PART B
SPECIAL PROVISIONS

SPECIFICATIONS

FOR

SANITARY SEWER REHABILITATION

NEILSON ST BACKLINE, THOUSAND OAKS BLVD BACKLINE, PORTLAND AVE BACKLINE, PERALTA AVE, SAN LORENZO AVE /WASHINGTON AVE, CAPISTRANO AVE, MIRAMAR AVE BACKLINE, THE ALAMEDA BACKLINE, ARLINGTON AVE BACKLINE, MICHIGAN AVE BACKLINE, ALAMO AVE BACKLINE, SAN DIEGO RD AND BACKLINE, SANTA BARBARA RD AND BACKLINE, SAN LUIS RD BACKLINE, HENRY ST BACKLINE, BERRYMAN ST AND BACKLINE, GRIZZLY PEAK BLVD AND BACKLINE, CYPRESS ST/BUENA AVE, ROSE ST, GRANT ST, EDITH ST, AND MILVIA ST BACKLINE

SPECIFICATION NO. 20-11352-C
DESCRIPTION OF BID ITEMS

Description of Bid Items including their respective measurement for payment are listed below:

**BID ITEM NO. 1: MOBILIZATION AND DEMOBILIZATION**

Mobilization shall include obtaining insurance and bonds, moving all materials and equipment onto the site, obtaining and paying for all permits by other agencies if applicable, furnishing temporary construction utilities, installing construction signs (see Special Conditions of the Special Provisions for details), and installing any temporary buildings, spaces and facilities for the Resident, Project Representative and inspectors, and other construction facilities all as required for the proper performance and completion of the work.

Demobilization shall include final cleaning and restoration of the job site, removal of all temporary facilities and equipment from the work area, disconnection of the temporary construction utilities and turnover of project to the City.

Measurement for payment shall be as Lump Sum (LS). For the purpose of payment, mobilization will be assumed to be 60 percent of the total amount bid for this item. Payment for mobilization will be according to the following schedule.

A. When the monthly partial payment estimate of the amount earned, not including the amount earned for mobilization, is 5 percent or more of the original contract amount, 50 percent of the contract item price for mobilization will be included in said estimate for payment.

B. When the monthly partial payment estimate of the amount earned, not including the amount earned for mobilization, is 10 percent or more of the original contract amount, the total amount earned for mobilization shall be 75 percent of the contract item price for mobilization, and said amount will be included in said estimate for payment.

C. When the monthly partial payment estimate of the amount earned, not including the amount earned for mobilization, is 20 percent or more of the original contract amount, the total amount earned for mobilization shall be 100 percent of the contract item price for mobilization, and said amount will be included in said estimate for payment.

**BID ITEM NO. 2: TRAFFIC CONTROL PLAN AND PROVISIONS**

This item shall include all labor, materials, and equipment as needed to provide traffic control as described under Special Condition No. 24 of the specifications. Contractor shall submit a proposed traffic control plan, no later than two (2) weeks after the award of the project by the Berkeley City Council, for review and approval by the City’s traffic engineer. The plan shall be prepared under the direction of a licensed traffic engineer or civil engineer, who must stamp and sign the plan.

Measurement for payment shall be as Lump Sum (LS). The contractor shall be paid on the
BID ITEM NO. 3: LIGHTED MESSAGE BOARD

This item is to provide compensation for additional notification near the work area. The Contractor shall provide portable changeable message boards for use on the project at the City’s request. Each portable message sign unit shall consist of a controller unit, a power supply, and a structural support system, all mounted on a trailer, per Caltrans Standard Specification Section 12-3.32. Message boards shall be installed as directed by the Engineer at least one (1) week prior to start of construction and shall be relocated to the next street location as job progresses or as directed by the Engineer. Board shall be maintained to the satisfaction of the Engineer.

Measurement for payment shall be as Each (EA).

BID ITEM NO. 4: PRE-CONSTRUCTION AUDIO/VIDEO SURVEY, AND DISTRIBUTION OF PUBLIC NOTICES

This item shall include all labor, materials, and equipment, including, but not limited to, recording devices, video cameras, cameras, and other equipment as required to perform a pre-construction survey to document existing conditions at the project site, staging areas, and other areas affected by the work. The contractor shall submit written records, photographs, and videos to the City prior to commencing work. The documentation of pre-construction conditions for the areas affected by the work is to facilitate restoration of the areas to existing conditions or better.

This item shall also include all labor and materials associated with the distribution of Public Notices to residences, businesses, and other properties affected by the work. The first Public Notice will be prepared and distributed by the City. The second Public Notice (Door Hanger) shall be distributed by the Contractor at least 72 hours prior to construction. The Contractor shall submit the “Door Hanger” for approval by the City prior to distribution to the residences, businesses, and other properties affected by the work.

Measurement for payment shall be as Lump Sum (LS). The Contractor shall be paid on the basis of work completed as noted on the monthly submission of progress payment.

BID ITEM NO. 5: PRE-CONSTRUCTION CLOSED CIRCUIT TELEVISION (CCTV) INSPECTION AND LOCATION OF ACTIVE SEWER LATERALS

This item shall include coordination with and notification of the public; locating, identifying, marking and recording all active laterals; and documenting the pre-construction condition of existing sewer pipes. This item shall include labor, materials, utility marking devices, CCTV equipment, videos devices, and other CCTV related materials for clear documentation of deficiencies in the existing sewer pipes and location of laterals. Flow control, diversion and/or bypass pumping required in order to facilitate the pre-construction CCTV shall be included.
Documentation shall follow the National Association of Sewer Service Companies (NASSCO) pipeline assessment certification program (PACP) coding standards for all defects and consist of a color, DVD-format video, log sheets, and a written report detailing the pre-construction condition of the pipeline and lateral connection/openings. The report shall note the time and date of video inspection, street name, upstream and downstream maintenance hole, direction of view, direction of flow, surface material, pipe size, pipe material, lateral connections, video tape number, counter number, and a detailed logging of defects encountered. The report shall be prepared by an operator or worker who holds current PACP certification and shall be done using POSM format.

The camera shall be lowered into the upstream maintenance hole (or access point) and placed into the pipe. The camera cable shall be retracted to remove slack to ensure an accurate distance reading. The cable distance-counter shall be reset to the distance between the centerline of the maintenance hole and the front lens of the camera. The camera shall provide a view of the inside of the insertion maintenance hole, then move through the pipeline in a downstream direction whenever possible, stopping at the center of the next maintenance hole and provide a view of the inside of the end structure. The cable distance counter shall measure the distance between each inspection segment – centerline to centerline. The camera shall stop at all significant observations to ensure a clear and focused view of the pipe condition. Observations shall include, but not be limited to: Laterals – Standard, Laterals – Protruding, Cracks, Offset Joints. Open Joints, Sags, Line Deviations, Siphons, Missing Sections, Mortar, Infiltration, Debris, Grease, and Roots. If the quality of the video is deemed unacceptable by the Engineer, the pipeline shall be re-televised at no additional cost to the City.

Contractor shall identify all defects in the existing pipe requiring corrective action prior to pipe rehabilitation and identify any areas that require additional corrective actions that are above and beyond allowance for point repairs included in the bid items for pipe rehabilitation. Any areas that may require additional corrective actions shall be documented and provided to the Engineer for immediate review and direction. CCTV shall be provided to the City’s Engineer within 2 weeks of notice to proceed.

Measurement for payment shall be in Linear Foot (LF) of pre-construction video inspection of pipe inspected (regardless of pipe size) and submittal of video and report to the City. Any time or materials expended on investigating inactive laterals shall be included in the unit cost of locating active laterals. Work on this bid item shall be in accordance with Sub-section 500-1 of the Technical Provisions.

**BID ITEM NO. 6: CONSTRUCTION STAKING AND CUT SHEETS**

This item shall include all labor, materials, and equipment for the setting of construction stakes or markers as necessary to establish the lines and grade required for the execution and completion of the work specified in the plans and specifications. Included in this bid item is the preparation of cut/fill sheets to be submitted to the Engineer for approval prior to staking. The Contractor shall be responsible for any errors made in the sewer flow line and grade of the finished work and shall remedy the defective work with no extra cost to the City.
Measurement for payment shall be as Lump Sum (LS). For additional information, see Special Conditions of the specifications.

**BID ITEM NO. 7: REHABILITATE EXISTING MAINTENANCE HOLE (MH), ALL DEPTHS**

Contractor shall verify that the maintenance hole identified to be rehabilitated is a precast concrete maintenance hole. Brick m maintenance holes shall not be rehabilitated. If the maintenance hole is not a precast concrete maintenance hole Contractor shall notify the Engineer for further direction and prior to any further work on the maintenance hole. If the maintenance hole is a precast concrete maintenance hole, work shall proceed as described below.

This item shall include all labor, materials and equipment as needed for rehabilitation of existing precast concrete maintenance holes. Work includes but is not limited to removal of existing concrete as required, removal of existing steps, removal and replacement of the maintenance hole rim, frame and cover, delivery of discarded frame and cover to the City's Corporation Yard, repair of damaged connections to maintenance hole, construction of new concrete flow channel as indicated in the plans and specifications, installation of new drop connection when elevation difference between the inlet and outlet is at least the distance for the required fittings and the drop is 18-inches or greater, grouting (if necessary) with Mainstay ML-72, lining of maintenance hole interior wall with Mainstay DS-5, vacuum testing, removal and disposal of debris, sediment and grease, flow control, diversion or bypass pumping, dewatering, furnishing of concrete to raise the maintenance hole invert to the elevation shown in the Plans, and forming and reconstructing channels and base. The existing maintenance hole channel shall be removed prior to placing new pipe and concrete. If plastic pipe is laid through maintenance holes, cement water stop maintenance hole coupling shall be used at the pipe entry and exit point for all pipes, and shall be in accordance with the plans and specifications.

Listed below are the names of concrete repair and liner material for maintenance hole rehabilitation and their local distributor:

a) Mainstay by Madewell Products Corporation
   Steve Hallam, Sales Manager
   Telephone: (770) 856-4470
   Fax: (866) 859-2961

Any similar methods submitted by the Contractor that will produce the same result of eliminating water infiltration shall be reviewed and approved by the Engineer. Rehabilitation of the maintenance hole interior surface by means of grouting only will not be accepted. Maintenance hole rehabilitation shall include the installation of an approved lining material.

Measurement for payment shall be as Each (EA). The Contractor shall be paid on the basis of work completed as noted on the monthly submission of progress payment and after the delivery of the discarded frame and cover to the City's Corporation Yard. **The City reserves**
the right to withhold payment for work under this bid item until successful completion of required testing.

BID ITEM NO. 8: CONSTRUCT STD. MAINTENANCE HOLE (MH) AND DROP MH, ECCENTRIC CONES, ALL DEPTHS

This item shall include all labor, materials, and equipment necessary for the excavation and construction of a new standard maintenance hole or drop maintenance hole as shown in the plans and specifications, the connection to pipe, drop connection, concrete encasement, bedding, backfill, including imported backfill, aggregate base material, compaction, lining of the interior wall of the maintenance hole with Mainstay DS-5 (see Bid Item No.7 for a list of liner material providers), vacuum testing, flow control, diversion or bypass pumping, dewatering, temporary and permanent resurfacing, including asphalt or concrete pavement reconstruction to restore the existing improvements. Maintenance hole located in the street areas shall be TYPE A frame and cover in accordance with I/I Standard Detail, Drawing No. 14 and; maintenance hole located in the backline areas shall be TYPE B frame and cover in accordance with I/I Standard Detail, Drawing No. 15. Item shall also include temporary shoring, sheeting, and bracing (which may include sheet piling) as necessary for the execution and completion of the work specified in the plans and specifications.

Measurement for payment shall be as Each (EA) regardless of depth. Contractor shall be paid on the basis of work completed as noted on the monthly submission of progress payment. The City reserves the right to withhold payment for work under this bid item until successful completion of required testing.

BID ITEM NO. 9: REMOVE EXISTING STRUCTURES AND CONSTRUCT STD. MAINTENANCE HOLE (MH), DROP MH, OR LAMPHOLE, ECCENTRIC CONES, ALL DEPTHS

Contractor shall verify that the maintenance hole identified to be removed is a brick maintenance hole. If the maintenance hole is not a brick maintenance hole, Contractor shall notify the Engineer for further direction and prior to any further work on the maintenance hole. If the maintenance hole is a brick maintenance hole, work shall proceed as described below.

This item shall include all labor, materials, and equipment necessary for the excavation and complete removal of existing maintenance hole or lamphole structure, removal and replacement of the maintenance hole rim, frame and cover, delivery of discarded frame and cover to the City's Corporation Yard, removal and disposal of debris, the construction a new standard maintenance hole, mini- maintenance hole, drop maintenance hole, or lamphole as shown in the plans and specifications, the connection to pipe, drop connection, concrete encasement, bedding, backfill, including imported backfill, aggregate base material, compaction, lining of the interior wall of the maintenance hole with Mainstay DS-5 (see Bid Item No.7 for a list of liner material providers), vacuum testing, flow control, diversion or bypass pumping, dewatering, temporary and permanent resurfacing, including asphalt or concrete pavement reconstruction to restore the existing improvements. Structures located in
the street areas shall be TYPE A frame and cover in accordance with I/I Standard Detail, Drawing No. 14 and; structures located in the backline areas shall be TYPE B frame and cover in accordance with I/I Standard Detail, Drawing No. 15. Item shall also include temporary shoring, sheeting, and bracing (which may include sheet piling) as necessary for the execution and completion of the work specified in the plans and specifications.

Measurement for payment shall be as Each (EA). The Contractor shall be paid on the basis of work completed as noted on the monthly submission of progress payment and after the delivery of the discarded frame and cover to the City's Corporation Yard. **The City reserves the right to withhold payment for work under this bid item until successful completion of required testing.**

**BID ITEM NO. 10: REHABILITATION BY METHOD "A" CURED-IN-PLACE-PIPE (CIPP) LINER, INCLUDES POINT REPAIR TO CORRECT SAGS**

This method of sewer rehabilitation involves the insertion of an approved epoxy or epoxy-vinyl ester-resin-impregnated flexible fabric tube. The material shall be compatible with and capable of carrying epoxy or epoxy-vinyl-ester resin, be able to withstand installation pressures and curing temperatures. The approved epoxy shall be compatible with the application and be able to cure in the presence of hot water or steam. Refer to Section 500-1.4 of the “Greenbook” 2015 Edition and Part D – Technical Provisions for material composition, testing and other requirements for the installation of CIPP liner. Refer to Section 500-1.2 of the “Greenbook” 2015 Edition and Part D – Technical Provisions for Pipeline Point Repair/Replacement. PVC Pipe Liner is not allowed for this project.

If specified on the plans, this method can also include the use of an approved ultraviolet (UV) light-cured resin-impregnated fiberglass tube liner (See Special Condition No. 30). The Project Engineer reserves the right to change the design from UV CIPP to flexible fabric (felt) CIPP.

This item shall include all labor, materials, and equipment necessary for the execution and completion of this rehabilitation method, including, but not limited to surface removal and restoration including reconstruction of pavement on any street disturbed by the sewer work (See Special Condition No. 18), dewatering, flow control, diversion or bypass pumping (Note: Bypass Pumping for sewer mains 27” and larger, shall be included in Bid Item No. 28), point repairs, removal of protruding laterals, excavation, backfill including imported backfill, sewer cleaning, insertion and curing of fabric tube, reinstatement of lateral connections, and testing.

Obtaining construction access from property owners for work on private property shall be included in the unit bid price, see Special Condition No. 20.

Measurement for payment shall be in "Linear Foot (LF)." Payment includes as-built submittals to the City. **The City reserves the right to withhold payment for work under this bid item until successful completion of required testing.**
BID ITEM NO. 11: REHABILITATION BY METHOD "B" PIPE SPLITTING OR OTHER COMPARABLE METHOD, INCLUDES POINT REPAIR TO CORRECT SAGS

This method involves the use of a hydraulically powered system to install a new pipe through, and in the place of, an existing pipe. This method includes the operation known as pipe splitting or bursting whereby the hydraulic powered system is used to expand and break away existing pipe and at the same time pull a new pipe into the resulting pipe space.

This method also includes the operation known as sliplining whereby a new pipe is inserted into and pulled through an existing pipe of larger diameter, and the existing pipe generally remains intact.

There are several types of pipe breaking and/or sliplining equipment now available and the Contractor shall submit to the City for review and approval the method to be used, procedures, equipment and diagrammatic sketches showing the pipe installation.

This method includes the excavation of two pits large enough to accommodate the winching equipment in one pit, and insertion of the new HDPE pipe in the other.

This item shall include all labor, materials, and equipment necessary for the execution and completion of this rehabilitation method, including, but not limited to potholing of utilities, surface removal and restoration including temporary and permanent resurfacing, including asphalt or concrete pavement reconstruction to restore the existing improvements disturbed by the work (See Special Condition No. 18), excavation of pits, dewatering, flow control, diversion or bypass pumping, point repairs, excavation backfill including concrete grout where noted on the drawings and at lateral connections and other openings, imported backfill, compaction of bedding material beneath and around the location of active lateral connections and at excavation pits, pipe cleaning, pipe installation, and testing.


At no extra cost to the City, Contractor shall repair to original condition any surface damaged as a result of ground heave from method “B” rehabilitation. This includes restoration of grading, paving, sidewalks, driveways, curb, gutter, striping, landscaping, or of any other surface feature damaged by method “B” rehabilitation.

Item includes the performance of point repairs needed to correct the alignment (sags, offset joints, protruding laterals, etc…) if such repairs are identified in the drawings. Provide an allowance for one additional point repair (25 contiguous linear feet, or less) per 600 feet of existing pipe being rehabilitated in the unit price bid, see Special Condition No. 15.

Obtaining construction access from property owners for work on private property shall be included in the unit bid price, see Special Condition No. 20).
Item shall also include temporary shoring, sheeting, and bracing (which may include sheet piling) as necessary for the execution and completion of the work specified in the plans and specifications. See Special Condition No. 19 for approximation of ground elevation and depth of excavation for backline sewers.

Measurement for payment shall be in Linear Foot (LF). The Contractor shall be paid on the basis of work completed as noted on the monthly submission of progress payment. Payment includes As-Built submittals to the City. The City reserves the right to withhold payment for work under this bid item until successful completion of required testing.

BID ITEM NO. 12: SEWER CONSTRUCTION AND REPLACEMENT BY METHOD “C” TRADITIONAL OPEN TRENCH METHOD, 8-INCH TO 45-INCH DIAMETER, INCLUDES REPAIR OF SAGS

This item shall include all labor, materials, and equipment necessary for the execution and completion of this work including, but not limited to saw cutting of existing surfacing, excavation, hand excavation including potholing to determine the location of existing sewer and adjacent main and service utilities before trenching, correction of conflict between new sewer and utilities, removal and disposal of abandoned utilities as required, restoration of curb, gutter and sidewalk, restoration of existing improvements such as landscaping, lawn, brick walkways, retaining walls, etc. (see Special Condition No. 18), flow control, diversion or bypass pumping (Note: Bypass Pumping for sewer mains 27” and larger, shall be included in Bid Item No. 28), locating wire, connection to existing structures, dewatering, bypass pumping, pipe provision and installation, bedding, backfill, including imported backfill, aggregate base material, compaction of bedding material beneath and around the main and at the locations of active lateral connections, pipe cleaning, pipe installation, temporary resurfacing, permanent resurfacing including concrete pavement reconstruction, testing of new sewer line, and all other work (excluding maintenance holes) necessary to install the pipe complete and in place.

This method includes the excavation of trenches large enough to remove the existing pipe and accommodate the installation of new HDPE pipe. HDPE pipe length shall be assembled in the field with butt-fused joints in accordance with ASTM D 2657 and Section 500-1.3.5 of the Technical Provisions.

As directed on the Plans, this method also includes the excavation of trenches large enough to remove the existing pipe and accommodate the installation of new PVC pipe. New PVC pipe to be installed shall match pipe type, wall thickness, and inner diameter of the existing pipe. Connection to existing pipe shall be via shielded repair coupling (Fernco 5000 RC series, or approved equal).

Obtaining construction access from property owners for work on private property shall be included in the unit bid price (see Special Condition No. 20).

Item shall also include temporary shoring, sheeting, and bracing (which may include sheet
piling) as necessary for the execution and completion of the work specified in the plans and specifications. See Special Condition No. 19 for approximation of ground elevation and depth of excavation for sewers and backline sewers.

Measurement for payment shall be in Linear Foot (LF). The Contractor shall be paid on the basis of work completed as noted on the monthly submission of progress payment. Payment includes As-Built submittals to the City. The City reserves the right to withhold payment for work under this bid item until successful completion of required testing.

**BID ITEM NO. 13: LOWER LATERAL RECONSTRUCTION (TYPICALLY 4-INCH AND 6-INCH LATERALS)**

This item shall include all labor, materials, and equipment necessary for the notification of and coordination with the public; saw cutting of existing surfacing including concrete pavement; surface removal and restoration; excavation; dewatering; removal and disposal of existing pipe; locating wire; flow control, diversion or bypass pumping; provision and installation of high density polyethylene pipe (HDPE) and fittings (the new lateral pipe and two-way cleanout shall match the existing size); bedding; backfill including imported backfill; compaction; mortar cement for plugging abandoned sewer main at point of disconnections; mortar cement for plugging abandoned sewer laterals at point of disconnection; demolition and removal of existing tee, lateral riser, and cleanout frame and cover for abandoned sewer laterals; testing; temporary and permanent resurfacing including asphalt or concrete pavement reconstruction to match existing improvements; temporary sheeting, plywood, or equivalent type of cover to protect newly-poured concrete from vandalism; sidewalk and driveway repair; and all other necessary work to install the pipe complete and in place.

Item shall also include temporary shoring, sheeting, and bracing as necessary for the execution and completion of the work specified in the plans and specifications. See Special Condition No. 19 for approximation of ground elevation and depth of excavation for backline sewers.

