoining ground. All pits shall at all times be adequately barricaded from public access and for the protection of workers.
4. Backfill for the pit shall be as specified for trenches.
5. The pits shall be sheeted and dewatered at all times. The Contractor shall furnish and install equipment to keep the pit free of excess water. The Contractor shall also provide surface protection during the period of construction so that surface runoff does not enter the pit. The dewatering method used shall not cause damage to adjacent structures or property due to lowering of the water table and subsequent ground settlement. In the event any damage does occur, the Contractor shall be fully responsible for correction of damage and/or settlement of any claims arising from such damage.

3.07 SIDE SEWER (LATERAL) AND CULVERT T.V. INSPECTION AND ABANDONING INACTIVE SIDE SEWER (LATERAL) AND CULVERTS

A. General

All existing active and newly built side sewers and culverts interiors shall be inspected by CCTV with a high resolution camera (minimum 640x480 pixels) and delivered with original resolution in MPEG format on DVD media, prior to paving, to evaluate if their structural condition warrants replacement and ensure quality and craftsmanship of assets delivered, respectively. These side sewers shall be televised either from the side sewer (lateral) air vent or inside open main sewer trench. As directed by the City Representative, Contractor may be asked to televise side sewers and culverts located outside the limits mentioned but within paving contract limits. The Contractor shall

to give accurate measurement of locations where defects are identified, and identify the street address of property or location of the intersection return. If Contractor encounters debris inside active side sewers and culverts, Contractor shall flush all debris out prior to re-televising in order to ensure a clear and complete television recording.

5. Record locations of active side sewers and culverts and their conditions shall be provided by the Contractor in the form of a log and drawing markup.

C. POST CONSTRUCTION QUALITY ASSURANCE FOR ACCEPTANCE

1. Televising of newly constructed side sewer shall be performed from the farthest practicable upstream location to the connection to the main sewer line. In no case may the television inspection exclude more than 10% of the expected finished pipe length; and as such, this exclusion will only be allowed from the uppermost portion of the run. Side sewer TV inspection must be completed, submitted, and accepted prior to substantial completion. Side sewer inspection should be performed after necessary back fill and compaction of 90% of lower lateral. **The inspection video must show the backfilled lower lateral and a context shot of the surrounding landmarks (for a location reference) before the camera is inserted into the sewer lateral for the remainder of the inspection.**
2. Post construction video inspection will be reviewed by the City Representative to validate contractor workmanship of the new pipeline facilities, installed in place after necessary backfill and compaction of the trench excavation has been completed. Video inspections of newly laid pipeline facilities performed prior to necessary backfill and compaction of the trench excavation, or lacking evidence thereof, will not be accepted or used by the City Representative to validate contractor workmanship. Further, CCTV inspections must include video of the surrounding landmarks for location reference and a shot proving the sewer lateral has been backfilled before the camera is inserted into the pipe; any inspection not showing the backfill at the time of inspection will be rejected. All subsequent CCTV inspection, repairs, and replacement shall be completed at no cost to the City.
3. Contractor shall furnish a copy of the side sewers and culvert DVD(s) and log(s), at the same time as the post construction main sewer DVD(s) are furnished, to the City Representative. If side sewer and culvert TV inspection DVD(s) and log(s) are not furnished, then the respective progress payment shall be withheld.
4. CCTV inspection camera quality shall be minimum 640x480 pixel resolution with adequate lighting to illuminate the sewer lateral interior wall 6 feet ahead of the camera. Inspection speed shall be reduced so that insertion of the camera does not exceed 1 foot per second.
5. All CCTV inspection videos shall be accurately reflected on construction drawings by the Contractor, certified by the City Representative.

3.08 SIDE SEWER CONNECTION

A. The sewer plan indicates side sewer connections at all side sewer vent locations or at least one lateral for each property. The number and locations of these connections are approximate only.

B. The Contractor shall confirm that each property has been provided with a satisfactory connection for all its side sewers per Section 316.06 of the SFDPW Standard Specifications.

C. This item includes any necessary side sewer extensions to make the proper connection.

3.09 REPAIR OR REPLACEMENT OF 6 OR 8-INCH DIAMETER SIDE SEWER (LATERAL) AND CULVERT

A. The Contractor is responsible to coordinate and make TV inspection DVD available to the City Representative for review as soon as possible after TV inspection has been performed and obtain City Representative's approval prior to reconnecting the side sewer to the main.