Measurement for payment shall be Linear Foot (LF). Pipe shall be measured along the centerline of the pipe from downstream side of the two-way cleanout near the curb or sidewalk to the connection of the fitting at the sewer main. Unit prices for this bid item are for all depths. Payment includes all As-Built drawings and completion of "Sewer lateral As-Built Record" Forms. The City reserves the right to withhold payment for work under this bid item until successful completion of required testing.

**OPTION** - Lower lateral reconstruction using pipe rehabilitation method “B” instead of open trench method shall conform to the description of bid item – “SEWER REHABILITATION BY METHOD “B” – PIPE SPLITTING OR OTHER COMPARABLE METHOD” and Special Condition No. 15. Replacement of Concrete encased lower lateral encountered when using this method shall be removed at the Contractor’s expense.
BID ITEM NO. 14: INSTALLATION OF TWO-WAY CLEANOUT AND LATERAL RISER

This item shall include all labor, materials, and equipment necessary for installation of a two-way cleanout and lateral riser, including but not limited to, excavation, pipe cutting, cleanout fitting, couplings, riser, connection to the lateral and/or existing building sewer, concrete collar, frame, cover, backfill including imported backfill, compaction, flow control, and dewatering as required.

Measurement for payment shall be as Each (EA). Payment includes all As-Built drawings and completion of "Sewer lateral As-Built Record" Forms.

BID ITEM NO. 15: CONNECTION OF ACTIVE LATERALS TO NEW OR REHABILITATED SANITARY SEWER MAIN OR MAINTENANCE HOLE

Contractor is responsible for reconnecting all active sewer laterals to the rehabilitated sewer mains. This item shall include all labor, materials and equipment necessary for preparation of maintenance hole or new sewer main for lateral connection; lateral connection including butt fusion, saddle or wye, and miscellaneous materials; use of in situ cutter, bedding, excavation, backfill including imported backfill; dewatering, flow control, diversion or bypass pumping, testing, compaction, and temporary and permanent resurfacing to match existing improvements. The contractor is responsible for locating all active sanitary sewer laterals connecting to rehabilitated sewer main or maintenance hole prior to construction. Payment for locating active sewer laterals is included as part of Bid Item No. 5.

Sanitary sewer lateral connection(s) shall be in accordance with Sections 500-1.1.7 of the Technical Provisions and Sections 500-1.6.6, and 500-1.6.12 of the “Regional Standards”, June 30, 2016 Edition.

Measurement for payment shall be as Each (EA). Payment includes all As-Built drawings and completion of "Sewer lateral As-Built Record" Forms.

BID ITEM NO. 16: POST-CONSTRUCTION CLOSED CIRCUIT TELEVISION (CCTV) INSPECTION AND CONSTRUCTION AS-BUILT DRAWINGS

Post-construction CCTV inspection shall be performed to determine if the construction of the new pipe is in compliance with the plans and specifications. This item shall include labor, CCTV equipment, videos and other CCTV related materials for proper documentation of the newly installed sewer pipes. Flow control, diversion and/or bypass pumping required in order to facilitate the post-construction CCTV of the large diameter sewer pipe shall be included in Bid Item No. 28.

The camera shall be lowered into the upstream maintenance hole (or access point) and placed into the pipe. The camera cable shall be retracted to remove slack to ensure an accurate distance reading. The cable distance-counter shall be reset to the distance between the
centerline of the maintenance hole and the front lens of the camera. The camera shall provide a view of the inside of the insertion maintenance hole, then move through the pipeline in a downstream direction whenever possible, stopping at the center of the next maintenance hole and provide a view of the inside of the end structure. The cable distance counter shall measure the distance between each inspection segment – centerline to centerline. The camera shall stop at all significant observations to ensure a clear and focused view of the pipe condition. Observations shall include, but not be limited to: Laterals – Standard, Laterals – Protruding, Cracks, Offset Joints. Open Joints, Sags, Line Deviations, Siphons, Missing Sections, Mortar, Infiltration, Debris, Grease, and Roots. Defects encountered during the video inspection and any rejected work shall be repaired and re-televised at the Contractor’s expense.

Post-construction CCTV inspection shall be documented with written reports that include a NASSCO Pipeline Assessment Certification Program (PACP) coding of all defects. The PACP coding shall be accomplished by an operator or worker who holds current PACP certification. Inspection report shall be done using POSM format. Documentation shall consist of a color, DVD-format video, log sheets, and a written report detailing the post-construction condition of the pipeline and lateral connection/openings. The report shall note the time and date of video inspection, street name, upstream and downstream maintenance hole, direction of view, direction of flow, surface material, pipe size, pipe material, lateral connections, video tape number, counter number, and a detailed logging of defects encountered. If the quality of the video is deemed unacceptable by the Engineer, the pipeline shall be re-televised at no additional cost to the City.

Measurement for payment shall be in Linear Foot (LF) of post-construction video inspection of pipe inspected (regardless of pipe size) and submittal of two (2) copies of the final video and report to the City. Payment includes all As-Built submittals to the City.

**BID ITEM NO. 17: REMOVE EXISTING AND CONSTRUCT STANDARD CURB AND GUTTER**

This item is an allowance for replacement of deteriorated curb and gutter that is adjacent and outside the limit of trench excavation. Estimated cost for the restoration of curb and gutter directly under the sewer trench excavation shall be included under sewer construction. The exact location of work of this bid item will be determined and marked in the field by the Engineer. The curb and gutter damaged during the construction shall be restored at the Contractor's expense. Work shall include saw cutting, excavation, provision of temporary curb ramps for access, removal and disposal of discarded concrete, backfill material, compaction test, Portland Cement Concrete, formwork and all other work necessary to construct the curb and gutter in place.

Measurement for payment shall be in Linear Feet (LF). The Contractor shall be paid on the basis of work completed as noted on the monthly submission of progress payment.
**BID ITEM NO. 18: REMOVE EXISTING AND CONSTRUCT STANDARD SIDEWALK AND DRIVEWAY**

This item is an allowance for all labor, materials, and equipment necessary for the replacement of deteriorated sidewalk and driveways that are adjacent and outside the limit of trench excavation. Estimated cost for the restoration of the sidewalk and driveways directly over the sewer trench excavation and full width of sidewalk to be removed and replaced shall be included under sewer construction. The exact location of work of this bid item will be determined and marked in the field by the Engineer. The sidewalk damaged during the construction shall be restored at the Contractor's expense. Work shall include saw cutting, excavating, provision of temporary curb ramps for access, removal and disposal of discarded concrete, backfill material, aggregate base material, compaction, Portland Cement Concrete, form work and all other work necessary to construct standard sidewalk and driveways complete and in place.

Measurement for payment shall be in Square Foot (SF). The Contractor shall be paid on the basis of work completed as noted on the monthly submission of progress payment.

**BID ITEM NO. 19-20: UTILITY CROSSINGS NOT SHOWN AND/OR IDENTIFIED ON THE PLANS AND NOT MARKED ON THE STREET**

This item is to provide an allowance for all labor, materials, and equipment necessary for potholing unforeseen utility company pipes or ducts not shown and/or identified on the Plans. This excludes existing sewer laterals encountered during open excavation and construction of the sanitary sewer. Included in this item are field investigations, hand excavation, removal and disposal of abandoned utility pipes and ducts 24-inches or smaller, field investigations, hand excavation, removal and disposal of abandoned pipes in conflict where required.

The Contractor shall notify the Engineer upon encountering this unforeseen utility crossing and before continuing the trench excavation.

Measurement for payment shall be made as Each (EA).

**BID ITEM NO. 21: ROCK EXCAVATION**

This item is for all labor, materials, and equipment necessary for excavation of rock encountered during trenching that requires jackhammering, drilling, or boring type of equipment including the excavation and removal of boulders with overall dimension of 18-inches in diameter or greater. Rock excavation shall also include hauling and disposal of rock, all labor, tools, materials, and equipment.

The Contractor shall notify the Engineer upon encountering the presence of such rock condition before continuing trench excavations.

Measurement for payment shall be in Cubic Yard (CY).
BID ITEM NO. 22:  PRESERVATION/RECONSTRUCTION/REPLACEMENT OF CITY MONUMENT

The Contractor shall be responsible for the preservation of existing survey monuments, benchmarks, reference points, and stakes. The Contractor shall replace City Monuments and reference marks removed during the performance of the work. Whenever a City Monument is disturbed or removed during the performance of the work, the Contractor shall replace the monument in accordance with Standard Plan 7940, 8090, 8091 or 8179, as applicable. Monument casings (boxes and lids) shall be provided by the contractor, and dome brass markers shall be supplied by the City.

Monument replacement must be done in a neat, workman-like manner. Pavement cuts shall be accurate, with vertical cuts to exact dimensions as shown on the Standard Plan. Each replacement monument shall be constructed such that the center of the dome brass marker is set within 0.04 foot of the referenced position. Monument boxes and lids shall be placed at the proper finished grade and as detailed by Standard Plan 7940, 8090, 8091 or 8179 as applicable. Existing monument lids shall be salvaged by the Contractor and delivered to the City Survey Staff or Project Inspector.

The City has elected to reference known monuments within the project site. Copies of the corner records for the referenced monuments shall be provided to the Contractor prior to the start of construction. For each monument that has been disturbed or removed, the replacement monument location(s) will be established by the referencing surveyor after final pavement is completed. The new dome brass marker shall not receive final punching prior to seven (7) days after completion of the monument construction.

In the event that any non-referenced monuments or monument reference points become in danger of being disturbed due to construction, the Contractor shall cease the threatening activity and notify the Project Manager and City Survey Staff immediately. Response to endangered monuments or reference points is a priority call, and they shall be referenced in accordance with the City of Berkeley Monument Reference Guidelines (see Appendix). In no case may an unreferenced monument or monument reference point be damaged during construction.

Should any monument not designated for replacement sustain damage during construction, the Contractor shall bear the expense for rebuilding it as well as for the survey work the City survey crew or its survey consultant must perform in the process. In any instance where the City deems a damaged monument to be irreplaceable, whether designated or not designated for replacement, the Contractor shall be fined $20,000 per monument.

Measurement for payment will be as Each (EA) for each monument installed. Work under this bid item shall include all labor, material, and incidentals necessary to install the monument complete in place. The Contractor shall be paid on the basis of work completed as noted on the monthly submission of progress payment and after the delivery of the salvaged lids to the City Survey Staff or Project Inspector.
**BID ITEM NO. 23: SUPPLEMENTAL WORK**

This item is an allowance for all labor, materials, and equipment for standby construction services as the need may arise by the City for responding to urgent or emergency sanitary sewer related projects located within the City. When the standby services are necessary, the City will define the location, limits and scope of work for the project and will request a cost proposal from the Contractor. The City has the option to accept, negotiate, approve or reject at its sole discretion any cost proposals for additional work requested. The additional work may include sanitary sewer replacement/rehabilitation and related work in either backline sewer easements on private property or within street and public right of way.

The scope will be defined, and shall include all labor, material, and equipment as needed to complete the work such as mobilization, demobilization, traffic control, construction signage, public notification, and construction staking, and may include, but is not limited to, flow control, diversion and/or bypass pumping, maintenance hole rehabilitation, construction of new maintenance hole, pipe rehabilitation, locating active laterals, lower lateral reconstruction, installation of two-way cleanouts, connection of active laterals to rehabilitated sewer main, pre- and post-construction CCTV, and preparation and submission of As-Builts.

The City does not have an obligation to provide or approve of any additional work under this bid item allowance.

Measurement for payment shall be as Lump Sum (LS). The Contractor shall be paid on the basis of work completed as noted on the monthly submission of progress payment.

**BID ITEM NO. 24: BAY AREA RAPID TRANSIT (BART) DISTRICT PERMIT TO ENTER**

Contractor shall work with the City’s Representative to obtain a Permit to Enter from Bay Area Rapid Transit (BART) District prior to starting work in the BART Right-Of-Way/Easement located on the project Plans.

The City of Berkeley has begun the application and review process with BART. Contractor shall obtain additional insurance coverage, adhere to BART’s general guidelines for construction, and agree to the general terms of the permit as illustrated in Appendix 6 of the project Specifications. Contractor shall submit one (1) wet-signed original of the required insurance certificates and endorsements no later than five (5) days after award by City Council.

A minimum of 2 weeks prior to start of work under the Permit, the Contractor shall give notice to the City’s Representative and BART Representatives. Additional time beyond the required two week minimum advance notice may be required for obtaining all approvals.
Full compensation for conforming to the requirements in the Permit, including any required fees, shall be considered as included in the bid price.

Measurement for payment shall be as Lump Sum (LS). The Contractor shall be paid on the basis of work completed as noted on the monthly submission of progress payment.

**BID ITEM NO. 25: CALTRANS ENCROACHMENT PERMIT/WORK AUTHORIZATION**

The Contractor shall apply for and obtain a double encroachment permit from Caltrans prior to start of work.

A minimum of one week prior to start of work under the Encroachment Permit, Contractor shall give notice to, and approval of construction details, operations, public safety, and traffic control shall be obtained from State Representative listed in the Encroachment Permit. Additional time beyond the required one week minimum advanced notice may be required for obtaining traffic control approval.

For bid purposes the contractor shall assume traffic control within Caltrans right-of-way will be authorized only from 9 a.m. to 3 p.m., Monday through Friday, excluding holidays as defined in the 2018 Caltrans Standard Specifications.

Caltrans Encroachment permit Storm Water Document Requirements shall be per the Caltrans Encroachment manual Section 406.2B.

Full compensation for conforming to the requirements in the encroachment permit, and work authorization, including any required fees, shall be considered as included in the bid price.

Measurement for payment shall be as Lump Sum (LS).

**BID ITEM NO. 26: CITY OF ALBANY – ADDITIONAL TRAFFIC CONTROL REQUIREMENTS AND REVIEW FOR PERMIT**

Contractor shall apply for, pay for, and obtain Encroachment and Traffic Control Permits through the City of Albany’s Building Department for work within the City of Albany’s right-of-ways. The contractor shall provide traffic control as described under Special Condition No. 24 of the specifications and in compliance with the City of Albany’s standard specifications. Contractor shall submit a proposed traffic control plan, no later than two (2) weeks after the award of the project by the Berkeley City Manager, for review and approval by the City of Albany and for review by the City of Berkeley’s traffic engineer. The plan shall be prepared under the direction of a licensed traffic engineer or civil engineer, who must stamp and sign the plan.

Additionally, the contractor shall work with the City of Berkeley’s and City of Albany’s representatives to obtain an Encroachment permit for work within the City of Albany’s right-
of-ways prior to starting construction.

Full compensation for conforming to the requirements in the Permit, including any required fees, shall be considered as included in the bid price.

Measurement for payment shall be as Lump Sum (LS).

**BID ITEM NO. 27: STORMWATER POLLUTION CONTROL AND SEWAGE SPILL PREVENTION AND RESPONSE REQUIREMENTS**

Stormwater Pollution Control shall be per Specifications, Special Condition No. 22, STORMWATER POLLUTION CONTROL.

The Contractor shall be fully responsible for preventing sewage spills, containing any sewage spillage, recovery and legal disposal of any spilled sewage, any and all fines, penalties, claims, and liability arising from negligently causing a sewage spill and any violation of any law, ordinance, code, order, or regulation as a result of a sewage spill.

Prior to the start of construction, the Contractor shall develop and submit to the City’s Representative, for review and approval, a written Spill Response Plan, developed to respond to any construction related sewage spill. This shall include, but is not limited to, all labor, materials and equipment necessary for the items below:

a. Identification of all nearby waterways, channels, catch basins and entrances to underground storm drains and furnishing all of the necessary materials, supplies, tools, equipment, labor and other services.

b. Means and methods of monitoring the flow in the sewer bypass system.

c. Arrangements for an emergency response unit comprised of emergency response equipment and trained personnel to be immediately dispatched to the job site in the event of sewage spill(s).

d. An emergency notification procedure, which includes an emergency response roster with telephone numbers and arrangements for backup personnel and equipment and an emergency notification roster. The Contractor shall designate a primary and secondary representative and include their respective phone numbers, pager numbers, and cellular phone numbers. The Contractor’s representatives shall be accessible and available at all times to respond immediately to any construction related emergency.

In case of sewage spill, the Contractor shall act immediately without instructions from the City’s representative, to control the spill and take all appropriate steps to contain it in accordance with their Spill Response Plan. The Contractor shall immediately notify the City’s representative of the spill and all actions taken. The Contractor shall, within three working days from the occurrence of the spill, submit to the City’s representative a written confirmation describing the following information related to the spill:

a. the nature and volume
b. the specific location, date and time
c. the duration
d. the cause
e. the type of remedial and/or clean up measures taken and the date and time of implementation
f. the corrective and/or preventive actions taken
g. the water body impacted and results of any necessary monitoring

It shall be the Contractor’s responsibility to assure that all field forces, including subcontractors, know and obey all safety and emergency procedures, including the Spill Response Plan.

Measurement for payment shall be as Lump Sum (LS).

**BID ITEM NO. 28: SEWER BYPASS (FOR SEWER MAINS 27” AND LARGER)**

The Contractor shall provide temporary means to maintain and handle the sewage flow in the existing sanitary sewer system as required to complete the necessary construction and rehabilitation requirements, including but not limited to pre-construction and post-construction CCTV, rehabilitation of maintenance hole, and lateral connections. The Contractor shall prepare and submit a detailed bypass plan to the City’s Representative for approval before the bypass is installed. The Contractor shall size the bypass system to handle the peak flow of the system.

The Contractor shall provide a one-hundred percent (100%) back-up in the bypass system. The Contractor shall utilize the backup system to mitigate any additional wet weather flows, perform the necessary maintenance and repairs on the bypass system, and exercise and ensure the operability of the backup system.

Any pump, including backup pumps, shall be appropriate for sanitary sewer effluent containing solids and fibers, and be a complete unit with its own suction and discharging pumping. The backup bypass system shall be fully installed, operational, and ready for immediate use. Prior to the full operation of the bypass system, the Contractor shall demonstrate that both the primary and backup bypass systems are fully functional and adequate, and shall certify the same, in writing.

The Contractor shall provide one dedicated fuel tank for every pump/generator, if fuel/generator pumps are used. The Contractor shall provide a fuel level indicator outside each fuel tank. The Contractor shall continuously (while in use) monitor the fuel level in the tanks and ensure that the fuel level does not drop below a level equivalent to two (2) hours of continuous bypass system operation. The Contractor shall take the necessary measures to ensure the fuel supply is protected against contamination. This includes, but is not limited to fuel line water traps, fuel line filters, and protecting fuel stores from precipitation. If electric power driven pumps are used, the Contractor shall provide an emergency standby power generator.

The Contractor shall continuously (while in use) monitor the operation of the bypass system
and all impacted facilities, and shall continuously monitor the flow levels downstream and upstream of the bypass to detect any possible failure that may cause a sewage backup and/or spill. The Contractor shall include the means and methods of monitoring the flow in their Spill Response Plan. The Contractor shall routinely inspect and maintain the bypass system, including the backup system. The Contractor shall maintain a log of all pertinent inspection, maintenance and repair records.

All labor, materials, and equipment associated with these sewer bypass requirements for sewer mains 27” and larger shall be included in this bid item. Typical flow control, diversion, and bypass pumping required to complete the necessary construction of smaller sewer mains shall be included in subsequent bid items. See bid item descriptions.

Measurement for payment shall be as Lump Sum (LS). The Contractor shall be paid on the basis of work completed as noted on the monthly submission of progress payment.

**BID ITEM NO. 29: INVESTIGATE OTHER EXISTING SEWER MAINS, SEWER STRUCTURES AND LATERALS**

This item shall include all labor, CCTV equipment, utility locating equipment, and all other equipment and materials required for investigation and/or field location work identified on the drawings. This item does not include investigation and location work included under Bid Item No. 5.

CCTV investigation shall be in accordance with Section 312-3 of the Technical Specifications. The Contractor shall notify the City’s Representative upon completion of the investigation and submit the video(s) and report(s).

Measurement for payment shall be as Lump Sum (LS). The Contractor shall be paid on the basis of work completed as noted on the monthly submission of progress payment.

**BID ITEM NO. 30: CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE, CREEK PERMIT – ADDITIONAL REQUIREMENTS FOR WORK ADJACENT TO CITY’S CREEK**

Due to limited access and the ecological sensitivity of the area of work, Contractor shall provide all labor, equipment, and materials for additional protective construction measures for this work. Contractor shall not use tracked or wheeled vehicles. Contractor shall exercise care to protect the existing vegetation and restore vegetation to the maximum extent practicable. Access pits shall be dug by manual labor. All work shall be performed using Best Management Practices (BMPS) including, but not limited to, straw wattles and silt fences to contain sediment and prevent discharge into the creek. No discharge of construction water, materials or sediments into the creek will be allowed. See Special Conditions for additional information on Stormwater Pollution Control and Creek Protection.

The City has submitted a “Notification of Lake or Streambed Alteration” with the California Department of Fish and Wildlife for work adjacent to and/or in the Creek(s) as shown on
Plains. A Streambed Alteration Agreement and further mitigation measures may be required. Mitigation measures and additional construction requirements which are above and beyond the scope described herein are not included in this bid item. If a permit is required, Contractor shall be paid for the actual cost of the permit that was paid by the Contractor to the Department of Fish and Wildlife plus 15% for overhead and profit.

This bid item may or may not be authorized to be performed by the Contractor as part of this Contract.

Measurement for payment shall be as Lump Sum (LS).

**BID ITEM NO. 31: POINT (SPOT) REPAIR**

This item shall apply to repair of defects not required to otherwise be completed as part of the sewer rehabilitation. This item shall include all labor, materials, and equipment necessary for the execution and completion of this work as described on the drawings and these specifications, including excavation of trenches large enough to repair the identified defect.

Obtaining construction access from property owners for work on private property shall be included in the unit bid price (see Special Condition No. 20).