B. The City Representative shall review the television inspection of each side sewer/culvert, and evaluate its structural condition.

If existing side sewer or culvert has defects stated in section "T.V. INSPECTION OF EXISTING SIDE SEWERS/CULVERTS AND ABANDONING INACTIVE SIDE SEWER", then side sewer or culvert shall be repaired or replaced as necessary by the Contractor with the City Representative's approval.

All locations, invert elevations and slopes of side sewers shall be conformed unless otherwise directed by the City Representative.

3.10 PRE AND POST CONSTRUCTION MAIN SEWER VIDEO INSPECTION

A. CCTV-General

Existing main sewer (of pipes to be lined), newly constructed, and rehabilitated main sewer interiors shall be inspected by CCTV with a minimum 1080p resolution (1920x1080 pixels) camera and delivered with original resolution in MPEG format on DVD media to detect active connections prior to plugging and filling the sewer, and to evaluate the Contractor's quality of workmanship after constructing/rehabilitating a new sewer facility, respectively.

All pipes shall be thoroughly cleaned prior to inspection, and inspections must be conducted in accordance with the version 6 of National Association of Sewer Service Companies (NASSCO) Pipeline Assessment & Certification Program (PACP). **Personnel on the job are required to be trained and NASSCO PACP certified. Minimum PACP guidelines for any sewer main CCTV inspection will be enforced. Inspections shall not exceed 0.5 feet per second and shall stop, pan and zoom all around all joints, lateral connections, culvert connections, and any visible irregularities or defects. Video quality shall be minimum 1080p resolution (1920x1080 pixels) with adequate lighting to illuminate the pipe interior wall.**

The Contractor shall record by color video picture and voice recording, the main sewer and locations of the side sewer connections. **The video shall have the project name, limits of the sewer being televised, Maximo Asset ID, and the upstream and downstream manhole numbers (the Start_Node and End_Node fields from the pipe's GIS) superimposed on the beginning of each inspection.** The camera shall travel through the sewer at a speed at or below half of a foot (0.5 feet) per second. A continuous counter in feet measurement shall be superimposed at the bottom of the screen to show the distance from the starting manhole or a reference point to an exit manhole or reference point. The date of the video recording shall be superimposed on the screen. There shall be sufficient artificial light in the interior of the sewer to produce a clear well-focused picture and illuminate the pipe interior wall.

The DVD shall have a label with the project name, specification number and limits including the date of the television inspection. The Main Sewer TV Inspection Log shall have the locations measured in feet of the side sewer connections from the commencement point of the camera, a sketch showing the project limits and the direction the camera was run through the sewer. The Contractor shall provide and furnish the City with a copy of the "Main Sewer TV Inspection Log and TV DVD" to: Construction Manager, 49 South Van Ness, Suite 700 San Francisco, CA 94103, through the City Representative.

Within one week following the pre-construction meeting, the City Representative will provide the Contractor electronically the following files for performing main sewer inspections:

1. For pre-construction inspection, shape file of existing sewer lines with current pipe asset ID's, including start and end node ID's of manholes, drains and non-manhole junctions
2. For post-construction inspection, a shape file of to be constructed sewer lines and nodes with new asset ID's.
3. A shape file of City base map consisting of right-of-way/blocks and streets.

Contractor will:

1. Import sewer line shape file to sewer inspection software such as Pipelogix, POSM, WinCan, GraniteXP or others.
2. Select the corresponding pipe record to be inspected by identifying upstream manhole ID from pipe list. Enter the MXASSETNUM field from the pipe's GIS into the NASSCO Pipe_Segment_Reference field, use the Start_node value from the pipe's GIS in the NASSCO Upstream_MH field and the End_Node value from the pipe's GIS for the Downstream_MH field.
3. Begin inspection
4. Stop the tractor, pan and zoom at defects and irregularities in or on the pipe surface. Irregularities are defined as anything other than a uniform pipe wall material and includes scuffs, cobwebs, discoloration, or any NASSCO defined observation code.
5. Pause and turn camera view at each lateral/culvert connection point
6. Code all observations such as defects, locations of lateral connections, change in pipe alignment, unusual conditions, and other discernible features, as defined in the NASSCO PACP observation codes
7. End inspection at FINISH manhole or other non-manhole junction (connection to another main sewer or change in pipe size as identified per sewer line shape file).
8. Prepare one video file for each individual inspection from manhole to manhole or end node as defined by the GIS.
9. Export inspections to NASSCO Exchange Database format for delivery to the City.