Measurement for payment shall be as Each (EA) based on the range of depth of the excavation to flowline of pipe (0 to 5 ft, 5 ft to 10 ft, etc…). The Contractor shall be paid on the basis of work completed as noted on the monthly submission of progress payment. Payment includes As-Built submittals to the City for those repaired defects.

**BID ITEM NO. 32: PLUG AND ABANDON EXISTING SEWER MAINS, SEWER STRUCTURES AND LATERALS**

This item shall include all labor, excavation equipment, and all other equipment and materials required for abandonment and plugging of existing sewer mains, sewer structures and laterals where noted on the drawings. Item shall also include restoration of disturbed site conditions in kind or better.

Measurement for payment shall be as Lump Sum (LS). The Contractor shall be paid on the basis of work completed as noted on the monthly submission of progress payment.
The following are Plans showing the sheet numbers and their corresponding drawing title:

<table>
<thead>
<tr>
<th>SHEET NO.</th>
<th>DRAWING TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TITLE, VICINITY MAP, LOCATION MAP, INDEX OF DRAWINGS</td>
</tr>
<tr>
<td>2</td>
<td>ABBREVIATIONS, LEGEND, GENERAL NOTES</td>
</tr>
<tr>
<td>3</td>
<td>SURVEY CONTROL TALBES</td>
</tr>
<tr>
<td>4</td>
<td>SURVEY CONTROL TALBES</td>
</tr>
<tr>
<td>5</td>
<td>NEILSON STREET BACKLINE 2 – PLAN AND PROFILE</td>
</tr>
<tr>
<td>6</td>
<td>NEILSON STREET BACKLINE 1 – PLAN AND PROFILE</td>
</tr>
<tr>
<td>7</td>
<td>THOUSAND OAKS BLVD BACKLINE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>8</td>
<td>PORTLAND AVE BACKLINE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>9</td>
<td>PORTLAND AVE BACKLINE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>10</td>
<td>PORTLAND AVE BACKLINE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>11</td>
<td>PERALTA AVENUE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>12</td>
<td>SAN LORENZO/WASHINGTON AVENUE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>13</td>
<td>SAN LORENZO/PERALTA AVENUE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>14</td>
<td>PERALTA/CAPISTRANO AVENUE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>15</td>
<td>CAPISTRANO AVENUE 20&quot; SS – PLAN AND PROFILE</td>
</tr>
<tr>
<td>16</td>
<td>CAPISTRANO AVENUE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>17</td>
<td>CAPISTRANO AVENUE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>18</td>
<td>CAPISTRANO AVENUE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>19</td>
<td>MIRAMAR AVENUE BACKLINE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>20</td>
<td>THE ALAMEDA SIDELINE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>21</td>
<td>ARLINGTON AVENUE BACKLINE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>22</td>
<td>ARLINGTON AVENUE BACKLINE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>23</td>
<td>MICHIGAN AVENUE BACKLINE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>24</td>
<td>ALAMO AVENUE BACKLINE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>25</td>
<td>25. SAN DIEGO ROAD BACKLINE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>SHEET NO.</td>
<td>DRAWING TITLE</td>
</tr>
<tr>
<td>----------</td>
<td>----------------------------------------------------</td>
</tr>
<tr>
<td>26</td>
<td>SAN DIEGO ROAD – PLAN AND PROFILE</td>
</tr>
<tr>
<td>27</td>
<td>SAN LUIS ROAD BACKLINE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>28</td>
<td>SANTA BARBARA BACKLINE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>29</td>
<td>SANTA BARBARA ROAD – PLAN AND PROFILE</td>
</tr>
<tr>
<td>30</td>
<td>SAN LUIS ROAD BACKLINE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>31</td>
<td>THE ALAMEDA BACKLINE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>32</td>
<td>BERRYMAN STREET AND BACKLINE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>33</td>
<td>BERRYMAN STREET AND BACKLINE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>34</td>
<td>BERRYMAN STREET AND BACKLINE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>35</td>
<td>HENRY STREET BACKLINE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>36</td>
<td>BERRYMAN STREET – PLAN AND PROFILE</td>
</tr>
<tr>
<td>37</td>
<td>GRIZZLY PEAK BLVD – PLAN AND PROFILE</td>
</tr>
<tr>
<td>38</td>
<td>GRIZZLY PEAK BLVD BACKLINE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>39</td>
<td>GRIZZLY PEAK BLVD BACKLINE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>40</td>
<td>CYPRESS STREET / BUENA AVE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>41</td>
<td>ROSE STREET – PLAN AND PROFILE</td>
</tr>
<tr>
<td>42</td>
<td>ROSE STREET – PLAN AND PROFILE</td>
</tr>
<tr>
<td>43</td>
<td>GRANT STREET – PLAN AND PROFILE</td>
</tr>
<tr>
<td>44</td>
<td>GRANT STREET – PLAN AND PROFILE</td>
</tr>
<tr>
<td>45</td>
<td>EDITH STREET – PLAN AND PROFILE</td>
</tr>
<tr>
<td>46</td>
<td>MILVIA STREET BACKLINE – PLAN AND PROFILE</td>
</tr>
<tr>
<td>47</td>
<td>MISCELLANEOUS DETAILS</td>
</tr>
<tr>
<td>A</td>
<td>SEWER EASEMENT PLAN</td>
</tr>
</tbody>
</table>
DESCRIPTION OF GENERAL CONDITIONS

General Condition No. 1:  Pre-Construction Meeting

1.01 Prior to commencement of work at the site, a preconstruction meeting will be held at Engineering Division conference room, 4th Floor, 1947 Center Street, Berkeley. Date and time of the meeting will be as agreed upon by the Contractor and the Engineer. The meeting shall be attended by:
   a. Contractor and his superintendent
   b. Contractor’s principal subcontracts and representatives of major material suppliers and manufacturers as appropriate
   c. City Engineer, Inspectors, and/or his representatives
   d. City’s Surveyor, Traffic Engineer, Police and/or Fire Departments
   e. City’s Contract Compliance Officer
   f. City’s Employment Programs Administrator
   g. City’s Parks/Waterfront Department
   h. Representatives of EBMUD, PG&E, Telephone Co., Cable TV and AC Transit

1.02 The purpose of the meeting is to discuss and establish construction procedures such as field coordination, inspection, and anticipated problems to be encountered during the performance of the work. The agenda of the meeting will include the following:
   a. Contractor's tentative schedules
   b. Contractor's submittals
   c. Project layout
   d. Traffic control
   e. Housekeeping
   f. Payment
   g. Coordination with other utility companies
   h. Change orders
   i. Notification to the property owner
   j. Public Relation Policy

1.03 The Engineer will preside, note, and distribute the minutes of the meeting to all persons in attendance.

General Condition No. 2:  Audio-Video Survey

Where the preconstruction and audio-video survey does not, in the judgment of the Engineer, adequately document the condition of existing improvements, the Contractor shall supplement the audio-video tapes with such still photographs as the Engineer may direct. The costs of such still photographs shall be deemed to be included in the lump sum bid amount for the audio-video survey. If a separate bid item is otherwise not provided, the preconstruction audio-video survey shall be included in prices paid for the various contract items of work involved and no additional compensation will be allowed. It shall be the responsibility of the Contractor to adequately document the condition of existing improvements, and the Contractor may be held liable for any damage whose pre-existence he/she is unable to
General Condition No. 3: Holidays

3.01 The full width of the street's traveled way shall be opened for use by public traffic on designated legal holidays and Reduced Service Days.

3.02 Designated legal holidays are January 1, the third Monday in February, the last Monday in May, July 4, the first Monday in September, November 11, Thanksgiving Day, and December 25. When a designated legal holiday falls on a Sunday, the following Monday shall be observed as a designated legal holiday. When November 11 falls on a Saturday, the preceding Friday shall be observed as a designated legal holiday.

3.03 The following are recognized City Holidays. No work shall be performed on these days unless previously authorized by the Engineer.

- Third Monday in January (Martin Luther King’s Birthday)
- Lincoln’s Birthday
- Monday or Friday nearest May 19 (Malcom X Day)
- Second Monday in October (Indigenous People’s Day)
- Day After Thanksgiving Day

3.04 No work shall be performed during the Christmas holiday season from November 21 through January 3 within the designated City streets in the business districts and all designated highway routes.

3.05 Designated streets and their limits are listed below:

- Telegraph Ave. Bancroft Ave. to South City Limits
- Bancroft Ave. Piedmont Ave. to Shattuck Ave.
- Durant Ave. Shattuck Ave. to Bowditch Street
- College Ave. Webster St. to Russell St.
- Sacramento Ave. University Ave. to South City Limits
- Shattuck Ave. Rose Ave. to Ashby Ave.
- Adeline St. Shattuck Ave. to Alcatraz Ave.
- University Ave. Sixth St. to Oxford St.
- Hearst Ave. Frontage Rd. to Sixth St.
- Gilman St. Frontage Rd. to Hopkins St.
- Center St. Fulton Ave. to Martin Luther King, Jr.
- Kittredge St. Fulton Ave. to Milvia St.
- Vine St. Walnut St. to Shattuck Ave.
- Solano Ave. The Alameda to West City Limits
- Allston Way Fulton Ave. to Milvia St.
- Addison St. Fulton Ave. to Milvia St.
- Fourth St. Addison St. to Virginia St.
- Euclid Ave. Hearst Ave. to Ridge Rd.
- Fulton Ave. Hearst Ave. to Dwight Way
3.06 Designated highway routes are:
   Ashby Avenue
   Tunnel Road
   San Pablo Avenue

3.07 Due to budgetary constraints, City of Berkeley offices will be closed on the second Friday of each month for “Reduced Service Days” (a.k.a. VTO or Voluntary Time Off days). When a holiday falls on the second Friday, the previous day shall be a Reduced Service Day. Despite the City’s reduced level of service, the contractor shall plan to perform work during such days. Reduced Service Days will be included in the Engineer’s accounting of working and calendar days.
DESCRIPTION OF SPECIAL CONDITIONS

Special Condition No. 1: TECHNICAL SPECIFICATIONS

Part D of the specifications contains standard technical specifications for new sewer construction and sewer rehabilitation. Not all types of work described in Part D are required for this project.

Special Condition No. 2: OPEN TRENCH

The maximum length of open trench shall be 300 feet as stated in Subsection 306-3.5.

Special Condition No. 3: UPPER LATERALS

Rehabilitation of upper laterals are not included in the scope of work. Limit of work is noted in the miscellaneous details sheet of the Plans.

Special Condition No. 4: PERFORMANCE OF THE CONTRACT

Performance of the contract shall begin within fifteen (15) working days from the date of award of the contract instead of thirty (30) calendar days or 14 calendar days as stated in Subsection 301.6 and 801.2 of Part C - General Provisions. Prior to the commencement of construction, the Contractor shall submit all submittals, traffic plans and construction schedules with sufficient time for their review and approval by the Engineer.

Special Condition No. 5: IMPORTED TRENCH BACKFILL

Imported trench backfill material shall be crushed aggregate base consisting entirely of crushed rock and rock dust conforming to the requirements of Section 200-1.1 and 200-1.2 of the Standard Specification for Public Works Construction, 2015 Edition. The aggregate shall be uniformly graded, such that the percentage composition of the material by weight, as determined by laboratory sieves conform to the following gradation:

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percentage Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 1/2&quot;</td>
<td>100</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>60 - 100</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>50 - 65</td>
</tr>
<tr>
<td>No. 4</td>
<td>30 - 55</td>
</tr>
<tr>
<td>No. 30</td>
<td>10 - 30</td>
</tr>
<tr>
<td>No. 200</td>
<td>3 - 9</td>
</tr>
</tbody>
</table>

Trench backfill material shall not contain roots, sods, brush, wood, vegetable matter, other organic and deleterious materials.

Approved recycled materials maybe used in the pipe trench backfill zone.
materials shall be well-graded, cleaned and free of any toxic and harmful contaminants. Broken and crushed asphalt concrete shall be limited to a maximum of 25% of the total mixtures of recycled materials. The Contractor shall include test results of these materials in the submittals.

**Special Condition No. 6: TEMPORARY BITUMINOUS SURFACING**

Temporary Bituminous Surfacing (cutback) shall be placed immediately following final compaction of the trench backfill and aggregate base and with the approval of the Engineer. Minimum depth of cutback shall be 2 inches to the top of grade, compacted with vibratory compactor or roller and as approved by the Engineer. Temporary cutback shall be inspected and maintained by the Contractor on a daily basis and temporary surfacing shall be maintained including correction of ridges and depressions to a condition where the surface shall not vary to more than 1/2 inch from the edge of the 10-foot straight edge.

Upon notification from the Engineer, the Contractor shall correct the surface deficiencies within 24 hours. The City may request the City crews or contract another contractor to perform the necessary work and repairs if the deficiencies have not been corrected after the 24-hour notification.

The cost of the work performed by City crews or another contractor plus an additional 70 percent surcharge shall be paid by the Contractor by deduction from payment due on the contract.

**Special Condition No. 7: CLEANUP WORK**

Cleanup of work areas shall be in accordance with Subsections 401.6, Cleaning up; 401.7, Dust and Debris Control; 401.7-1, Emergency Cleanup Work; and 401.13, Final Cleaning Up of Part C - General Provisions. Street cleaning equipment shall include an approved self-propelled or walk-behind mechanical street sweeping and vacuuming device to remove sediment, dirt, and debris from the project site during construction activities and for final clean-up.

Underground Service Alert and other utility paint markings shall be eradicated and removed at the end of construction at the request of the City’s Representative.

In the event the Contractor fails to satisfactorily comply to the requirements stated on the noted subsections and the Engineer determines that an emergency exists, the Contractor will be notified by the Engineer to correct the violation immediately.

Cleanup, debris and dust control shall be a daily maintenance requirement. After a 24-hour notification to the Contractor for non-compliance or deficiencies, the City may request City crews or contract another contractor to perform the necessary clean-up work.
The cost of the work performed by City crews or another contractor plus an additional 70% surcharge shall be paid by the Contractor by deduction from payment due on the Contract.

**Special Condition No. 8: AS-BUILT RECORDS**

In accordance with Subsection 401.15 of the General Provisions, the Contractor shall maintain at the jobsite one (1) set of marked Plans for review by the Engineer at all times, and shall submit as-built records of the project to the Engineer upon completion of the work. As-buils shall be legibly written and in printed style on a full-size set of plans. The following are changes and additions that shall be incorporated in the as-buils:

a) Location of lateral connections to the main sewer measuring from the downstream maintenance hole. Locations shall be recorded within 2 feet of the actual location of the connection. The Contractor shall write every station for each location/connection.
b) Location of each sewer clean-out and location of sewer lateral from clean-out to sewer main. Location shall be recorded within 2 feet of the actual location and address of property served shall be verified.
c) Demolition and removal of non-active sewer laterals, tee, riser, and clean-outs.
d) Sewer Alignment changes made during construction for the sewer main and sewer laterals.
e) Identify on as-built where sewer replacement was installed by trenchless method.
f) Maintenance hole depth and location changes. The Contractor shall indicate the final inverts, maintenance hole rim elevation, and station.
g) Location of unforeseen structures in conflict with sewer alignment encountered during trench excavation. Contractor shall also indicate the type of structure, sizes, and bottom elevation with respect to the project elevation.
h) Identify pipe material that was installed for all reaches of new and replaced and rehabilitated piping.

The Contractor shall complete and submit "SEWER LATERAL AS-BUILT RECORD" FORMS (attached) upon completion of work. Lateral As-Built information required shall be logged as the work progresses.
SANITARY SEWER LATERAL AS-BUILT RECORD
CITY OF BERKELEY
DEPARTMENT OF PUBLIC WORKS

DATE: ____________________

PLAN SHEET: ___________ OF ___________

PROJECT: ________________________________________________________________

LOCATION (STREET IN WHICH SANITARY SEWER MAIN IS LOCATED):

STREET: __________________________________________________________________

<table>
<thead>
<tr>
<th>HOUSE NUMBER</th>
<th>STREET</th>
<th>DOWNSTREAM MAINTENANCE HOLE ID</th>
<th>DISTANCE FROM LAST DOWNSTREAM MAINTENANCE HOLE (LF)</th>
<th>LAID LATERAL LENGTH (LF)</th>
<th>LATERAL MATERIAL</th>
<th>REMARK</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Special Condition No. 9: GUARANTEE OF WORK

The Contractor shall guarantee the entire work constructed by him/her under the contract in accordance with Subsection 801.13 of the General Provisions. The guarantee shall be for a period of one year after completion and acceptance by the City.

The Contractor shall agree to make, at his/her own expense, any repairs or replacements made necessary by defects in materials and workmanship which becomes evident within the said guarantee period. The Contractor shall make all repairs and replacements within 10 Working Days after receipt of verbal/written notification for repair/replacement from the Engineer. However, the Contractor shall respond within 24 Hours after notification to repair or replace nonfunctional sanitary sewer lateral and main that is causing inconvenience and a health hazard to the public.

The City may request the City crews or contract another contractor to perform the necessary repair/replacement work if the deficiencies have not been corrected after the prescribed length of time. Payment for this work plus administrative cost shall be reimbursed from the Surety Bond submitted by the Contractor.

Special Condition No. 10: CONSTRUCTION SIGNAGE

The Contractor shall provide four (4) construction signs for this project and shall be placed on locations designated by the Engineer. The size of construction signs is 2'-7" x 6'-0", white background color and in black uniform lettering. Construction signs shall be installed on both ends of the street scheduled for rehabilitation two days prior to start of construction and shall be relocated to the next street location as job progresses or as directed by the Engineer. Construction signs are included under Bid Item "Mobilization and demobilization" and shall conform to the detail noted in the Standard Details Section. Signs shall be maintained to the satisfaction of the Engineer.

The Contractor shall provide two (2) portable changeable message boards for use on the project at the City’s request. Each portable message sign unit shall consist of a controller unit, a power supply, and a structural support system, all mounted on a trailer, per Caltrans Standard Specification Section 12-3.32. Message board shall be installed as directed by the Engineer two days prior to start of construction and shall be relocated to the next street location as job progresses or as directed by the Engineer. Construction signs are included under Bid Item "Mobilization and demobilization". Board shall be maintained to the satisfaction of the Engineer.

Special Condition No. 11: PARKING SIGN AND PERMIT FEES

The City will provide "NO PARKING" signs to the contractor upon request for this project at no cost. Permit fees for city work under this city construction will be waived.
Special Condition No. 12:  PUBLIC RELATION REQUIREMENTS

Public Relation Policy.  In the course of serving its citizens, it is the policy of the City of Berkeley to be responsive, helpful and courteous to its resident at all times. Any City’s employee or City’s Contractor that will be in contact with residents, in person or by telephone, will adhere to this policy.

The Contractor is required to prepare a Public Relations Plan to implement the above policy. The Plan shall be submitted for approval before commencing the work under this contract. The Contractor shall certify that he understands and will adhere to the City's Public Relation Policy, and that all Contractor employees will be briefed on proper relations with the public in accordance with above policy statement.

Contractor’s employees without specific public relations responsibilities shall be informed of the name of the Contractor's and the City's Public Relation Coordinators for referral purposes.

Any Contractor’s employee who does not adhere to the above public relations policy by displaying rude, offensive and uncooperative behavior shall be discharged immediately on written request of the engineer per subsection 801.4

Public Relation Plan:  The Public Relations Plan shall include but is not limited to the following:

a. Name of the contractor's Public Relations Coordinator and his/her experience with interfacing with the public.

b. Plans for conducting public impact assessments prior to commencing the total project, each stage of the project, as necessary to execute the provisions of this contract without undue impact on the public.

c. Techniques or plans for interfacing with the public and agencies at various stages of the project, especially during work on upper laterals located on private property.

d. Method of notifying and informing the public and agencies prior to construction stages, providing ample time to address their concerns.

e. Plans for coordinating public relations matters with the City during the preconstruction conference, weekly meetings and during review of the construction schedule.

f. Provisions for and frequency of briefing employees on the details of executing the Public Relations Plan.

Poor performance and non-adherence to the City's public relations policy are grounds for being declared a non-responsive contractor that may result in the city rejecting bids on future contracts.
No additional compensation will be paid by the City for implementing Public Relations Policy requirements. All such related effort is a mandatory requirement of the contract.

Special Condition No. 13: UTILITIES IN CONFLICT WITH SANITARY SEWER AND STORM DRAIN

The Contractor shall determine the unknown location of main and service utilities in advance of work in order not to delay the schedule of construction. Advance potholing shall be included in the planning and execution of the work. No additional compensation will be paid by the City for the performance of this work. At the direction of the Engineer, it is Contractor's responsibilities to make correction if conflict arises among utilities. If conflict arises, the Contractor shall inform the Engineer in advance before any correction is made.

Special Condition No. 14: NON-DISCRIMINATION AND CONTRACT COMPLIANCE CONFERENCE

At the Non-Discrimination and Contract compliance conference, the apparent lowest responsive bidder shall submit the proposed staffing resources in order to start and complete the project within the contract time frame. This should account for other Berkeley contracts that the Contractor may be working on concurrently or within the same time frame.

Special Condition No. 15: PIPE REHABILITATION AND REPLACEMENT USING TRENCHLESS METHOD

Rehabilitation of existing sewer pipes using the trenchless method will be used in this project; locations and methods are shown on the Plans. The two trenchless methods are as follows: Method "A" - Cured-In-Placed-Pipe liner (CIPP), Folded and Reformed PVC pipe liner, Deformed/reformed HDPE pipe liner; Method "B" – Pipe breaking, pipe splitting or bursting, sliplining, or other comparable method. These two methods of pipe rehabilitation ("A" & "B") do not apply where the new sewer is to be installed at a different slope and flowline elevations (open-cut method) from the existing sewer that is to be removed and replaced.

The Contractor shall be responsible for determining the condition and alignment of the existing pipes to be rehabilitated through closed circuit television inspection (CCTV). Cleaning of the pipeline and removal of debris such as sludge, grease, roots, rocks and any foreign materials shall be performed prior to pipe rehabilitation. All costs incurred with this work shall be included in the bidder's proposal.