If counts or locations of main sewer assets (pipes and manholes) built differ from plan drawings then the contractor shall communicate these changes to the City immediately so that the City can provide new asset ID's and GIS maps before CCTV inspection begins. All assets must have city provided ID's before CCTV inspection begins. The Contractor should expect a **minimum** of one full workday for the City to provide new/updated asset ID's and GIS maps.

Database file, DVD & Log:
Contractor shall submit database files, video files in MPEG format with minimum 1080p resolution (1920x1080 pixels) on DVDs, and digital inspection logs in PDF format. All

main sewer inspection data will be standardized per PACP guidelines and in NASSCO Exchange Database Format.

DVD submitted by the Contractor should have a typed label on the front of the DVD providing the following information:

1. Contract ID Number (#)
2. Street Names with Limits
3. Main Sewer Post-Construction TV (or Pre-Construction)
4. Contract Title
5. Date

The Contractor shall submit the post-construction main sewer video DVDs within five (5) calendar days after the completion of the sewer work at each location for review. Post construction video inspection will be reviewed by the City Representative to validate contractor workmanship of the newly constructed main sewer facilities, installed in place after necessary backfill and compaction of the trench excavation has been performed. Video inspections of newly constructed main sewer facilities performed prior to necessary backfill and compaction of the trench excavation will not be accepted or used by the City Representative to validate contractor workmanship. If post-construction main sewer TV inspection DVDs are not furnished, the respective progress payment shall be withheld.

3.11 CORRECTION OF DEFECTS IN SEWER FACILITIES CONSTRUCTED IN THIS CONTRACT

A. The Contractor will provide warranty of three (3) year period, following the date of acceptance of the work, for all the sewer facilities constructed under this contract.

B. The City will inspect the sewer facilities prior to the end of three (3) year post-construction period, following the date of acceptance of the work.

C. Adjacent pipes at each joint are to be concentric. Maximum allowable eccentricity is 1% of pipe I.D. or 3/16-inch, whichever is greater. Greater eccentricity shall be corrected.

D. Any defects shall be corrected by the Contractor at no expense to the City.

3.12 CLEANING EXISTING CATCH BASINS LOCATED WITHIN PROJECT LIMIT

A. At the conclusion of all the work under this contract, Contractor shall clean all existing catch basins and storm water inlets located within the project limit as specified on the contract drawings. Cleaning shall include but not limited to removal of sediments and other debris in the barrels and cast iron traps. The Contractor shall notify the City Representative at least 24 hours in advance before cleaning the existing catch basins. After cleaning catch basins, the Contractor shall get approval of City Representative for satisfactory work performance.

3.13 CAST IRON WATER TRAP FOR CATCH BASIN

A. After cleaning existing catch basins, the Contractor shall check the condition of existing water trap if one exists. If existing catch basin does not have cast iron water trap or existing water trap is not in good condition or according to our standards, the Contractor shall furnish and install new cast-iron water trap including cleanout cap per SFDPW Standard Plan 87,194.

If existing water trap is in good condition but does not have a specified cleanout cap, the Contractor shall furnish and install cleanout cap including all incidental work at no cost to City All work shall be done as directed by City Representative.

3.14 CATCH BASIN

A. Catch basin shall be constructed in accordance with SFDPW Standard Drawing 87,187 or 87,188 at the locations shown on the Contract Drawings and in accordance with Section 312 of the SFDPW Standard Specifications. Catch basin elected by Contractor to be cast-in-place shall be constructed in accordance with the applicable requirements of Section 303 of the SFDPW Standard Specifications.

B. Rim Elevations of the Catch basins shall conform to the Curb Ramp Drawings. Remove existing storm water inlets and construct catch basins and restore curb, gutter and sidewalk where applicable.

C. Catch basin frame and grating shall be in accordance with the SFDPW Standard Drawing 87,193.

D. New catch basins shall include cast iron water trap with cleanout cap.

3.15 INSTALLATION OF VCP CULVERTS

A. VCP culverts shall be installed in accordance with the requirements of Section 306.06 of the SFDPW Standard Specifications.