Existing sags and/or vertical offsets that would affect the alignment of the new pipe installed using these methods are to be corrected by the Contractor prior to start of pipe placement. Sags in the new replacement sewer that appears in the post construction video inspection tapes are to be removed and corrected by open trench, and shall be at the expense of the Contractor with no additional compensation or cost to the City.

For Method "B", the Contractor shall furnish and install HDPE SDR – 17. Approved color
for inside wall are white, gray and other approved light colored pipe. Both the inside and outside may be of the same color. For pipe rehabilitation work involving sliplining (i.e. new pipe O.D. is of a smaller diameter than existing host pipe I.D.), the new pipe shall be installed such that it rests permanently at the invert of the host pipe throughout its entire length. Refer to Section 500-3 of the “Greenbook” 2015 Edition for annular space grouting requirements for the installation of sliplining systems.

Prior to construction, the Contractor shall submit to the City for review and approval the materials, procedures, equipment, shop drawings and other submittals as required by the Plans and Specifications.

**Special Condition No. 16: PAVEMENT STRIPING AND LANE MARKING RESTORATION TIME LIMIT**

Restriping and pavement marking to restore those deleted, or damaged shall be completed within ten (10) working days after finish paving or asphalt resurfacing is completed.

**Special Condition No. 17: CONSTRUCTION STAKING AND CUT SHEETS**

This section hereby revises section 501.7 of the General Provisions of these specifications.

Construction surveys and stakes to establish the lines and grades will be the responsibility of the Contractor and not provided by the City.

The Contractor will be responsible for setting lines and grades for the execution and completion of the work in accordance with the Plans and Specifications. The Contractor will be held responsible for all errors in staking discovered during the performance of the work and no additional compensation shall be charged to the City for correction of such deficiency.

Stakes or marks will be set by the Contractor, utilizing a qualified land surveyor in conformance with the requirements in Chapter 12, "Construction Surveys," of the California Department of Transportation's Surveys Manual.

In all other respects, Section 501.7 and the General Provisions of these specifications remain in full force and effect.

**Special Condition No. 18: PROTECTION AND RESTORATION OF EXISTING IMPROVEMENTS**

The Contractor shall be responsible for the protection of public and private property adjacent to the Work and shall exercise due caution to avoid damage to such property.

The Contractor shall repair or replace all existing improvements and street pavements which are not designated for removal (e.g., street sections, curbs, gutters, driveways, fences, walls, structures, landscaping, etc.) which are damaged or removed as a result of its operations.
Repairs and replacements shall be at least equal to existing improvements, and shall match them in finish and dimensions.

Prior to initiating work in the public right of way and in the easements, the Contractor shall make an audio/video recording of the affected areas showing all existing improvements, and their conditions. The recordings shall be turned over to the Engineer in DVD-format and shall serve as historical documentation of the preconstruction conditions.

Damages within the public right of way including street pavement will be restored to the satisfaction of the Engineer after work on that particular block is completed.

Any damages to the private properties will be restored to the satisfaction of the property owner/engineer within seven (7) days of the damage(s), and prior to mobilizing pipe installation and rehabilitation in another project area. Non-conformance and delays by the contractor in restoration on private property can cause and generates highly publicized complaints from the property owners.

The Engineer will have the authority to stop or curtail pipe construction/rehabilitation work in another location or vicinity of the project in order to complete the required restoration work.

**Special Condition No. 19: APPROXIMATION OF EXISTING GROUND GRADES FOR BACKLINE SEWER PROFILES**

Existing ground elevations shown on the plans for the Sewer Profiles for backline sewers are approximate.
Actual ground elevation may be higher or lower at specific locations than shown on the drawings.

No additional compensation will be provided where some actual depths are deeper than shown on the plans; but are offset by other areas that are shallower than shown over the sewer centerline, and where it does not exceed the overall average depth of backline sewer where excavation is required.

**Special Condition No. 20: CONSTRUCTION ACCESS AGREEMENTS**

Access agreements between the City and private property owners are required for work outside the City’s right-of-way. The City has mailed the access agreement forms to the property owners. The City will follow up by additional mailing and personal site visit to the residences to obtain all the access agreements. The contractor shall not enter any private property before the access agreement is fully executed.

The Contractor may be required to reschedule or change the planned sequence of work for the backline sewer work depending on the acquisition of the construction access agreement.

The Contractor shall assist the City when requested to expedite the acquisition of access agreements from property owners by making personal on-site visits.
**Special Condition No. 21: TEMPORARY SHEETING, SHORING, AND BRACING**

Temporary sheeting, shoring and bracing shall be installed in accordance with requirements of OSHA and the Construction Safety Orders of the State of California, pursuant to the provisions of Section 6707 of the California Labor Code. Sheetin, shoring and bracing plans shall be signed and sealed by a California registered engineer and submitted to the City prior to start of this work.

Payment for temporary sheeting, shoring, and bracing or equivalent method shall be included in the bid items for the construction of maintenance holes, and sewer pipes rehabilitation or construction.

**Special Condition No. 22: STORMWATER POLLUTION CONTROL**

Standard Specifications referred under Special Condition No. 22 is the State of California, Department of Transportation (Caltrans) Standard Specifications, 2015 Edition.

22.01 Stormwater Pollution Control. The intent of these requirements is compliance with federal, state, City, and other local agencies’ regulations that prohibit non-stormwater discharges from construction sites. Pollutants (any substance, material, or waste other than rainfall derived stormwater) discharged to storm drains is strictly prohibited. Further, the Contractor is informed that Federally Endangered species have been identified in creeks within the City limits. Point source, pollutants, stormwater, and other relevant information are defined in Berkeley Municipal Code (BMC) Chapter 17.20 – DISCHARGE OF NON-STORMWATER INTO CITY’S STORM DRAIN SYSTEM – REDUCTION OF STORMWATER POLLUTION, and the City’s stormwater NPDES (National Pollutant Discharge Elimination System) Permit No. CAS612008. These documents are available upon request.

22.02 Best Management Practices (BMP) and Source Control. The Contractor shall use appropriate BMPs and source control techniques on the site(s) at all times, regardless of time of year or rainfall conditions, in order to prevent non-stormwater discharges from construction sites. BMPs shall be in conformance with the California Stormwater Quality Association’s “Stormwater Best Management Practice Handbook”, current edition.

22.03 Water Pollution Control Plan (WPCP) and Coordinator. The Contractor shall prepare, submit for favorable review by the City, and implement a WPCP which shall contain at a minimum the items included in this section. The WPCP shall show the locations of all storm drains, storm drain pipes, creeks, creek culverts, points of entry (catch basins, inlets, outlets), and other features through which stormwater flows. The WPCP shall identify each point of entry and show how each entry point will be protected. The WPCP shall include a protocol for allowing drainage to flow properly during rainfall events WHILE STILL PREVENTING non-stormwater discharges from entering the storm drains, creeks, and Bay. The Contractor shall designate an individual (to be
approved by the City) available at all times of sufficient authority to halt work and implement BMPs and source control measures for the Contractor and all sub-contractors, suppliers, and other personnel that may be at the construction site(s), to prevent non-stormwater discharges from the construction site(s). This individual shall be the contact person for all matters of the project regarding non-stormwater discharges. The WPCP shall include descriptions and sketches of all BMPs, show locations and describe protocols for implementing and maintaining the following BMPs for but not limited to material storage, dewatering operations, bypass pumping, saw-cutting operations, pavement operations, concrete operations, grading and excavation operations, spill prevention and control, vehicle and equipment cleaning, vehicle and equipment operation and maintenance, litter control, dust control, pavement cleaning, and construction waste management. All employees, subcontractors, suppliers, and any others involved with the construction site(s) shall be trained in implementing, the importance of, and purpose of the WPCP. Training records shall be submitted to the City along with requests for progress payment. Where BMPs affect traffic or parking, they shall be shown on the traffic control plans for the construction site(s). The WPCP shall be updated to meet changing stages of the construction site(s). Work shall not begin without the City completing its review and finding no exceptions taken on the WPCP and finding at City’s sole discretion that the WPCP meets the intent and goals of the project.

In addition, the Contractor shall observe the following guidelines:

a) Paving during wet weather:
   1) No paving while it is raining.
   2) No paving of the top lift of asphalt concrete (AC) on any day that experiences \( \frac{1}{4}'' \) of rain in a twenty-four period
   3) No paving of bottom lift if previous seventy-two (72) hour period experienced more than \( \frac{1}{2}'' \) of rain, unless directed by the City Engineer or his designee.

b) Store materials in accordance with Section 13-4.03C, “Material Management” of the Standard Specifications.

c) Cover inlets and maintenance holes when applying asphalt, seal coat, tack coat, slurry seal, fog seal, etc. in conformance with the provisions in Section 13-4.03E(7), "Paving, Sealing, Sawcutting, Grooving, and Grinding Activities," of the Standard Specifications

d) Place drip pans or absorbent materials under paving equipment when not in use.

e) During wet weather store paving equipment indoors or cover with tarp or other waterproof covering.

f) Sweep site daily to prevent sand, gravel or excess asphalt from entering or being transported by rain into the storm drain system.

g) Keep ample supplies of drip pans or absorbent materials on-site.

h) If paving involves portland cement concrete, refer to Section 13-4.03D(3) Concrete Waste of the Standard Specifications.

Do not wash out concrete trucks into storm drains, open ditches, streets, streams, etc. The Contractor shall prevent the discharge of pollutants from concrete operations by using measures to prevent run-on and run-off pollution, properly disposing of wastes, and
by implementing the following BMP’s:

a) Store all materials in waterproof containers or under cover away from drain inlets or drainage areas.

b) Avoid mixing excess amounts of Portland cement materials. Dispose of any excess materials properly.

c) Whenever possible, perform washout of concrete trucks off-site where discharge is controlled and not permitted to discharge to the storm drain system. For on-site washout:
   1) Locate washout area at least fifty (50) feet from storm drains, open ditches or other water bodies, preferably in a dirt area.
   2) Confine run-off from this area by constructing a temporary pit or bermed area large enough for the liquid and solid waste.

d) Wash out concrete wastes into the temporary pit where the concrete can set, be broken up and then disposed of properly. If the volume of water is greater than what will allow concrete to set, allow the wash water to infiltrate and/or evaporate, if possible. Remove or vacuum the remaining silt and debris from the ponding or bermed area and dispose of it properly.

e) Dispose of waste water from washing of exposed aggregate to dirt area. The dirt area shall be adequate to contain all the waste water and once the waste water has infiltrated, any remaining residue must be removed.

f) Collect and return sweepings from exposed aggregate concrete to a stockpile or dispose of the waste in trash container.

22.04 Training. The Contractor is responsible for ensuring all personnel, laborers, subcontractors, suppliers, and any other personnel that are involved with the construction site(s) are trained in the importance of preventing non-stormwater discharges. Each worker shall be certified as being trained before being allowed to work. Before any work begins, the Contractor shall submit and certify under penalty of perjury a list of all workers who have been trained on the importance of pollution prevention, BMP and source control operation and maintenance, and recognize the authority of the City to stop the work in the event of a non-stormwater discharge. The training shall include as a minimum, review of the BMP and WPCP, and all BMPs (including BMP operation and maintenance) that are planned for the construction site(s).

22.05 Enforcement. The City has the authority through this contract and appropriate sections of the BMC to enforce any portions of this section. City enforcement may include but is not limited to: citations, orders to abate, bills for City cleanup costs and administration, civil suits, and criminal charges and enforcement. Enforcement action by the City does not void or suspend any enforcement actions by other agencies and actions by the City and other agencies shall be cumulative.

22.06 Submittals and Contract Time. Contractor is cautioned and advised to have appropriately trained staff with any applicable certifications prepare all submittals for Storm Water Pollution Controls including the WPCP, and have appropriately trained staff available to meet with City staff to review the submittals. It is considered reasonable that
the Contractor shall make a complete and acceptable submittal at least by the second submission. The City reserves the right to deduct monies from payments due Contractor to cover additional costs of project manager’s and Architect/Engineer’s review beyond the second submission. Illegible submittals will be rejected and returned to the Contractor.

**Special Condition No. 23: CREEK PROTECTION**

The Contractor shall be responsible for and conduct all aspects of the work within the requirements of BMC Chapter 17.08 – PRESERVATION AND RESTORATION OF NATURAL WATERCOURSES (Creek Ordinance), and any other creek protection requirements by other agencies. Portions of the Work involving a creek channel may not be permitted between October 15 through April 15, or other dates as may be stipulated in applicable permits. Any work between the creek banks shall be conducted to not create conditions which will allow erosion, and shall be fully restored to equal or better than the erosion resistant condition as before the work undertaken. Complying with the requirements of creek protection shall include but not be limited to scheduling the Work around any time periods prohibiting work within creek limits, installing erosion control measures and employing appropriate BMPs for controlling erosion, monitoring, updating and modifying BMPs to meet the requirements for changing site conditions to comply with erosion control and creek protection, and replanting creek banks to reestablish erosion resistance and bank stability.

**Special Condition No. 24: TRAFFIC CONTROL**

Contractor shall provide traffic control within the work zone throughout the project as needed for the various traffic situations and street configurations in full conformance with the Federal Highway Administration’s (FHWA) "California Manual on Uniform Traffic Control Devices 2014 Revision 3" (MUTCD), as amended for use in California" herein after referred to as Traffic Control Manual. The Traffic Control Manual may be obtained online at [http://www.dot.ca.gov/trafficops/camutcd/camutcd2014rev3.html](http://www.dot.ca.gov/trafficops/camutcd/camutcd2014rev3.html).

Construction area signs shall be furnished, installed, maintained and removed by the Contractor when no longer required. **Extensive traffic signage, e.g., warning signs and detour signs, may be required for this project.** Contractor shall be responsible for placing all barricades for perimeter street closures as required. Per Section 501.10 – Traffic Control of the General Provisions, at main entry and exit points of each work location, the Contractor shall provide a 30" x 30" sign advising the public of the anticipated period of time that traffic delays may be anticipated. This sign will also include name and telephone number of the Contractor along with starting and completion dates of the contract. Sign will be erected 7 days in advance of any work.

**Placement of traffic control on San Pablo Avenue (State Route 123) or Ashby Avenue (State Route 13) will require an encroachment permit from the State of California. Contractor shall apply and pay for such permit from the State of California, the cost of which shall be included in the cost bid for this item.**
Contractor shall be responsible for providing traffic control plan for encroachment permit to and obtaining approval of said traffic control plan from State of California. Contractor shall be responsible for all notification of work to, application for and obtaining work authorization number from State of California. Any damages arising from work related to encroachment permit shall be the responsibility of the Contractor.

The Contractor shall be responsible for posting "No Parking" signs a minimum of four days in advance of concrete work, paving operations, failed area, and planning work so as to comply with the City’s construction notification requirement of 72 hours. Cones shall not be used as barricades. "No Parking" signs may be obtained from the City at no cost to the Contractor. The "No Parking" signs shall be updated as necessary. The Contractor shall check and maintain (e.g., re-install missing signs, reposition displaced barricades, etc.) postings on a regular basis prior to start of work.

If traffic is to be detoured over a centerline or detoured in advance of the work, detour plans must be submitted to and approved by the Engineer prior to starting work. Police, Fire and Public Works Department shall be notified at least two days in advance of any work which will interfere with the normal flow of vehicular or pedestrian traffic. Intersection closure may only occur if the two adjacent intersections remain open, unless otherwise approved by the Engineer. The Contractor shall coordinate his traffic control/diversion plan with City personnel, a minimum of 3 weeks prior to starting work, to assure that traffic is diverted in a safe and convenient manner.

**Truck routes shall be approved by the City’s Traffic Engineer prior to start of work. Truck traffic is not allowed on Marin Avenue within the City of Albany.**

Personal vehicles of the Contractor's employees shall not be parked within the area of work.

A minimum of one (paved) traffic lane, not less than 12 ft. wide, shall remain open for use by public traffic during construction operations. When construction operations are not actively in progress, not less than two such lanes shall be open to public traffic. The Contractor may be allowed to close residential streets if approved in writing in advance by the Engineer. No work that interferes with public traffic shall be performed between 6:00 p.m. and 7:00 a.m.

Start of work shall be no earlier than 7:30 a.m. No work process, including starting, warm up, and delivery of equipment, shall be done outside of work hours. The use of vehicle horns to alert residents to move their vehicles out of the construction zone is not permitted. The Contractor should attempt to locate vehicle owners by knocking on doors.

The full width of the traveled way shall be open for use by public traffic on Saturdays, Sundays and designated legal holidays, and when construction operations are not actively in progress, unless specified otherwise.
Minor deviations from the requirements of this section concerning hours of work may be permitted upon the written request of the Contractor if in the opinion of the Engineer, public traffic will be better served and the work expedited. Such deviations shall not be adopted until the Engineer provides written approval.

The traffic control system shall consist of closing traffic lanes in accordance with the Traffic Control Manual. Signs and other devices for the traffic control system shall conform to the Traffic Control Manual.

If any component in the traffic control system is damaged, displaced or ceases to operate or function as specified, from any cause during the progress of the work, the Contractor shall immediately repair said component to its original condition or replace said component and shall restore the component to its original location.

Lane closures may be made for work periods only. At the end of each work period, all components of the traffic control system shall be removed from the traveled way, shoulder and auxiliary lanes. If the Contractor so elects, said components may be stored at selected central locations approved by the Engineer within the limits of the public right-of-way.

Sufficient barricades and flashing lights shall also be placed to supplement all traffic signs used to divert and control traffic. Signs and barricades shall be checked periodically every day and replaced or repaired as necessary. Any hazardous conditions shall be immediately eliminated.

The Contractor, at the end of each day, shall provide pedestrian and vehicle crossings at all street intersections. If the project is left open overnight, it shall be graded in such a way that pedestrians and vehicles can safely pass through the project. Temporary concrete, asphalt, or wood ramps shall be installed and maintained at all locations where existing ramps have been temporarily removed.

In accordance with Section 1603.1 of the Detail Specification, where a tack coat has been spread, pedestrian crossing areas shall be covered with sand so that the asphalt does not adhere to shoes.

No vehicular traffic shall be allowed on a tack coat.

Cleanliness is extremely important. Dust producing conditions shall be eliminated as soon as they are created.

If Contractor violates any of these provisions, a fine of $1,000 will be assessed for the first violation, $5,000 for the second and $10,000 for the third and further subsequent violations.
24.01 ACCESS AND EGRESS

The Contractor shall endeavor to cooperate with all business owners and residents occupying properties fronting on the streets in the matter of access and egress. **Contractor shall maintain a clear and accessible pedestrian corridor per the Pedestrian Access During Construction Projects Detail included herein.**

Where a business property has more than two vehicular paths of access, one path, 10 feet in width, shall remain open during all business hours, unless excepted by the Engineer.

24.02 LANE CLOSURES

No lane closures shall be permitted on the following streets Monday through Friday between 7:00 A.M. – 9:00 A.M. and 4:00 P.M. – 6:00 P.M., and Saturdays between 10:00 A.M. – 2:00 P.M., unless approved in advance by the City Traffic Engineer if it can be explained why such closure cannot reasonably be avoided. On Saturdays when UC football games are scheduled all construction-related lane closures along these corridors must be reopened at least 4 hours before the start of the game.

Major Streets:

- University Avenue
- San Pablo Avenue
- Shattuck Avenue
- Telegraph Avenue
- Sacramento Street
- Martin Luther King Jr. Way
- Ashby Avenue
- College Avenue
- Gilman Avenue
- Adeline Street

Notwithstanding the above, the Traffic Engineer reserves the right to review and comment on each individual traffic control plan based on its own merits.

Note: Routine maintenance, inconvenience to construction method or schedule, or adverse impacts on cost of work will generally not be accepted as grounds for exceptions.

**Special Condition No. 25: CURED-IN-PLACE-PIPE LINER**

This amendment modifies the Standard Specifications for Public Works Construction, 2015 Edition, Part 5 regarding materials, minimum physical properties and chemical resistance of felt or equivalent nonwoven liner material.

a.) **Materials**

   The sewn tube shall consist of one or more layers of absorbent non-woven felt
fabric and meet the requirements of ASTM F1216 or ASTM F1743, Section 5.

Resin system shall be a corrosion resistant polyester, vinyl ester, or epoxy and catalyst system that when properly cured within the tube composite meets the requirements of ASTM F1216 and ASTM F1243

b.) **Minimum Physical Properties**
The cured pipe material (CIPP) shall conform to the structural properties listed as follows:

- Modulus of Elasticity (ASTM D-790) – 250,000 psi.
- Flexural Stress (ASTM D-790) – 4,500 psi.

c.) **Chemical Resistance**
The CIPP liner shall meet the chemical resistance requirement of ASTM D5813. CIPP samples for testing shall be of tube and resin system similar to that proposed for actual construction.

**Special Condition No. 26: DIRECTIONAL DRILLING (NO DIG METHOD)**

Directional drilling is an alternate method to the traditional open cut method in installing gravity sewers on new alignment or grade without causing any major damage to existing improvements or disruption in the backyard easement and busy streets. The three steps involved in the installation of pipeline by directional drilling are as follows:

1. **Drilling of pilot hole** - the pilot is constructed by a rotary drilling head using pressurized mud to excavate and remove the soil. The drill rods are typically 10 feet long and hollow to transport drilling fluid and locating sensor wires. Tracking and locating the drilling operation is monitored by a surface-tracking device, which receives an electronic signal from the drilling head.

2. **Reaming operation** - This is to enlarge the pilot hole to a diameter large enough to accept the pipe. Reaming is accomplished by a rotating mechanical cutting tool and pressurized drilling mud that cuts and mixes the soil into the drilling mud slurry. Reaming may be done in one or more steps depending on the size of the pipeline and the nature of the soil.