3.16 RECORD DRAWINGS

A. Prior to acceptance of the work for warranty, the Contractor shall furnish the City Representative one (1) neatly and legibly marked, in red pencil, set of full-size record drawings showing all changes in the Contract Plans as specified in Section 01 77 00. Changes shall include, but not be limited to the field changes or adjustments in the final location or dimensions of the contract work; changes due to requests for information, changes due to change orders and changes to reflect the actual existing conditions. Marking of the drawings shall be accurate and current, and be done at the time work is performed. These drawings shall be presented monthly to the City Representative for review.

B. Each completed Record Drawing shall be signed by the Contractor and Construction Manager to indicate he has reviewed the drawings for completeness. Each completed Record Drawing shall be transmitted to the Project Engineer through the City Representative as soon as the work on that drawing is completed.

C. If record drawings are not furnished, the final payment will be withheld.

3.17 HANDLING AND DISPOSAL OF SEEPAGE, STORM WATER AND SEWAGE

A. The Contractor shall protect the work from water damage, shall keep excavations dry, shall dispose of water from all sources, shall do all necessary pumping, and shall install suitable conduits to remove and divert all sanitary, ground water, tidewater, storm water flow and unforeseen sub-drain, so as to prevent back-up, by-passing to the Bay, flooding damage to property, and damage to City's Right Of Way in accordance with the requirements of Sections 301 and 700.08 of SFDPW Standard Specifications and the requirements as set forth in this Section.

B. The Contractor shall not impede or obstruct any wet weather flow anywhere in the sewer system. Backing up of flow is not allowed. The Contractor shall be cautioned that a sudden storm can cause heavy flow in the sewer system that could reach ground level. The bypassing sewer flow system shall be adequate to handle a 5-year storm routinely and heavy flow that could reach ground level during the period of construction.

C. The Contractor is hereby informed that the work inside existing sewers or sewer trench involves contact with raw sewage, sludge, grease and hydrogen sulfide may be present. The Contractor shall provide all safety equipment including gas-monitoring devices to detect the presence of toxic gases. OSHA health and safety requirements shall be strictly enforced.

D. The Contractor shall take adequate measures to prevent the impairment of the operation of the sewer system. The Contractor shall prevent construction material, pavement, concrete, earth, paints, thinners, solvents or other debris or toxic material from entering a sewer or sewer structure including surface flow collection system, like catch basin and culvert.

E. Contractor shall provide for the transfer and dispose of sanitary and storm flow around the section or sections of pipe that are to be installed. The bypass shall be made for diversion of the flow at an existing upstream access point and gravity or pumping the flow into a downstream access point of adjacent system. The pump and bypass lines shall be of adequate capacity and size to handle the flow. The flow height shall not exceed one foot above the crown of any active sewer pipe access point.

F. The bypass pumping should be scheduled for 24-hour continuous duty from the start of the operation with backup equipment available for periods of maintenance and refueling. The Contractor shall obtain a night noise permit for any work between the hours of 8:00 PM and 7:00 AM, as specified in Section 2908 of the Police Code.

3.18 DRAINAGE MAINTENANCE

A. The Contractor shall be responsible for maintaining and keeping in operation all storm water inlets and catch basins throughout the entire project site, both inside and outside the phased construction work are, for the duration of the project, including the performance of the punch list until final acceptance of the project.

B. The Contractor shall check and remove all debris from the storm water inlets and catch basins prior to the rainy season and clear any clogged inlets and catch basins during the rainy season.

C. Prior to the final inspection and acceptance, the Contractor will check the storm water inlets and catch basins for debris and remove debris, if any.

3.19 CONTRACTOR SHALL NOT ALLOW DEBRIS TO ENTER SEWAGE SYSTEM

A. The Contractor shall take adequate measures to prevent the impairment of the operation of the sewer system. He/she shall prevent construction material, pavement, concrete, earth, or other debris from entering a sewer, sewer structure, catch basin or storm water inlet.

3.20 REMOVAL OF EXISTING CONCRETE SLURRY

A. The Contractor shall notify the City Representative immediately upon discovering concrete slurry within the sewer trench. The City Representative will arrange appropriate authority to witness the slurry material.

B. The Contractor shall remove existing concrete slurry when encountered within the trench width limit, including all incidental work.

C. Concrete slurry removal from the trench shall be disposed of as Contractor’s property in a legal manner.

END OF SECTION