3. **Pipe insertion** - Pipe insertion is accomplished by pulling the pipe into the reamed hole by the drill rod usually immediately behind the rotating mechanical reaming tool to ensure clearance of the hole. The reaming and pipe insertion may be accomplished by the same step. As the pipe is inserted, drilling mud is displaced and removed by a vacuum truck or pump. The drilling mud also acts as a lubricant to reduce friction on the pipe and fill the annular space between the outer wall of the pipe and the undisturbed soil.
Special Condition No. 27: **BOND RIDERS FOR ADDITIONAL WORK DURING CONSTRUCTION**

During construction, the City may request or authorize additional work as part of the contract. Prior to commencement of any Contract Change Order (CCO) or Contract Amendment (CA), the Contractor shall submit Surety Company Bond Riders for the new contract amount. The new contract amount is the contractor’s bid amount or authorized contract amount plus the CCO or CA. The Riders for any additional work shall be provided at no cost to the City. Typically, the maximum authorized contract amount requiring a Rider is the contractor’s bid amount plus 10%.

Special Condition No. 28: **RETAINED FUNDS**

Pursuant to California Assembly Bill 92 (AB-92), until 2023, the City shall retain five percent (5%) of such estimated value of work done as part security for the fulfillment of the Contract by the Contractor. Section 901.4.1 Retained Funds of the General Provisions of these specifications is hereby revised, decreasing the amount of retained funds from ten percent (10%) to five percent (5%). In all other respects, Section 901.4.1 and the General Provisions of these specifications remain in full force and effect.

Special Condition No. 29: **COMMERCIAL POLLUTION LIABILITY INSURANCE**

Contractor shall procure and maintain at its expense or cause its subcontractor to procure and maintain, a broad form Contractors Commercial Pollution Liability Insurance including contractual liability coverage for losses caused by pollution conditions (including sudden and non-sudden pollution conditions) arising from the services and operations of the Contractor or any subcontractor, and the cleanup, removal, transportation, storage, disposal, or handling of hazardous or toxic chemicals, materials, substances, or any other pollutants or pollution conditions, in an amount not less than $1,000,000 Per Occurrence and $2,000,000 General Aggregate limit for bodily injury property damage (including loss of use of damaged property or of property which has not been physically injured or destroyed). All costs of defense shall be outside the limits of the policy.

Any such insurance provided by a subcontractor must be approved separately in writing by the City. Approval of a substitution of a subcontractor’s insurance shall require a certification by the Contractor that all activities for which Contractors Pollution Liability Insurance will provide coverage will be performed exclusively by the subcontractor providing the insurance. The deductible shall not exceed $25,000 per claim. Contractual liability shall include coverage of tort liability of another party to pay for bodily injury, property damage (including loss of use of damaged property or of property which has not been physically injured or destroyed), or environmental damage to a third person or organization. There shall be no endorsement or modification of the coverage limiting the scope of coverage for either “insured vs. insured” claims or contractual liability. Occurrence based policies shall be procured before the Work commences and shall be maintained for the duration of this Contract. Claims Made policies shall be procured before the Work commences, shall be maintained for the duration of this
Contract, and shall include a 12 month extended Claims Discovery Period applicable to this Contract or the existing policy or policies must continue to be maintained for 12 months after the completion of the Work under the Contract without advancing the retroactive date. Except as provided for under California law, the policy or policies must provide that the City is entitled to thirty (30) days prior written notice (10 days for cancellation due to non-payment of premium) of cancellation or non-renewal of the policy or policies.

**Special Condition No. 30: PIPE REHABILITATION AND REPLACEMENT USING UV – CURED RESIN IMPREGNATED FIBERGLASS TUBE**

The Engineer may, at his or her discretion, exercise the option to direct the Contractor to rehabilitate the structurally and/or functionally deteriorated sanitary sewer pipelines using the trenchless method of cured-in-place pipe (CIPP) with a resin impregnated fiberglass tube that is cured by ultraviolet light.

The CIPP material shall consist of a resin-impregnated fiberglass material tube (“Liner”) which when cured shall extend the full length of the original pipe and provide a structurally sound, smooth, joint-less and watertight pipe. Refer to Part D, Section 500.1.14.

**Special Condition No. 31: LIQUIDATED DAMAGES**

The Contractor shall pay the City of Berkeley the sum stated in the Bidder’s Proposal for each and every working day’s delay in finishing the work in excess of the number of working days prescribed in the specifications. The City will strictly enforce liquidated damages on this contract. Contractor shall carefully assess their capacity to complete the work within the designated working days prior to submitting a bid for the work.

**Special Condition No. 32: SB 854 – PUBLIC WORKS REFORM**

No contractor or subcontractor may be listed on a bid proposal for a public works project (submitted on or after March 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)].

No contractor or subcontractor may be awarded a contract for public work on a public works project (awarded on or after April 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5.

This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations.

**Special Condition No. 33: PAVEMENT THICKNESS**

Concrete pavement and asphaltic concrete pavement thickness varies throughout the City. Contractor is required to match during pavement restoration the thickness of the
existing pavement. Contractor shall assume that concrete pavement is up to 7-inches thick and asphaltic concrete pavement is up to 15-inches thick for the basis of bid. These values do not include any base or subbase material as required elsewhere in these Contract Documents.

Special Condition No. 34: TERMINATION OF CONTRACT FOR CONVENIENCE

a. Owner may terminate performance of the Work under the Contract Documents in accordance with this clause in whole, or from time to time in part, whenever Owner shall determine that termination is in Owner’s best interest. Termination shall be effected by Owner delivering to the Contractor notice of termination specifying the extent to which performance of the Work under the Contract Documents is terminated, and the effective date of the termination.

b. Contractor shall comply strictly with Owner’s direction regarding the effective date of the termination, the extent of the termination, and shall stop work on the date and to the extent specified.

c. Contractor shall be entitled to a total payment on account of the Contract work so terminated measured by (i.) the actual cost to Contractor of Work actually performed, up to the date of the termination, with profit and overhead limited to twelve percent (12%) of actual cost of work performed, up to but not exceeding the actual contract value of the work completed as measured by the Schedule of Values and Progress Schedule, (ii.) offset by payments made and other contract credits. In connection with any such calculation, however, Owner shall retain all rights under the Contract Documents, including but not limited to claims, indemnities, or setoffs.

d. Under no circumstances may Contractor recover legal costs of any nature, nor may Contractor recover costs incurred after the date of the termination.

Special Condition No. 35: SUBMITTAL REVIEW PROCEDURE

Unless otherwise specified, the Engineer shall review the submittal and return to the Contractor within ten (10) working days after receipt of the submittal instead of ten (10) calendar days as stated is Subsection 401.12-3 of Part C – General Provisions.

Special Condition No. 36: POST-CONSTRUCTION CCTV

If the Contractor fails to complete and submit all post-construction CCTV videos and reports to the City prior to the end of the term of the contract, as defined in the Bidder’s Proposal and as amended by the Engineer, the City may assess a fine of $4.00 per linear foot of new sewer main and lower lateral not inspected.

Special Condition No. 37: ORDINANCE NO. 7,670-N.S. GENDER
In accordance with Ordinance No. 7,670-N.S. the term manhole shall be replaced by the term maintenance hole throughout the contract documents.

**Special Condition No. 38: PRECEDENCE OF CONTRACT DOCUMENTS**

Section 501.4 of the General Provisions is completely revised to the following:

In the case of discrepancy or ambiguity in the Contract Documents, the following order of precedence shall prevail:

1. Federal and State requirements
2. Permits from other agencies as may be required by law
3. Signed Agreements and terms and conditions referenced therein.
5. General Provisions
7. Regional Standard for Sanitary Sewer System Installation, Rehabilitation and Repair (June 30, 2016)
8. Standard Specifications for Public Works Construction, Parts 2,3, and 5
9. Contract Plans, including General Notes
10. State Standard Plans as referenced in the Contract Documents

Furthermore in the case of discrepancy or ambiguity within any Contract Document listed above, the following precedence criteria shall be observed as applicable:

1. Modifications in inverse chronological order (i.e., most recent prevail)
2. Written numbers over figures, unless obviously incorrect
3. Figured dimensions over scaled dimensions
4. Large-scale (detail) Plans over small-scale (general) Plans.

In any conflict between a bill or list of materials shown in the Contract Documents and the actual quantities required to complete the Work required by the Contract Documents, then the actual quantities shall take precedence.

Notwithstanding anything to the contrary above, should any provisions or requirement of any Contract Document conflict with another provision or requirement in the Contract Documents on subject matters of hazardous waste abatement, clean up, disposal, or required safety standard or methods, then the most stringent provision or requirement shall control.
PEDESTRIAN ACCESS DURING CONSTRUCTION PROJECTS

The purpose of the following standards for construction in the public right-of-way is to ensure pedestrian safety and access. The standards apply to City of Berkeley crews, contractors with the City and all other persons working in the public right-of-way. With the unique nature of each project, situations may arise which have not been covered in these standards; each project requires review on a case-by-case basis to ensure that complete, safe, usable and accessible paths of travel are maintained during construction.

All construction activities involving work affecting pedestrian access or safety within the public right-of-way shall comply with the following requirements for disability access during construction:

1. **Maintenance of a clear and accessible pedestrian corridor**
   a. The pedestrian corridor shall be a nominal width of 6’ where feasible and not less than 4’ wide at single points of contact. The corridor shall conform to the most recent Americans with Disabilities Act Accessibility Guidelines (ADAAG) for slope, cross-slope, surface characteristics, and projections from the side, to the maximum extent feasible.
   b. The accessible pedestrian corridor, to the maximum extent feasible, shall coincide with the corridor for the general public and shall connect with facilities throughout and adjacent to the project area.
   c. Equipment, debris, construction materials, or vehicles shall not obstruct the pedestrian corridor, existing ramps, temporary ramps, private entrances, or adjoining walkways. The Contractor shall clean public walkways adjoining the construction site of accumulated trash and debris.
   d. The Contractor or permittee shall not park vehicles in or otherwise obstruct blue curb parking spaces, except as permitted by the City Traffic Engineer as a component of an approved traffic plan.

2. **Installation of temporary ramps that conform to accessibility standards**

   The Contractor or permittee shall maintain temporary concrete, asphalt, or wood ramps to provide a safe path of travel for mobility-impaired pedestrians at all locations where permanent ramps have been temporarily removed during construction and where needed by pedestrians being routed into and out of the parking lane, a crosswalk, or the street area.
   a. Temporary ramps shall be constructed so that their removal will not damage the existing pavement, curb and gutter. After the project, the Contractor shall restore any damaged surfaces to their original condition.
   b. Ramps shall have a minimum 4’ wide walking surface and a slope not to exceed 8%. The walking surface of any ramp shall be non-slip during all weather conditions and shall be
even and smooth. Curb ramps shall be kept free of debris, staging material, equipment, etc.

c. Asphalt or concrete ramps shall be constructed to snugly meet the existing adjacent surfaces without gaps. Where drainage may be impaired by an asphalt or concrete ramp, a schedule 40 PVC pipe, minimum 2” in diameter, shall be installed through the ramp.

d. Wood ramps shall be constructed with ¾” or thicker plywood platform, supported at the curbside with a suitable wood framing, and anchored to the street on the street side with 16d nails. Ramps shall have a smooth transition without vertical or horizontal gaps larger than ¼” between the wood and the concrete curb.

e. Transitions between temporary ramps and the street surface shall be smooth such that no lip exists at the base of the ramp. For a wood ramp, this may be achieved by installing a minimum of 3” of cutback asphalt tamped evenly and securely in place.

f. The sides of a ramp shall be protected where there is any drop-off. Protection may consist of barricades or guardrails, or, for asphalt or concrete ramps, flared sides with slope not exceeding 8%. For a short time period and as long as continuous supervision of pedestrians is provided on-site, when approved by the City’s Engineer, edge protection at the side of ramps may consist of closely spaced traffic cones.

3. **Construction of signposts, barricades and fencing**

Impenetrable barricades shall be used to separate pedestrians from hazards. Such barricades shall be installed and maintained on all sides of excavations that may be exposed to pedestrians, particularly pedestrians who are blind. Barricades shall be constructed using materials and methods that are suitable to the site conditions. Signs and fencing material shall not protrude into the clear pathway.

a. A-frames used for defining a path of travel, not barricading trenches from vehicular travel, shall be placed end-to-end without spacing between adjacent barricades, and they all shall be connected, set up, and maintained to ensure that individual A-frames do not move out of place or separate throughout the duration of the hazardous condition. As an example of an acceptable connection, A-frames may be connected by 2 X 4’s that are attached along the base of the barricade system. (This will help a person who is blind negotiate a safe path of travel. Openings between A-frames would give confusing signals to a person who is blind and using a “long cane,” “walking cane” or “white cane.”)

b. Caution tape does not provide an adequate barricade and shall not be used by itself to delineate the path of travel. However, it may be used in addition to other protections to highlight danger, and it may be used in conjunction with true barricades, such as A-frames.

c. Where fencing material, such as chain link or plastic mesh, is used alongside a pedestrian corridor, there shall be a minimum 3” height, solid, uninterrupted toe-board at the bottom
of the fence. This baseboard will act as a guide-strip for blind pedestrians using canes. A safe design can be achieved by attaching a solid material, e.g., wood, bender board, sheet metal or other solid rail to the fencing material or supports between 1” and 5” above grade, allowing drainage beneath, if necessary. The material should have a high visual contrast to the street/sidewalk surface. (Walking canes used by blind pedestrians and wheelchair foot pedals could get caught in fencing or A-frames unless there is a sold bottom “shoreline.”)

d. Signposts, scaffolding and fencing supports shall be placed entirely outside the pedestrian path of travel so the path is a minimum 4’ wide and 80” high without obstruction. Scaffolding wing nuts, fence-post footings and support braces shall not protrude into the walkway. Signs shall not protrude into the pathway below 80” height.

e. The Contractor shall maintain the construction barriers in sound, neat and clean condition during construction. Whenever a barricade erected by the Contractor is removed or breached, the Contractor shall immediately replace the barricade and take appropriate measures to ensure it remains in place. Hazards identified by the Inspector shall be abated within an hour of notification to the crew.

4. Identification of the safe path of travel

If a portion of the public pedestrian way is rerouted due to construction, the path of travel shall be clearly defined. Where the Traffic Engineer determines a pedestrian access corridor cannot be provided or for a brief duration cannot be utilized, notification shall be provided for pedestrians who have mobility or vision impairments.

a. Paths of travel that do not continue to the next corner or to a safe crosswalk shall be closed to through pedestrian traffic. Signs, a minimum of 36” x 36”, containing lettering stating that the sidewalk is closed and directing pedestrians to use the other sidewalk must be posted and maintained at the corners of each block or at the crosswalk affected. Alternatively, flaggers may be posted at each closed corner or at the crosswalks to direct and assist pedestrians.

b. Pedestrian access corridors necessitated by the closure of the sidewalk shall be clearly delineated with closely-spaced cones or barricades, fences and/or other methods as deemed necessary and as approved by the City’s Engineer. When a walkway extends into the roadway, the delineation shall separate pedestrians safely from traffic. A safe design can be achieved by protecting pedestrian traffic with a fence or railing 42” in height on the street side of the walkway.

c. Curb ramp alignment can help direct blind pedestrians to and through the temporary path of travel. If a crosswalk is closed due to construction then curb ramps leading into that crosswalk also should be barricaded in such a manner that walkways that are not closed remain accessible to use. (Curb ramps are not used solely by persons in wheelchairs. They are also an indicator to persons who are blind that there is a crosswalk and a safe path of travel to cross the street.)
5. **Surfacing of pedestrian corridors**

During construction, tripping hazards and barriers for people with mobility impairments must be removed to maintain an accessible pedestrian corridor.

a. Any change of level in a path of travel which exceed ¼” height must be beveled at 45º to provide a smooth, non-tripping transition. No change in level in the path of travel shall exceed ½” unless it is ramped.

b. Trenches, temporary paving or walking surfaces, wooden platforms or steel plates, grates, utility covers, and conduit or raceways in the pedestrian corridor, shall have a smoothly finished, firm walking surface made even with the surrounding walkways.

c. The aisle or loading area adjacent to an accessible parking space is part of the pedestrian corridor. To the maximum extent feasible, construction work adjacent to an accessible parking zone shall not block the sidewalk area that serves the blue painted curb.

6. **Restoration of pedestrian routes**

a. The Contractor or permittee shall remove temporary ramps as soon as construction of the permanent access ramp is completed and usable.

b. As construction work is completed, the surface of the pedestrian path of travel shall be restored free from all ridges, gaps, bumps and rough edges.

c. Construction that affects an existing curb ramp shall include replacement or repair of the curb ramp to meet current City standards to the satisfaction of the City’s Engineer.

7. **Telephonic Notification to Disability Community When Construction Occurring**

The Contractor or Subcontractor shall telephonically notify the East Bay Center for the Blind and the Ed Roberts Campus when there is to be a construction project on Adeline Street, between Russell and Fairview Streets. The telephonic notice should be provided 72 hours in advance and should provide the date, time and purpose of the project, as well as a contact person at the City that can be reached with questions or comments.

East Bay Center for the Blind: 1-510-843-6935
Ed Roberts Campus: 1-510-225-6300

8. **Liquidated damages**

The Contractor will be assessed liquidated damages in the amount stated in the Bidder’s Proposal.
PART C
GENERAL PROVISIONS

SPECIFICATIONS

FOR

SANITARY SEWER REHABILITATION

NEILSON ST BACKLINE, THOUSAND OAKS BLVD BACKLINE, PORTLAND AVE BACKLINE, PERALTA AVE, SAN LORENZO AVE /WASHINGTON AVE, CAPISTRANO AVE, MIRAMAR AVE BACKLINE, THE ALAMEDA BACKLINE, ARLINGTON AVE BACKLINE, MICHIGAN AVE BACKLINE, ALAMO AVE BACKLINE, SAN DIEGO RD AND BACKLINE, SANTA BARBARA RD AND BACKLINE, SAN LUIS RD BACKLINE, HENRY ST BACKLINE, BERRYMAN ST AND BACKLINE, GRIZZLY PEAK BLVD AND BACKLINE, CYPRESS ST/BUENA AVE, ROSE ST, GRANT ST, EDITH ST, AND MILVIA ST BACKLINE

SPECIFICATION NO. 20-11352-C
This Amendment to the Standard Specifications for Public Works Construction applies to the rehabilitation and construction of sewers and other improvements as shown in the Plans.


Only those materials and construction methods described in the Standard Specifications, as modified by this Amendment, and included in the Contract Documents, will be used by the Contractor.

GENERAL PROVISIONS

SECTION 1 - DEFINITION OF TERMS

101.1 Whenever in these specifications, or in any documents or instruments where these specifications govern, the following terms are used, they shall have the following meanings:

101.2 AASHTO -- The latest revised specifications of the American Association of State Highway and Transportation officials.

101.3 As Directed -- As directed by the Engineer or his designated representative.

101.4 ASTM -- The latest revised specifications of the American Society for Testing Materials.


101.6 Bidder -- Any individual, firm, partnership, or corporation submitting a proposal for the work contemplated, acting directly or through a duly authorized representative.

101.7 City, Agency -- City of Berkeley.

101.8 Council -- City Council of the City of Berkeley.

101.9 Engineer -- The Manager of Engineering for Public Works of the City
101.10 Contract -- The written agreement covering the performance of the work.

101.11 Contractor -- The person or persons, partnership, association or corporation, private or municipal, who have entered into a contract with the City, as party or parties of the second part of his or their legal representatives.

101.12 Laboratory -- The official testing laboratory of the City or other laboratories authorized by the Engineer.

101.13 Proposal -- The written offer of the bidder for the work when made out and submitted on the prescribed proposal form, properly signed and guaranteed.

101.14 Proposal Guaranty -- The security required by the notice to bidders to be furnished by the bidder as a guaranty that the bidder will enter into a contract for the construction of the work upon award.

101.15 Plans -- The official plans, profiles, cross-sections, details, working drawings, and supplemental drawings, or reproductions thereof, approved by the Engineer, which show the location, character, dimensions, and details of the work to be done, and which are to be considered as a part of the contract supplementary to these specifications.

101.16 Purchasing Agent -- The Purchasing Agent of the City of Berkeley.

101.17 Specifications -- The directions, provisions, and requirements contained herein, supplemented by special provisions, pertaining to the method and manner of performing the Work, and to the quantities and qualities of materials to be furnished under the Contract. The term Specifications shall include the Contract Documents, General Provisions, Special Provisions, Technical Specifications, Standard Details, and all supplementary agreements entered into between the contracting parties.

101.18 Subcontractor -- The person or persons, partnership, association, or corporation, private or municipal, who have a direct contract with the Contractor. It includes one who
<table>
<thead>
<tr>
<th>Section</th>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>101.19</td>
<td>Street</td>
<td>Any dedicated right-of-way for public use as an avenue, highway, lane, alley, court, crossing, or intersection.</td>
</tr>
<tr>
<td>101.20</td>
<td>The Work</td>
<td>All the work described in the Specifications and Contract or indicated on the Plans as the contemplated improvement covered by the Contract.</td>
</tr>
<tr>
<td>101.21</td>
<td>Contract Change Order</td>
<td>A written order to the Contractor signed by the Engineer directing an addition, deletion or revision in the work, an adjustment in the contract price, or the contract time issued after the effective date of the Contract. A change order may or may not also be signed by the Contractor.</td>
</tr>
<tr>
<td>101.22</td>
<td>Allowance</td>
<td>An inexact bid quantity listed on the Bidder's Proposal in anticipation that work of the particular nature will be required, but the quantity is not known until the work of the whole is in progress or completed. The quantity listed is for comparison of total bids. Bidder agrees to do each unit of work for the unit price bid in the proposal.</td>
</tr>
<tr>
<td>101.23</td>
<td>Resident Engineer</td>
<td>Designated inspection representative(s) of the Engineer.</td>
</tr>
<tr>
<td>101.24</td>
<td>NPDES Permit</td>
<td>National Pollutant Discharge Elimination System Permit</td>
</tr>
<tr>
<td>101.25</td>
<td>RWQCB</td>
<td>San Francisco Regional Water Quality Control Board</td>
</tr>
<tr>
<td>101.26</td>
<td>Traffic Engineer</td>
<td>The Transportation Manager of the Transportation Division of the Public Works Department of the City of Berkeley, or his/her designated representative(s)</td>
</tr>
</tbody>
</table>
SECTION 2 - PROPOSAL REQUIREMENTS AND CONDITIONS

201.1 AVAILABILITY OF PLANS AND SPECIFICATIONS. Plans and Specifications may be examined at the office of the Engineering Division. Copies of the Plans and Specifications are available at the office of the Engineering Division. Copies of the Notice to Bidders and proposal forms may be obtained from the Engineering Division.

201.2 APPROXIMATE ESTIMATE. The quantities given in the Notice to Bidders, Proposal, and Contract forms are approximate only, being given as a basis for the comparison of bids, and the City does not, expressly or by implication, agree that the actual amount of work will correspond therewith. For work bid on a lump sum price basis, any estimate of quantities is provided only for the convenience of Bidders and is not guaranteed correct by the City.

201.3 EXAMINATION OF PLANS, SPECIFICATIONS, AND SITE OF THE WORK. The Bidder shall examine carefully the site of the work contemplated and the proposal, Plans, Specifications, and Contract forms therefore. It will be assumed that the Bidder has investigated and is satisfied as to the conditions to be encountered, as to the character, quality, and quantities of work to be performed and materials to be furnished, and as to the requirements of these Specifications, the Plans, and the Contract.

201.4 PROPOSAL FORM. All proposals must be submitted on forms for that purpose furnished by the City. Letters of transmittal cannot be considered as part of the bid.

All proposals shall give the prices proposed, and shall be signed by the Bidder, who must give his address. The Bidder shall fill out all blanks in the proposal form as therein required. In case of error, unit prices will govern over extensions and written words will govern over numerals, unless it can be established that an obviously incorrect entry has been made.

201.5 REJECTION OF PROPOSALS CONTAINING ALTERATIONS OR IRREGULARITIES. Proposals may be rejected if they show any alterations of form, additions not called for, conditional bids, incomplete bids, or irregularities of any kind. When proposals are signed by an agent, other than an officer or manager of a corporation or a member of a partnership, a power of attorney or written authorization must be on file with the City prior to opening bids or shall be submitted with the proposal; otherwise, the proposal will be rejected as irregular and unauthorized.

201.6 PROPOSALS GUARANTY. All bids shall be presented in a sealed envelope and shall be accompanied by a proposal guaranty made payable to "City of Berkeley" and for the amount equal to at least ten percent (10%) of the bid unless otherwise specified on the Notice to Bidders. Said guaranty shall be an unconditional certified or cashier's check, a bank or postal money order, or bid bond executed as surety by a corporation authorized to issue surety bonds in the State of California.

201.7 WITHDRAWAL OF PROPOSALS. Any bid may be withdrawn at any time prior to but not after, the hour fixed in the public notice for the opening of bids, provided that a request in writing executed by the Bidder or through a duly authorized representative, for the withdrawal of such bid is filed with the Purchasing Agent. The withdrawal of a bid shall not prejudice the right of a Bidder to file a new bid.
201.8 **DISQUALIFICATION OF BIDDERS.** More than one proposal from an individual, a firm or partnership, a corporation or an association under the same or different names will not be considered. Reasonable ground for believing that any Bidder is interested in more than one proposal for the work contemplated will cause the rejection of all proposals in which such Bidder is interested. If there is a reason of believing that collusion exists among the Bidders, none of the participants in such collusion will be considered in this or future proposals. Proposals in which the prices are unbalanced may be rejected.

201.9 **COMPETENCY OF BIDDERS.** Prior to the submission of bids, the Contractor shall be licensed in accordance with the provisions of Chapter 9 of Division III of the Business and Professional Code of the State of California and evidence of such license shall be presented to the Engineer on request.

The Engineer may require the Bidder to present satisfactory evidence that he has sufficient experience and that he is fully prepared with the necessary capital, materials, machinery, and skilled workmen to carry out the contract.

201.10 **MATERIAL GUARANTY.** Before any contract is awarded, Bidders may be required to furnish a complete statement of the origin, composition, and manufacture of any or all materials to be used in the construction of the work, together with samples, which may be subjected to the tests provided for in these Specifications to determine their quality and fitness for the work.

201.11 **ADDENDA.** Prior to the time set for opening of bids, the Engineer may issue addenda for clarification of the Plans or Specifications or for minor alterations in the work. Such addenda shall take precedence over Plans, Specifications, and all other Contract Documents issued prior to the opening of bids.
SECTION 3 - AWARD AND EXECUTION OF CONTRACT

301.1 CONSIDERATION OF BIDS. Bids will be opened publicly by the Purchasing Agent of the City on the date and at the time set forth in the Notice to Bidders. The right is reserved by the City by action of the Council to reject any or all bids, to advertise for new proposals, to negotiate in the open market for a Contract at a reasonable price, to purchase in the open market, to have the work performed by City employees, or to abandon the work, if in the judgment of the Council, the best interests of the City will be promoted thereby.

301.2 AWARD OF CONTRACT. The award of the Contract, if awarded, will be to the lowest responsive Bidder whose proposal complies with all the requirements prescribed. The award, if made, will be made within seventy-five (75) calendar days after the opening of the proposals. All bids will be compared on the basis of the Engineer's estimate of the quantities of work to be done.

301.3 RETURN OF PROPOSAL GUARANTEES. All proposal guarantees will be held by the City until the Contract has been authorized by Council resolution and signed by the City Manager after which guarantees for unsuccessful proposals will be returned to the unsuccessful Bidders. If bids are rejected, the proposal guarantees will be returned after the date of the rejection.

301.4 CONTRACT BONDS. At the time of execution of the Contract by the City Manager, the Contractor will be required to furnish a Surety Company Contract bond for faithful performance in the sum of not less than one hundred percent (100%) of the amount of his Contract, in addition to which he will be required to furnish a Surety Company labor and material bond in the sum of not less than one hundred percent (100%) of the amount of the Contract in accordance with the provisions of state laws.

Alterations, extensions of time, extra and additional work, and other changes authorized by these Specifications or any part of the Contract may be made without securing the consent of the Surety or Sureties on the Contract bonds.

301.5 EXECUTION OF CONTRACT. The Bidder's Proposal (offer) shall become a binding contract on the parties when the award of a contract pursuant to said proposal is authorized by resolution of the City Council. The proposal will then be executed in writing by the City Manager, or his/her authorized representative, in the name of the City.

301.6 FAILURE TO PERFORM CONTRACT. If the successful Bidder fails to begin performance of the Contract within thirty (30) calendar days from the date of the award of the Contract, the City will either let the Contract to the next lowest Bidder or will reject all other bids and call for new bids. The successful Bidder who has failed to begin performance of the Contract shall be liable to the City for the sum, not exceeding the amount of such cash, check, money order or bond as shall have been deposited as a proposal guaranty, by which the amount of the Contract, covering the said proposal, executed by and between the City and some third party, may exceed the amount bid by the original successful Bidder. Such portion of said cash, check, money order, or original bond as equals said sum shall be deemed to be liquidated damages and shall be declared forfeited to the City and shall be collected and paid to the City.
SECTION 4 - SCOPE OF WORK

401.1 WORK TO BE DONE. The intent is to prescribe complete work or improvement, which the Contractor undertakes to do in full compliance with the Plans, Specifications, and Contract. The Contractor shall perform all items of work covered and stipulated in the Specifications and Contract, together with any extra work, all in accordance with lines, grades, cross-sections, and dimensions shown on the Plans. It is further intended that all miscellaneous work required to make driveways, sidewalks, intersections, roof drains, and other privately owned improvements conform to the new work shall be performed by the Contractor. The Contractor shall furnish, unless otherwise provided in these Specifications, all material, implements, machinery, equipment, tools, supplies, transportation, and labor necessary to the prosecution and completion of the work.

All work described in the Plans and Specifications will be let under one contract unless otherwise set forth in the Notice to Bidders or on the Bidder's Proposal.

401.2 ALTERATIONS AND INCREASED OR DECREASED QUANTITIES. The City reserves the right in writing, to increase or decrease the quantity, to order additions to, omissions from, or corrections, alterations and modifications in the line, grade, form dimensions, Plan or kind or amount of work, or materials herein contemplated, or any part thereof, either before or after the beginning of construction, as may be deemed necessary or advisable by the Engineer, provided such alterations do not change the total cost of the project, based on original estimated quantities and the unit prices bid, by more than twenty percent (20%), and provided further that such items do not change the total cost of any major item by more than fifty percent (50%). (A major item is one where the total cost is more than ten percent (10%) of the total Contract price.) Any alterations in excess of these limits will be treated as extra work and will be covered by a Contract change order, the same as though the alteration were an extra work item.

Should conditions during the progress of the work make it impossible for the Contractor to comply strictly with the terms of the Contract, the Contractor shall apply in writing to the Engineer for an alteration, provided that it is not detrimental to the work or does not entail additional cost. If such alteration is acceptable to the Engineer, the Contractor shall be notified in writing, whereupon the alteration may be made. When such alteration is not acceptable to the Engineer, the Contractor shall determine some other method of doing the work which shall be acceptable.

Such alteration and increased or decreased quantities shall in no way affect or make void this Contract or any part thereof, except what is necessarily affected by such alteration and is clearly the evident intention of the parties to this Contract.

401.3 EXTRA WORK. New and unforeseen items of work will be classed as extra work when they cannot be covered by any of the various items for which there is a bid price or by combinations of such items, or if the character of an item is materially changed on which the Contractor based his bid price, and that change materially increases or decreases the cost of the item as outlined in Section 401.2 hereof.

Prices for extra work shall be itemized and covered by a Contract change order submitted by the Contractor and approved by the Engineer prior to actual starting of such work.
Should the parties be unable to agree on unit prices for the extra work, or if it is impractical, the Engineer may instruct the Contractor to proceed with the work by force account and he shall be paid as provided in Section 901.2 of these Specifications.

401.4 **UNAUTHORIZED WORK.** Work done without lines and grades being given, work done beyond the lines and grades shown on the Plans, work done in the absence or without the knowledge of the Engineer, including any work performed by subContractors without proper superintendence by the Contractor, as provided for in Section 501.6, or any extra work done without written authority, will be considered as unauthorized and at the expense of the Contractor and will not be measured or paid for by the City.

401.5 **PROTECTION OF UTILITIES.** A preliminary study of the location of underground utilities within the limits of the work has been made. The location of the underground utilities indicated on the Plans is not guaranteed to be accurate or complete, but is plotted for the general information of the Contractor. The Contractor shall contact Underground Service Alert (USA) at (800) 642-2444 at least four (4) working days before excavating, to allow utility companies to mark and identify their respective utilities within the limit of the work. Aboveground utilities are not shown on the Plans. It shall be the responsibility of the Contractor to coordinate and determine the exact locations and/or depths of all of the aboveground utilities, underground utilities, and their service locations.

The Contractor shall be responsible for protecting and supporting the aboveground utilities and the identified underground utilities that occur in the limits of the work with a method acceptable to the respective utility owners. The cost of protecting and supporting the utilities shall be included in the bid prices for the various items of work. Any identified damage to the Pacific Bell Telephone, PG&E, EBMUD, or Cable TV lines shall be repaired by the respective utility owner at the Contractor's expense.

See also Sections 701.25.1 and 701.25.2.

401.6 **CLEANING UP.** The Contractor shall not allow the site of the work to become littered with trash, rubbish, and waste material, but shall maintain the site in a neat and orderly condition throughout the construction period. The Engineer shall have the right to determine what is or is not trash, rubbish or waste material and the place and manner of disposal.

The Contractor shall maintain a neat appearance to the Work. Contractor shall promptly remove splattered concrete, asphalt, oil, paint, corrosive liquids and cleaning solutions from surfaces to prevent marring or other damage.

Broken concrete debris, and unsuitable excavated native soil during construction shall be disposed of concurrently with its removal. If stockpiling is necessary all debris shall be placed in trash bins daily and shall be removed or disposed of weekly. Any waste shall not be buried on the site or disposed of into storm drains, sanitary sewers, streams, or waterways.

Forms or falsework that are to be re-used shall be stacked neatly concurrently with their removal.
Forms and false work that are not to be re-used shall be disposed of concurrently with their removal.

Full compensation for conforming to the provisions in this section, not otherwise provided for, shall be considered as included in prices paid for the various Contract items of work involved and no additional compensation will be allowed therefor.

Sidewalks, street area, parking strips, and driveway approaches must be kept reasonably clean at all times during construction and be completely and carefully cleaned after the work has progressed beyond the immediate vicinity to the satisfaction of the Engineer. Reasonable cleanup is defined as no dust, rock, or mud on any portion of the public right-of-way or the private properties as a result of the Contractor's work.

401.7 **DUST AND DEBRIS CONTROL.** The Contractor shall be responsible for controlling dust in the air and rocks, debris, mud or dirt which are scattered as a result of his operations on the job. The Contractor shall be responsible for cleaning all mud, rock, dust, dirt, and debris-producing materials that originate in the project area and are deposited on other public or private property by truck tires, spillages, or by other means. The Contractor shall have suitable and adequate street cleaning equipment on the project site at all times.

The Contractor shall begin cleanup operation by 3:00 PM and before the end of each day's work. The Contractor shall clean all paved portions of the project and paved streets leading from the project that have dust-producing materials or debris deposited upon them. The work areas shall be swept clean at the end of each day's work and at other times when directed by the Engineer.

The Contractor shall restrict the use of water to control dust in order to conserve water during drought situations or mandated rationing required by the Water Utility Company. Any discharge that is not composed entirely of stormwater, except discharges pursuant to a NPDES permit, into the local drainage system is unlawful. The temporary diversion of storm and subsurface waters must be approved by the RWQCB and Engineer. The Contractor shall implement appropriate erosion and sediment control measures to reduce pollutants into the City's drainage system and public right-of-ways.

The cost of the above work, including the providing of barricades, water and other materials, labor, and equipment shall be at the sole cost and expense of the Contractor.

The Engineer may determine that an emergency exists when dust, rocks, debris, mud, or dirt are scattered in the public right of way or in the private properties as a result of Contractor's activities and/or deterioration of such conditions due to rain. The emergency conditions may also be declared when traffic or the Contractor's equipment travelling through a job causes dust to fly or rocks, debris, mud, or dirt to be scattered. Similar emergency conditions may be determined by the Engineer if the storage of materials, tools, or any other equipment related to the project, in the public rights of way, is obstructing or blocking access to the neighboring properties, dangerously placed without proper barricades and lights, and stockpiled materials and washwaters are entering into the street gutter and storm drain inlets.

401.7-1 **EMERGENCY CLEANUP WORK.** In any case in which the Contractor fails to
satisfactorily complete the cleanup work described in this section, the Engineer or his representative may determine that an emergency exists. In the event an emergency is determined by the Engineer, the Contractor shall immediately make available manual labor or mechanical equipment capable of handling the cleaning process. During such an emergency, City forces may be called upon to complete the cleanup work, or the City may contract for the cleanup work. All construction work shall be shut down during this cleanup work by the City/Contract forces. The Engineer may shut down further construction work until the violations are corrected to the satisfaction of the Engineer. The cost of the work performed by City/Contract forces plus an additional 70% surcharge shall be paid by the Contractor by deduction from payment due him on the Contract. No compensation shall be given to the Contractor for stoppage of work.

Such action by the Engineer, however, shall not relieve the Contractor of his responsibility for any damages which may occur before, during or after such action has been taken by the Engineer, and shall place no liability upon the City or the Engineer.

401.8 **NOISE CONTROL.** All construction machinery and vehicles employed on the project shall be equipped with approved sound muffling devices, and operated in a manner to cause the least noise consistent with efficient performance of the work. Section 701.11 specifies time limitation in which engine driven equipment shall not be operated.

401.9 **TEMPORARY LIGHT, POWER, AND WATER.** The Contractor shall at its own expense, furnish, install, maintain, and remove all temporary light, power, and water, including piping, wiring, lamps, and other equipment, necessary for the work. The Contractor shall not draw water from any fire hydrant, except to extinguish a fire, without first obtaining permission from the water agency concerned.

401.10 **COORDINATION WITH AFFECTED RESIDENTS.** This Contract may include a significant amount of work within construction easements in private property. The Contractor shall be required to provide adequate notification to, and coordination with, the affected residents. At least 1 week prior to working in easements, the Contractor shall notify the affected residents in writing of the intention to perform work within their properties, the starting dates of work, and duration of the work.

The Contractor shall only initiate an amount of work that can be reasonably completed on the same day. If the initiated work is unfinished, the Contractor shall provide adequate covers and appropriate barricades and warning signs to ensure public safety to the satisfaction of the Engineer. After completion of work in the easement area, the Contractor shall obtain written release from the property owners and give a copy to the Engineer. Any damages to the properties shall be restored and handled in accordance with Section 401.11 of this specification.

In addition, service connections may be required to be temporarily stopped for rehabilitation of the sewer mains and/or laterals. At least 1 week prior to working in a particular area, the Contractor shall notify the affected residents in writing of the intended work, the starting date and duration, and any coordination requirements to facilitate work progress. The Contractor shall be required to adequately notify affected residents of schedule changes.
For service connection disruptions required to make system improvements, the Contractor shall provide a second notice to residents/businesses not less than 48 hours prior to service interruption. For interruptions in service longer than the limits specified below, the Contractor shall at his cost arrange for and provide in-kind services. Maximum interruption time without provision of in-kind services for private residences shall be as follows:

Water Services: 4 hours  
Sewer Services: 7 hours

All interruptions shall be restored by the Contractor at the end of each day.

The Contractor shall plan for and provide the services of a septic tank pumper truck to periodically pump out any sewage which may accumulate in excavation pits at the two-way clean-out location. Alternatively, the Contractor may utilize submersible sewage pumps or trash pumps to convey the sewage from the pits to a functional portion of the existing sanitary sewer within the project area.

The Contractor shall at all times perform his lateral connection work so as to minimize the quantity of sewage which may accumulate, to minimize adverse impacts on public health and sanitation and to minimize the potential for odors. The Contractor shall at all times maintain an adequate supply of bottled chlorine bleach (sodium hypochlorite solution) to treat any accumulated sewage should this be determined necessary by the Engineer to minimize odors and to protect the public and workers' health.

All costs to the Contractor for coordination with the affected residents shall be included in bid prices for the replacement or rehabilitation of sewer mains and laterals.

401.11 PROTECTION AND RESTORATION OF EXISTING IMPROVEMENTS. The Contractor shall be responsible for the protection of public and private property adjacent to the Work and shall exercise due caution to avoid damage to such property.

The Contractor shall repair or replace all existing improvements and street pavements which are not designated for removal (e.g., street sections, curbs, gutters, driveways, fences, walls, structures, landscaping, etc.) which are damaged or removed as a result of its operations. Repairs and replacements shall be at least equal to existing improvements, and shall match them in finish and dimensions.

Prior to initiating work in the public right of way and in the easements, the Contractor shall make an audio/video cassette tape recording of the affected areas showing all existing improvements, and their conditions. The tapes shall be turned over to the Engineer and shall be used as a historical recording of the preconstruction conditions. The costs of the preconstruction audio-visual survey shall be the responsibility of the Contractor.

Any damages to the private properties will be restored to the satisfaction of the property owners/Engineer within seven (7) days of the damage(s).

Damages within the public right of way including street pavement will be restored to the satisfaction
of the Engineer after work on that particular block is completed.

401.12 **SUBMITTALS.** Where required by the Specifications, the Contractor shall submit descriptive information which will enable the Engineer to advise the Agency whether the Contractor's proposed materials, equipment or methods of work are in general conformance to the design concept and in compliance with the drawings and Specifications. The information to be submitted shall consist of proposed construction schedule, traffic control plan, shoring, sheeting and bracing as required drawings, Specifications, descriptive data, certificates, samples, test results and such other information, all as specifically required in the Specifications. In some instances, specified submittal information described some, but not all, features of the material, equipment, or method of work. Features not requiring submittals shall be as specified.

401.12-1 **CONTRACTOR'S RESPONSIBILITIES.** Contractor shall be responsible for the accuracy and completeness of the information contained in each submittal and shall assure that the material, equipment or method of work shall be as described in the drawings. Submittal documents shall be clearly edited to indicate only those items, models, or series of equipment, which are being submitted for review. All extraneous materials shall be crossed out or otherwise obliterated. The Contractor shall insure that there is no conflict with other submittals and notify the Engineer in each case where his submittal may affect the work of another Contractor or the Agency. The Contractor shall insure coordination of submittals among the related crafts and subContractors.

401.12-2 **TRANSMITTAL PROCEDURE.**

401.12-2a **General.** Submittals regarding material and equipment shall be accompanied by a transmittal form. A separate form shall be used for each specific item, class of material, equipment, and items specified in separate, discrete sections, for which the submittal is required. Submittal documents common to more than one piece of equipment shall be identified with all the appropriate equipment numbers. Submittals for various items shall be made with a single form when the items taken together constitute a manufacturer's package or are so functionally related that expediency indicates checking or review of the group or package as a whole.

401.12-2b **Deviation from Contract.** If the Contractor proposes to provide material, equipment, or method of work which deviates from the requirements of the Plans and Specifications, he shall indicate as "deviation" on the transmittal form accompanying the submittal copies.

401.12-2c **Submittal Completeness.** Submittals which do not have all the information required to be submitted, including deviations, are not acceptable and will be returned without review.

401.12-3 **REVIEW PROCEDURE.** Submittals are specified for those features and characteristics of materials, equipment, and methods of operation which can be selected based on the Contractor's judgment of their conformance to the requirements of the Plans and Specifications. Other features and characteristics are specified in a manner which enables the Contractor to determine acceptable options without submittals. The review procedure is based on the Contractor's guarantee that all features and characteristics not requiring submittals conform to the Plans and Specifications. Review shall not extend to means, methods, techniques, sequences or procedures of construction, or to verifying quantities, dimensions, weights or gages, or fabrication processes except where
specifically indicated or required by the Contract documents or to safety precautions or programs incident thereto. Review of a separate item, as such, will not indicate approval of the assembly in which the item functions.

When the Contract documents require a submittal, the Contractor shall submit the specified information as follows:

1. One reproducible original of all the submitted information. When individual sheets in the submittal exceed 8-1/2 inches x 11 inches, a sepia shall be submitted.

2. Four copies of all the submitted information.

Unless otherwise specified, within 10 calendar days after receipt of the submittal, the Engineer shall review the submittal and return one copy of the marked-up reproducible original noted in #1 above. The reproducible original will be retained by the Engineer. The returned submittal shall indicate one of the following actions:

1. If the review indicates that the material, equipment or work method complies with the Contract documents, submittal copies will be marked "NO EXCEPTIONS TAKEN." In this event, the Contractor may begin to implement the work method or incorporate the material or equipment covered by the submittal.

2. If the review indicates limited corrections are required, copies will be marked "MAKE CORRECTIONS NOTED." The Contractor may begin implementing the work method or incorporating the material and equipment covered by the submittal in accordance with the noted corrections.

3. If the review reveals that the submittal is insufficient or contains incorrect data, copies will be marked "AMEND AND RESUBMIT." Except at his own risk, the Contractor shall not undertake work covered by this submittal until it has been revised, resubmitted and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED."

4. If the review indicates that the material, equipment, or work method does not comply with the Contract documents, copies of the submittal will be marked "REJECTED -SEE REMARKS." Submittals with deviations which have not been identified clearly may be rejected. Except at his own risk, the Contractor shall not undertake the work covered by such submittals until a new submittal is made and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED."

401.12-4  **EFFECT OF REVIEW OF CONTRACTOR'S SUBMITTALS.** Review of drawings, methods of work, or information regarding materials or equipment the Contractor proposes to provide, shall not relieve the Contractor of his responsibility for errors therein and shall not be regarded as an assumption of risks or liability by the Engineer or the Agency, or by any officer or employee thereof, and the Contractor shall have no claim under the Contract on account of the failure, or partial failure, of the method of work, material, or equipment so reviewed. A mark of "NO
EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED" shall mean that the Agency has no objection to the Contractor, upon his own responsibility, using the plan or method of work proposed, or providing the materials or equipment proposed.

401.13 **FINAL CLEANING UP.** Upon completion of the work, and before acceptance and final payment, the Contractor shall clean the project areas and remove all surplus and discarded materials, falsework, rubbish and temporary structures and restore in an acceptable manner all property, both public and private, which has been damaged during the prosecution of the work, and shall leave the improvement in a neat and presentable condition throughout the entire length of the improvement under Contract to the satisfaction of the Engineer. If the Conditions as noted above are not corrected immediately, the Engineer may declare an emergency and take necessary action in accordance with Section 401.7-1 of this Specification.

401.14 **CHANGED CONDITIONS.** The Contractor shall notify the Engineer in writing of the following Work site conditions, hereinafter called changed conditions, promptly upon their discovery and before they are disturbed.

1. Subsurface or latent physical conditions differing materially from those represented in the Contract; and

2. Unknown physical conditions of an unusual nature differing materially from those ordinarily encountered and generally recognized as inherent in work of the character being performed.

The Engineer will promptly investigate conditions when notified or any conditions discovered by him which appear to be changed conditions. If the Engineer determines that the conditions are changed conditions and that they will materially increase or decrease the costs of any portion of the Work, a Change Order will be issued adjusting the compensation for such portion of the work in accordance with Subsection 401.3. If the Engineer determines that conditions of which has been notified by the Contractor do not justify an adjustment in compensation, the Contractor will be so advised in writing. Should the Contractor disagree with such determination, it may submit a notice of potential claim to the Engineer, as provided in Section 501.12.

If the Engineer determines that the conditions are changed conditions and that they will materially affect the performance time, the Contractor, upon submitting a written request, may be granted an extension of time subject to the provisions of Section 801.7.1.

The Contractor's failure to give notice of changed conditions promptly upon their discovery and before they are disturbed shall constitute a waiver of all claims in connection therewith.

401.15 **AS-BUILT RECORDS.** The Contractor shall maintain at the jobsite one (1) set of Plans marked to show any deviations which have been made from the Plans, including buried or concealed construction and utility features revealed during the course of construction. Record the horizontal and vertical location of all buried utilities that differ from the Plans. These Plans shall be available for review by the Engineer at all times. Upon completion of the work, deliver the marked set of prints in good condition to the Engineer for incorporation into the original drawings.
SECTION 5 - CONTROL OF THE WORK

501.1 **AUTHORITY OF THE ENGINEER.** The Engineer shall decide all questions which may arise as to the quality or acceptability of materials furnished and work performed, and as to the manner or performance and rate of progress of the work; all questions which may arise as to the interpretation of the Plans and Specifications; all questions as to the acceptable fulfillment of the Contract on the part of the Contractor; and all questions as to compensation. His decision shall be final and he shall have authority to enforce and make effective such decisions and orders which the Contractor fails to carry out promptly.

501.2 **PLANS.** All authorized alterations affecting the requirements and information given on the approved Plans shall be in writing. No changes shall be made in any plan or drawing after the same has been approved by the Engineer, except by direction of the Engineer. Where at any time reference is made to the Plans, the interpretation shall be the Plans as affected by all authorized alterations then in effect.

501.3 **CONFORMITY WITH PLANS AND ALLOWABLE DEVIATION.** Finished surfaces in all cases shall conform with the lines, grades, cross sections, and dimensions shown on the approved Plans. Deviation from the approved Plans, as may be required by the exigencies of construction, will, in all cases, be determined by the Engineer and authorized in writing.

501.4 **COORDINATION WITH CONTRACT DOCUMENTS.** These Specifications, the Plans, and all supplementary documents are essential parts of the Contract, and a requirement occurring in one is as binding as though occurring in all. They are intended to be cooperative, to describe and provide for a complete work. If there is a conflict between Contract Documents, the document highest in precedence shall control. The precedence shall be:

1. Federal and State requirements.
2. Permits from other agencies as may be required by law.
5. Contract Plans, including General Notes.

Change orders, supplemental agreements, and approved revisions to Plans and Specifications will take precedence over documents listed above. Detailed plans shall have precedence over general plans.

501.5 **INTERPRETATION OF PLANS AND SPECIFICATIONS.** Should it appear that the work to be done or any of the matters relative thereto are not sufficiently detailed or explained in the Plans or Specifications, the Contractor shall apply to the Engineer for such further explanations as may be necessary and shall conform to the same as part of the Contract, so far as may be consistent with the original Specifications; and in the event of any doubt or question arising regarding the true meaning of the Specifications, reference shall be made to the Engineer, whose decision thereon shall be final.

In the event of any discrepancy between any drawing and the figures written thereon, the figures shall be taken as correct.

Any part of the work which is not mentioned in the Specifications, but is shown in the Plans, or any part not shown on the Plans but described in the Specifications, shall be performed by the Contractor.

501.6 **SUPERINTENDENCE.** The Contractor will be supplied with five copies of the Plans and Specifications. Additional sets of Plans and Specifications shall be provided at the Contractor's cost which shall be equal to the City's reproduction costs. The Contractor shall have available on the work, at all times, one copy of each of said Plans and Specifications; he shall give the work the constant attention necessary to facilitate the progress thereof and shall cooperate with the Engineer and with other Contractors in every way. The Contractor shall, at all times, have a competent superintendent capable of reading and thoroughly understanding the Plans and Specifications, as his agent on the work, who shall receive instructions from the Engineer or his authorized representatives.

The superintendent shall have full authority to execute the order or directions of the Engineer without delay and to promptly supply such materials, tools, plant equipment, and labor as may be required. Such superintendent shall be furnished irrespective of the amount of work sublet.

501.7 **LINES AND GRADES.** Lines and grades for the work will be given by the Engineer. The Contractor shall give at least 48 hours' notice when he will require the services of the Engineer for laying out any portion of the work.

The Contractor may be required to furnish labor, at no extra cost to the City, to assist the City survey party. In general, this would mean the occasional furnishing of a laborer to drive stakes, pull maintenance hole covers, move obstructions, etc., in order to expedite the work.

The Contractor shall protect stakes set by City surveyors by placing guard stakes or large objects to protect them from damage. The Engineer shall charge the Contractor for all time spent resetting stakes.

501.8 **AUTHORITY AND DUTIES OF RESIDENT ENGINEER.** Duly authorized
Resident Engineers, who shall perform their duties under the direction of the Engineer, will be assigned to the project or each part thereof. The presence of the Resident Engineer shall in no way lessen the responsibility of the Contractor. In case of any dispute arising between the Contractor and the Resident Engineer as to materials furnished or the manner of performing work, the Resident Engineer shall have authority to reject materials or suspend the work until the questions at issue can be referred to and decided by the Engineer. The Resident Engineer is not authorized to revoke, alter, enlarge, relax, or release any requirement to these Specifications, nor to approve or accept any portion of the work, nor to issue instructions contrary to the Plans and Specifications.

501.9 **INSPECTION.** The Contractor shall furnish the Engineer or his designated representative with access to the work for ascertaining whether the work performed and materials used are in accordance with the requirements and intent of the Specifications and Contract.

The Contractor shall give the Engineer or his representative notice of the time when he or his subContractors will start the various units or operations of the work. Notice shall be given at least 24 hours in advance of starting or resumption time exclusive of Saturdays, Sundays, or holidays, for the purpose of permitting the Engineer to make the necessary assignment of his representative or inspector on the work. Any work performed by the Contractor or his subContractors in conflict with said notice shall be removed if so ordered by the Engineer, his representative or inspector on the work.

The inspection of the work shall not relieve the Contractor of any of his obligations to fulfill the Contract as prescribed. Defective work shall be made good, and unsuitable materials may be rejected, notwithstanding the fact that such defective work or unsuitable materials may have been previously overlooked by the Engineer and accepted or estimated for payment.

501.10 **TRAFFIC CONTROL.** The Contractor shall submit three copies of proposed traffic control plan to the Engineer for approval at least five (5) working days prior to commencement of work. No work will be started unless the traffic plan and requirements in Section 801.2 is duly approved. This plan will be submitted in the form of a drawing locating the project area and all major and minor access and exits to and out of this area. The plan will also include the immediate neighboring areas where the traffic shall be directly or indirectly affected as a result of construction work in the project area.

The traffic control plan shall be developed for various traffic situations and street configurations in the work and surrounding areas in full conformance with the "State of California Business, Transportation and housing Agency Department of Transportation Manual of Traffic Controls for Construction and Maintenance Work Zone" dated 1985, hereinafter referred to as Traffic Control Manual.

At main entry and exit points of each work location, the Contractor shall provide a 30" X 30" sign advising the public of the anticipated period of time that traffic delays may be anticipated. This sign will also include name and telephone number of the Contractor along with starting and completion dates of the Contract. Sign will be erected 7 days in advance of any work.

If traffic is to be detoured over a centerline or detoured in advance of the work, detour plan must be incorporated in the traffic control plan. Police, Fire, and Public Works Department shall be notified.
at least 48 hours in advance of any work which will interfere with the normal flow of vehicular or pedestrian traffic. Intersection closure may only occur if, in the traffic plan, the two adjacent intersections remain open, unless otherwise approved by the Engineer.

All signs and devices proposed to warn, direct, and control traffic in the vicinity of the work shall conform in size, shape, and color to the requirements set forth in the Traffic Control Manual mentioned above and approved by the Engineer in accordance with the traffic control plan.

The full width of the traveled way shall be open for use by public traffic on Saturdays, Sundays, designated legal holidays, after 3:00 P.M. on Fridays and the day preceding designated legal holidays, and when construction operations are not actively in progress.

Cost of traffic controls, including flag person, shall be included and spread among appropriate bid items as determined by the Contractor.

Public parking on streets may be restricted as necessary.

The Contractor shall furnish, erect, and maintain all signs except "No Parking" signs which shall be obtained by the Contractor from the City of Berkeley. All signs shall be placed as directed by the Engineer. The "No Parking" signs must be posted by the Contractor no later than 72 hours or as directed by the Engineer in advance of the time of need. "No Parking" signs shall bear the name of the Contractor and shall also specify the "No Parking" dates and locations.

The Contractor shall replace within a 24 hour period any sign that has been damaged, loss, or worn out.

The Traffic Engineer shall have authority to change the traffic plan and make recommendations through the Engineering Inspector after the project has started and throughout the project.

The Contractor shall comply with the traffic engineering recommendations within a 24 hour period or immediately if requested. Failure to comply with this item shall be enough reason for the Engineer to stop the project.

501.11   **DEFECTIVE AND UNAUTHORIZED WORK.** All work which is defective in its construction or deficient in any of the requirements of these Specifications shall be remedied, or removed and replaced by the Contractor in an acceptable manner, and no compensation will be allowed for such correction.

Upon failure of the Contractor to comply immediately with any order of the Engineer made under the provisions of these Specifications, the Engineer shall have the authority to cause defective work to be remedied, or removed and replaced, and unauthorized work to be removed, and to deduct the costs thereof from any monies due or to become due the Contractor.

501.12   **DISPUTED CLAIMS.** In any case where the Contractor deems extra compensation is due him for work or materials not clearly covered in the Contract, or not ordered by the Engineer as extra work, the Contractor shall notify the Engineer in writing of his intention to make claim for such
extra compensation before he begins the work on which he bases the claim. If such notification is not
given or the Engineer is not afforded proper facilities by the Contractor for keeping strict account of
actual cost, then the Contractor hereby agrees to waive the claims for such extra compensation.

Such notice by the Contractor, and the fact that the Engineer has kept account of the cost as aforesaid,
shall not in any way be construed as proving the validity of the claim. The claim must be passed upon
by the Engineer. In case the claim is found to be just, it shall be allowed and paid for as extra work.
Unless the Contractor gives notice of his claim to the Engineer within 10 calendar days, or before he
begins the work on which he bases his claim, whichever is sooner, it will not be considered.

501.13 **ARBITRATION.** Disputed claims may be settled by arbitration if both parties mutually
agree. The arbitration procedures shall be in accordance with the construction industry arbitration
rules of the American Arbitration Association. Arbitration awards shall be presented in writing and
shall include the following elements: (1) legal "finding of fact" established by the arbiter; (2) specific
breakdown of the dollar amounts allocated for each issue under arbitration; (3) the arbiter's
"conclusion of law"; (4) a summary of the evidence; and (5) reasons underlying the arbiter's award.

501.14 **FINAL INSPECTION.** Whenever the work provided and contemplated by the Contract
shall have been satisfactorily completed and the final cleaning up performed, the Engineer will make
the final inspection.

501.15 **PROGRESS MEETINGS.** The Contractor shall schedule and hold regular on-site
progress meetings weekly and at other times as requested by the Engineer or as required by progress
of the Work. The Contractor, Engineer, and all subContractors active on the site shall be represented
at each meeting. The Contractor may, at its discretion, request attendance by representatives of its
suppliers, manufacturers, and other subContractors. The purpose of the meetings will be to review
the progress of the work, maintain coordination of efforts, discuss changes in scheduling, and resolve
other problems which may develop.

501.16 **SUBSTITUTION.** Any materials, process, or article may be requested for a substitution
by the Contractor, in lieu of that specified or shown, under the following conditions:

1. Requests must be submitted in writing sixty (60) days prior to starting the work, as established
   by the Engineer, so as not to cause any delay in completion of the project.

2. The Contractor shall, at no cost to the City, furnish all testing, data, engineering, and design
   services (including the review costs incurred by the Engineer) for items offered as equivalent
to those specified. Test methods and findings shall, prior to installation, be subject to approval
   of the Engineer.

3. On sewer rehabilitation projects, the sewer rehabilitation methods shown on the Plans are the
   minimum levels acceptable for the respective reaches. The three sewer rehabilitation
   methods, in descending order of acceptability, are as follows:
   - Replacement
   - Inversion-Lining/CIPP
   - Sliplining
Substitution with a lower level rehabilitation method will not be permitted unless field conditions dictate that a lesser method will provide comparable sewer integrity. A credit change order will be prepared accordingly. The foregoing shall require the approval of the City and the Engineer. Substitution with higher level rehabilitation method may be acceptable subject to approval of the Engineer.

1. No requests for substitution will be considered during the bidding period.

2. Any substitution of any material, process, or article shall be at no additional costs to the City. Substitution with a lesser level rehabilitation method shall be accomplished by credit change order. Substitution with a higher level method shall be accomplished by a no cost change order.

The Engineer reserves all rights and will have final approval as to the substitution of alternative rehabilitation methods.

501.17 **REINSPECTION, RETESTING, AND RE-STAKING.** All costs incurred by the City for reinspection of poor workmanship, failing air tests, failing compaction tests, failing tests of any kind, and re-staking caused by the Contractor shall be deducted from the amounts due the Contractor by Contract change order. The Engineer's decision as to determination of poor workmanship shall be final.
SECTION 6 - CONTROL OF MATERIAL

601.1 **SAMPLE AND TESTS.** At the option of the Engineer, the source of each of the materials shall be approved by the Engineer before delivery is started and before such material is used in the work. Representative preliminary samples of the character and quality prescribed shall be submitted by the Contractor or producer of all materials to be used in the work, for testing or examination as desired by the Engineer.

All tests of materials furnished by the Contractor shall be made in accordance with commonly recognized standards as set forth in the Specifications and such other special methods and tests as may be prescribed.

The Contractor shall furnish such samples of materials as are requested by the Engineer, without charge. No material shall be used until it has been approved by the Engineer. Samples will be secured and tested by the laboratory whenever necessary to determine the quality of material.

601.2 **DEFECTIVE MATERIALS.** All materials not conforming to the requirements of these Specifications shall be considered as defective, and all such defective materials, whether in place or not, shall be rejected. They shall be removed immediately from the site of the work unless otherwise permitted by the Engineer. No rejected material, the defects of which have subsequently been corrected, shall be used until approved in writing by the Engineer.

Upon failure on the part of the Contractor to comply with any order of the Engineer made under this provision of these Specifications, the Engineer shall have authority to remove and replace defective material and deduct the cost of removal and replacement from any monies due or to become due the Contractor.

601.3 **STORAGE OF MATERIALS.** Materials shall be so stored as to ensure the preservation of their quality and fitness for the work. Stored materials shall be so located as to facilitate prompt inspection. Space for main storage/construction yard shall be the Contractor's responsibility.

No construction material shall be stockpiled in the street for a period of more than five (5) days at a particular location. Contractor shall coordinate with the Engineer to designate such temporary storage areas. The delivery of materials on site should be scheduled in installments in such a way that all stockpiled materials are used within the above specified period. Proper lighted barricades and other required traffic controls shall be maintained at all times around the stored materials. No material shall be stored on the sidewalk area and/or in front of driveways or within 15 feet of a fire hydrant or catch basin, passageways, or in such a way as to hinder pedestrians, vehicular flow, or drainage.

Street curbs and gutters shall be clear from stockpiled materials. All stockpiled materials shall be covered at the end of the day. To maintain flow of unobstructed surface water on the street, 4" diameter minimum drain pipes shall be provided along the gutters if any materials are stockpiled in those areas.

At least one lane shall be kept open in the street at every time during the time material is stockpiled.
in the public right of way. Any violation of the above requirements will result in a declaration of an emergency situation by the Engineer and proper remedial action shall be taken in accordance with Section 401.7 of this specification.

Clean up and tidiness under Section 401.6 shall be adhered to and enforced.

601.4 **TRADE NAMES OR ALTERNATIVES.** Whenever any article or any class of materials is specified by a trade name or by the name of any particular patentee, manufacturer or dealer, it shall be and is mutually understood to mean and specify the article or class of materials described, or any other equal thereto in quality, finish, and durability, and equally as serviceable for the purpose for which it is intended, subject to the approval and acceptance of the Engineer.
SECTION 7 - LEGAL RELATIONS AND RESPONSIBILITIES TO THE PUBLIC

701.1 LAWS TO BE OBSERVED. The Contractor shall keep himself fully informed of all state and national laws and all municipal ordinances and regulations of the City which in any manner affect those engaged or employed in the work, or which in any way affect the conduct of the work, and or all such orders and decrees of bodies or tribunals having any jurisdiction or authority over the same.

The Contractor shall at all times observe and comply with, and shall cause all agents and employees to observe and comply with all such laws, ordinances, regulations, orders and decrees, including all provisions of the Occupational Safety and Health Act of 1970 and all amendments thereto, and all applicable federal, state, municipal, and local safety regulations; and shall protect and indemnify the City, the Council, and the Engineer, and all of its and their officers and agents and servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by himself or his employees. If such discrepancy or inconsistency is discovered in the Plans, Drawings, Specifications, or Contract for the work in relation to any such law, ordinance, regulation, order or decree, the Contractor shall forthwith report the same, in writing, to the Engineer.

701.2 HOURS OF LABOR. Eight (8) hours of labor shall constitute a legal day's work for all workers employed on this Contract and the Contractor and any Subcontractor under him shall comply with and be governed by the laws of the State of California having to do with working hours as set forth in Division 2, Part 7, Chapter 1, Article 3 of the Labor Code of the State of California as amended.

The Contractor shall forfeit, as penalty to the City of Berkeley, twenty-five dollars ($25.00) for each laborer, worker, or mechanic employed in the execution of the Contract, by him or any subContractor under him, upon any of the work herein before mentioned, for each calendar day during which said laborer, worker, or mechanic is required or permitted to work more than eight (8) hours in any one calendar day and forty (40) hours in any one calendar week in violation of said Labor Code.

701.3 APPRENTICES. The Contractor and any subContractor working under him must comply with and be governed by the laws of the State of California having to do with the employment of apprentices on public works as set forth in Sections 1777.5 and 1777.6 of the Labor Code of the State of California.

Information relative to apprenticeship standards, wage schedules, and other requirements may be obtained from the Director of Industrial Relations, San Francisco, California, or from the Division of Apprenticeship Standards and its branch offices.

701.4 NONDISCRIMINATION. There shall be no discrimination against any employee who is employed in the work covered by this Contract, or against any applicant for such employment, because of race, religion, color, disability, national origin, or sexual preference. This provision shall include, but not be limited to, the following employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation, and
selection for training including apprenticeship.

In order that this provision against discrimination shall achieve the intended result, before a Contract is awarded to the apparent successful bidder there shall be a pre-award conference between such apparent successful bidder and the City Manager, or the City Manager's designated representative. Such pre-award conference shall be held after the opening of bids and before award of the Contract at a date and time to be designated by the City Manager, or his representative, and at such pre-award conference the apparent successful bidder shall present to the City Manager, or his authorized representative, the proposed program of affirmative action to ensure that persons are employed and employees are treated so that they receive equal opportunities without regard to race, religion, color, disability, national origin, or sexual preference. Such program shall include not only the affirmative action proposed to be undertaken by the apparent successful bidder in his own employment practices, but also the affirmative action that he proposes to undertake to assure that all Subcontractors working under him provide equal employment opportunities for all without regard to race, religion, color or national origin. Failure to carry out the proposed program of affirmative action shall be deemed to be a violation of the Contract within the meaning of Section 701.26 of the General Provisions.

If the bid of the apparent successful bidder is rejected by the Council and the Council wishes to award the Contract to another bidder, such Contract shall not be awarded until such bidder has complied with the requirements of this Section relating to pre-award conference and the effects thereof, as hereinabove set forth, shall be applicable to said other bidder, except that such pre-award conference shall be held within five (5) days following the action of the Council in rejecting the bid. The other bidders shall be considered for award pursuant to this paragraph in the order of their bids starting with the next lowest responsive bidder and continuing until a bidder complies with the requirements of this Section, or until the Council takes other action as authorize by Section 67 of the Charter.

701.5 PREVAILING WAGE. The Contractor and any subContractor working under him must comply with and be governed by the laws of the State of California having to do with the prevailing wage to be paid as is set forth in Division 2, Part 7, Chapter 1, Article 2 of the Labor Code of the State of California as amended.

The Contractor shall forfeit, as penalty to the City, twenty-five dollars ($25.00) for each laborer, workman, or mechanic employed, for each calendar day or portion thereof, such laborer, workman, or mechanic is paid less than the general prevailing wages hereinafter stipulated for any work done under the attached Contract, by him or by any subContractor under him, in violation of the provisions of said Labor Code. In addition, the Contractor shall pay to the workmen the wages resulting from the difference between the stipulated wage rate and the wages actually paid.
The Engineer has a current copy of general prevailing wage rates applicable to the work, a copy of which is made part of this Specification by reference.

701.6 **COMPENSATION INSURANCE.** Before beginning work, the Contractor shall furnish to the Engineer a certificate of insurance as proof that he has taken out full compensation insurance for all persons whom he may employ directly or through subContractors in carrying out the work specified herein, in accordance with laws of the State of California. Such insurance shall be maintained in full force and effect during the period covered by this Contract.

701.7 **GOVERNMENTAL REGULATIONS.** Bid price shall not be in excess of maximum prices permitted by the federal or state government.

All orders are subject to ability to obtain and use materials and deliver finished products under federal and state regulations and orders. If shipping dates are subject to delays resulting from preference rating or priority shipments order or requested by the United States Government or by any department, commission or agency thereof, the Contractor shall not be held liable for such delay.

701.8 **TAXES.** The City is liable for the State Sales Tax and where the County of purchase has adopted the Uniform Sales Tax law and a City and/or County tax is collected by the State, the City of Berkeley is liable for this tax also.

The City is exempt from the Federal Excise Tax and exemption certificates will be furnished. In certain instances, the bidder and subcontractor may be liable for Federal Excise Tax. Bidder must determine whether Federal Excise Tax is chargeable to him and if so, the amount of the tax should be included in the amount bid.

Any new or additional taxes levied after the adoption of these Specifications that are payable by the City are not to be included in the price bid, but added thereto when invoiced.

701.9 **PERMIT AND LICENSES.** The Contractor shall procure all permits and licenses, pay all charges and fees, and give all notice necessary for the lawful prosecution of the work.

701.10 **ROYALTIES AND PATENTS.** The Contractor shall pay all royalties and patent fees. He shall defend all suits and claims for infringements of any patent rights and shall save the City harmless from loss on account thereof, except that the City shall be responsible for all such loss when a particular process or the product of a particular manufacturer is specified. If, however, the Contractor has information that the procedures or article specified is an infringement of a patent, he shall be responsible for any loss unless he promptly gives said information to the City.

The Contractor shall assume all responsibilities arising from the use of patented materials, equipment, devices or processes used on or incorporated in the work.

All fees and royalties for any patented invention or process used in connection with the work shall be included in the price bid for such work, and the Contractor shall obtain a permit from the patentee for use of the same.
701.11  **PUBLIC CONVENIENCE AND SAFETY.** The Contractor shall so conduct his operations as to cause the least possible obstruction and inconvenience to the public.

Residents along the work shall be provided passage as far as practicable. Convenient access to driveways, houses, and buildings along the work shall be maintained and temporary crossings shall be provided and maintained in good conditions. Contractor shall maintain access to all driveways except when actually doing construction within the driveway boundaries, at which time parking access will be maintained unless alternate arrangement can be made with the property owners or tenants in advance. No more than one intersection street shall be closed at any one time without the approval of the Engineer.

The Contractor shall furnish all flagperson, barricades, barriers, lanterns, flares, "DR" type detour signs, and other devices which may be necessary for adequate and safe traffic control, and in accordance with the approved traffic control plans per Section 501.10 of this Specification.

Traffic control shall be performed in accordance with the following requirements:

- Safe pedestrian passage shall be provided at all times on the project site.

- All open trenches will be covered with appropriately thick steel plates in accordance with the "Work Area Traffic Control Handbook" published by Building News, Inc. (888) 264-2665. Safe passage for all vehicles shall be maintained at all times in both directions.

- Sufficient number of reflectorized signs shall be supplied and used on the job site at all times to efficiently control traffic in accordance with this Specification. Each and all barricades shall be equipped with operative automatic flashers.

- Berkeley Police and Fire Departments, Berkeley School District, City Streets and Utilities Division, and A.C. Transit shall be advised of the planned construction, blocked streets, and other changes affecting traffic conditions (48 hours in advance), every work day or more frequently. Additionally, the Police and Fire Departments and Resident Engineer must be given telephone numbers where the Contractor may be reached at all hours in the event of an emergency involving the work. Appropriate Police, Fire, Berkeley School District, City Streets and Utilities Division, and A.C. Transit telephone numbers are as follows:

  - Police: 510-981-5900
  - Fire: 510-981-5900
  - School: 510-644-6150
  - Streets & Utilities Division: 510-981-6620 (where applicable)
  - A.C. Transit: 510-839-2882

Proper signs and devices shall be used to warn, direct, and control traffic in the vicinity of the Work and shall conform in size, shape, and color to the requirements set forth in the Specifications and approved by the Engineer in accordance with the Traffic Control Plan.

Where such facilities are not provided or are out of service, and an emergency exists that necessitates
protective measures, the Engineer or his representative, may provide such facilities during the
emergency and the cost thereof shall be paid by the Contractor or deducted from monies due or to
become due him on the Contract. Such action by the Engineer, however, shall not relieve the
Contractor of his responsibility for any damages which may occur before, during or after such
precaution has been taken by the Engineer, and shall place no liability upon the City or the Engineer.

To keep evening and night noise levels to a minimum, no engine driven equipment shall be operated
between 5:00 p.m. and 7:30 a.m. unless previously authorized by the Engineer.

701.12 RESPONSIBILITY FOR DAMAGE. The City, the Council, or the Engineer shall not
be answerable or accountable in any manner for any loss or damage that may happen to the work or
any part thereof; or for any materials or equipment used in performing the work; or for injury or
damage to person or persons, either workmen or the public; or for damage to adjoining property from
any cause whatsoever during the progress of the work or at any time before final acceptance.

The Contractor shall be held responsible for any and all loss, accidents, injury or damage to persons
or property which may be the result of this Contract and for which the City might be held liable. The
Contractor shall protect and indemnify the City and save it harmless in every way from all claims,
suits or actions of law for damage or injury to persons or property that may arise or be occasioned in
any way because of this Contract. The Council may retain so much of the money due the Contractor
as shall be considered necessary, until disposition has been made of such suits or claims for damages
as aforesaid.

701.13 PUBLIC LIABILITY AND PROPERTY DAMAGE INSURANCE. Before
commencing the work, the Contractor shall furnish to the City Attorney satisfactory evidence of
public Liability and Property Damage insurance with limits of liability as listed in the Notice to
Bidders and as approved by the City's Risk Manager. Such insurance shall name the City of Berkeley
officers, employees, agents and its consultants associated with the project (City to provide names of
the consultant(s)) as additional named insured and it shall be provided that any cancellation or
reduction in coverage of the insurance by either the assured or the insurance company will not be
effective until thirty (30) days after written notice thereof has been given to the City.

701.14 CONTRACTOR'S RESPONSIBILITY FOR WORK. Until the formal acceptance
of the work by the Engineer, the Contractor shall have the charge and care thereof, except as provided
in Section 701.11, Public Convenience and Safety, and shall bear the risk of injury or damage to any
part thereof by the action of the elements or from any other cause, whether arising from the execution
or from the non-execution of the work. The Contractor shall rebuild, repair, restore, and make good
all injuries or damages to any portion of the work occasioned by any cause before final acceptance
and shall bear the expense thereof, except such injuries or damages as occasioned by acts of war.

701.15 ENTRY RIGHTS. The right is reserved to the City, and also to railway, water, gas,
telephone, telegraph, cable television and electric power transmission companies to enter upon the
work for the purpose of making repairs and changes that have become necessary by reason of work.
Projects financed in whole or in part with State funds shall be subject to inspection at all times by the
State of California agency having jurisdiction or his agent.
701.16 **COOPERATION BETWEEN CONTRACTOR AND UTILITY COMPANIES.** The Contractor shall be responsible for ascertaining the nature and extent of any simultaneous, collateral, and essential work by others. The City, its workers and Contractors, and others shall have right to operate within or adjacent to the workers to perform such work.

The City, the Contractor, and each of such workers, Contractors, and others shall coordinate their operations and cooperate to minimize interference.

The Contractor shall include in its bid all costs involved as a result of coordinating its work with others. The Contractor will not be entitled to additional compensation from the City for damages resulting from such simultaneous, collateral, and essential work. If necessary to avoid or minimize such damage, or delay, the Contractor shall redeploy its work force to other parts of the work.

Should the Contractor be delayed by the City, and such delay could not reasonably have been foreseen and prevented by the Contractor, the Engineer will determine the extent of the delay, the effect of the delay on the project as a whole, and any commensurate extension of time.

If the work of the Contractor is delayed because of any acts or omissions of any other Contractor or utility company, the Contractor shall on that account have no claim against the City other than for an extension of time.

701.17 **OBSTRUCTION.** No material or other obstruction shall be placed within fifteen (15) feet of fire hydrants, which must be at all times readily accessible to the Fire Department. Where the completion of the work requires their removal, the Contractor shall remove and dispose of all structures, debris, or other obstructions encountered in making the improvement.

701.18 **SANITARY CONVENIENCES.** Necessary sanitary facilities for the use of workers properly secluded from public observation and in compliance with health ordinances and laws, shall be constructed and maintained in an approved manner by the Contractor, and their use shall be strictly enforced.

701.19 **PRESERVATION OF MONUMENTS.** The Contractor shall carefully preserve bench marks, reference points and stakes, and in case of willful or careless destruction, they will be charged with the entire cost of replacing them and shall be responsible for any mistakes that may be caused by their unnecessary loss or disturbance. Monuments which have to be removed shall not be disturbed until authorized by the Engineer.

The Contractor shall provide the City with a minimum of 72 hours notice of any activities which may result in the displacement damage or destruction of monuments.

701.20 **OPENING SECTIONS OF NEW WORK.** Whenever, in the opinion of the Engineer, any section of the Work is in a condition for beneficial use by the City it may be opened for use. Such openings, when authorized in writing by the Engineer shall not represent acceptance of that portion of the Work unless all specified testing has been satisfactorily completed.

The Contractor will be responsible for all necessary repairs on any section of work, so opened, due to
defective material or work, damage by Contractor's operation, or to natural causes other than ordinary
wear and tear until final completion and acceptance of the work. Such repairs shall be at the expense
of the Contractor.

701.21 **ACCEPTANCE OF WORK ON CONTRACT.** When the final inspection is
completed and it has been determined that the Work is in accord with the Plans and Specifications,
the Engineer will formally accept the Contract. After such acceptance, the Contractor will be relieved
of protecting the Work, except for such correction or repair as shall be required to correct any defect
in the Work. The Contractor will not be required to perform any further work thereon except such
items as may be reserved specifically in the Specifications or formal written acceptance, and he shall
be relieved of responsibility for injury to persons or property or damage which occurs after the formal
written acceptance.

701.22 **CORRECTION OF ERRORS, RECOVERY FOR ERRORS, DISHONESTY OR
COLLUSION.** The City reserves the right to correct any error that may have been made in any
estimate that has been paid. The City also reserves the right to claim and recover by process of law
any sums sufficient to correct any error or make good any deficiency in the Work, regardless of when
such error, dishonesty or collusion shall be discovered.

701.23 **RIGHTS IN MATERIALS AND SALVAGE.** Ownership of materials incorporated in
the Work is vested in the name of the City. Any material delivered and paid for in part by the City or
any material furnished by the City to be incorporated in the Work, is or becomes the property of the
City. Any salvageable materials or installations existing at the site of the work (such as maintenance
hole rings and covers, catch basin gratings, angle iron, pipe railings, valve boxes and lamp-hole boxes,
and other steel, cast iron or metallic materials) that are the property of the City, if they are to be
removed shall be delivered F.O.B. to the storage yard designated by the City. The salvageable
materials shall be cleaned of clinging concrete and debris and delivered to the storage yard in the same
condition as it existed prior to removal, unless the Contractor is instructed otherwise by the Engineer.

701.24 **RIGHT-OF-WAY.** The right-of-way for the work to be constructed will be provided by
the City. The Contractor shall make his own arrangements, and pay all expenses for additional area
required by him outside the limits of the right-of-way, unless otherwise provided in the Special
Provisions.

701.25.1 **UNDERGROUND FACILITIES.** The City has investigated underground conditions
to the extent allowed by the City records and has indicated on the Drawings such underground
structures and conditions as are known to exist. In addition, the Drawings indicate information
furnished to the City by the utility agencies concerning their facilities. The City does not guarantee,
either expressly or by implication that the underground conditions indicated are either complete or
exact as to locations and depths. No additional allowance will be made in cases where underground
conditions vary as to number, structures, depths, locations or any other condition from the information
shown on the Drawings. In all cases, the cost of dealing with the identified underground facilities
encountered will be considered as being included in the bid prices for the various items of work.

701.25.2 **PROTECTION OF AND LIABILITY FOR UNIDENTIFIED UNDERGROUND
PUBLIC UTILITIES.** The following is pursuant to California Government Code Division 5,
Chapter 3.1, Section 4215. The City is responsible for the removal, relocation or protection of existing utilities located on the construction site that is subject of these Plans and Specifications if such existing underground utilities are not identified in the Plans and Specifications and made a part of the invitation for bids. The Contractor will not be assessed liquidated damages for delay in completion of the Contract, when such delay is caused by failure of the City or utility owner to provide for removal or relocation of the unidentified existing utility facilities.

701.26 **COMPLIANCE WITH CONTRACT.** In the event any provision of the Contract including the General Provisions and Specifications, is violated, and the Contractor refuses to comply after 10 days written notice is given by the City, the City shall have the additional right, without further notice, to cancel the Contract and/or declare such Contractor to be a non-responsive bidder, in which case no contract shall be awarded him by the City of a period of at least three (3) years from the date of violation, and then only after satisfactory evidence that he will comply with City specification and contract provisions.
SECTION 8 - PROSECUTION AND PROGRESS

801.1  **SUBLETTING AND ASSIGNMENT.** The Contractor shall give his personal attention to the fulfillment of the Contract and shall keep the work under his control. The Contract may be assigned only upon written consent of the Engineer.

SubContractors will not be recognized as such, and all persons engaged in the work of construction will be considered as employees of the Contractor, and their work shall be subject to the provisions of the Contract and Specifications.

When a portion of the work sublet by the Contractor is not being prosecuted in a manner satisfactory to the Engineer, the subContractor shall be removed immediately on the written request of the Engineer and shall not again be employed on the work.

801.2  **PROGRESS OF THE WORK AND TIME FOR COMPLETION.** The Contractor shall begin work within 14 calendar days from date of receipt of Notice to Proceed and shall diligently prosecute the same to completion before the expiration of the time specified in the Bidding Documents. After issuing of Notice to Proceed and prior to commencement of mobilization and construction, the Contractor shall be required to attend a pre-construction meeting. The Engineer may extend the starting date.

801.3  **PROGRAMMING WORK.** After notification of award and at least five (5) working days prior to start of any work, the Contractor shall submit to the Engineer for approval its proposed construction schedule. No construction work will start unless the schedule is approved by the Engineer. The construction schedule shall be in the form of a tabulation, chart, or graph and shall be in sufficient detail to show the chronological relationship of all activities of the project including, but not limited to, estimated starting and completion dates of various activities, submittal of shop drawings to the Engineer for approval, procurement of materials, and scheduling of equipment. The construction schedule shall reflect completion of all work under the Contract within the specified time and in accordance with these Specifications. The schedule shall include completion dates of all major activities on a block to block basis.

If the Contractor desires to make a major change in the method of operations after commencing construction, or if the schedule fails to reflect the actual progress, the Contractor shall submit to the Agency a revised construction schedule in advance of beginning revised operations.

Loss of work for any cause during the period of time prior to the submission of the progress schedule will not be considered by the Engineer in his computation of time extensions. In addition, the Contractor shall submit a complete list of subContractors who will perform the work on this project and a list of all major material suppliers. No substitutions of any kind will be allowed, either of subContractors or material suppliers without the written approval of the Engineer.

In case of any delays from the original schedule due to any reason, the Contractor will immediately notify the Engineer and resubmit the revised schedule within forty-eight (48) hours of that change. Any request for change in the original schedule shall be evaluated and approved or denied in accordance with requirements listed in these Specifications.
All work on the project shall be performed between the hours of 7:30 AM and 5:00 PM on a regular work day. No work shall be scheduled beyond these hours on a regular work day, City observed holiday, or weekend without prior approval from the Engineer. The Contractor shall submit this request in writing at least one week in advance. The Contractor shall pay for the inspection time of the City's resident Engineer or his designated representative on an overtime basis for required inspection of work performed beyond the mentioned regular day working hours and on holidays or weekends. This inspection charge will be deducted from the Contractor's progress payment.

All work, including finish paving on a City block and final clean up, shall be completed within five (5) weeks from the start of construction on the respective City block.

801.4 **CHARACTER OF WORKERS.** If any subContractor or person employed by the Contractor shall refuse to carry out the provisions of the Plans and Specifications or shall appear to the Engineer to be incompetent or to act in a disorderly or improper manner, he shall be discharged immediately on the written request of the Engineer, and such person shall not again be employed on the work.

801.5 **TEMPORARY SUSPENSION OF WORK.** The Engineer shall have the authority to suspend the work wholly or in part, for such period as he may deem necessary due to unsuitable weather, or to such other conditions as are considered unfavorable for the suitable prosecution of the work, or for such time as he may deem necessary due to the failure on the part of the Contractor to carry out orders given, or to perform any provisions of the work. In addition, the Contractor shall comply with the Traffic Engineering recommendation within a 24-hour period or immediately if requested. Failure to comply with this shall be sufficient reason for the Engineer to suspend the work. The Contractor shall immediately obey such orders of the Engineer and shall not resume the work until ordered in writing by the Engineer.

801.6 **LIQUIDATED DAMAGES FOR FAILURE TO COMPLETE WORK IN SPECIFIED TIME.** Time is of the essence and an essential condition of the Contract. If all the work called for under the Contract is not completed before or upon the expiration of the time set forth in the Bidding Documents, damage will be sustained by the City. Since it is and will be impracticable to determine the actual damage which the City will sustain in the event of and by reason of such delay, it is therefore agreed that the Contractor will pay to the City the sum specified in the Bidding Documents for each and every working day beyond the time prescribed to complete the work, not as a penalty, but as a predetermined liquidated damage. The Contractor agrees to pay such liquidated damages as are herein provided, and in case the same are not paid, agrees that the City may deduct the amount thereof from any money due or that may become due the Contractor under the Contract.

801.7 **EXTENSION OF TIME.** If the work called for under the Contract is not completed within the time specified, the Engineer may extend the time for completion if it serves the best interest of the City. If the time limit for the completion of the Contract is extended, the Engineer may charge to the Contractor or deduct from the final payment for the Work, all or any part of the actual cost of engineering, inspection, superintendence, and other overhead expenses which are incident to the Work, and which accrue during the period of such extension. The cost of final surveys and preparation of final estimate shall not be included in such charges.
801.7.1 **EXTENSION OF TIME DUE TO EXTRA WORK AND INCLEMENT WEATHER.** Extensions of time for extra work, when granted, shall be based upon the effect of delays to the Work and will not be granted for noncontrolling delays to minor portions of the work unless it can be shown that such delays did or will delay the progress of the Work. Extensions of time for inclement weather, when granted, shall be based upon impacts to the Contractors work operations causing not less than 75 percent of the effort to be shut down.

801.8 **DELAYS AND SUSPENSION OF WORK.** The Contractor shall not be assessed with liquidated damages nor the cost of engineering and inspection during any delay in the completion of the work caused by the wrongful act or negligence of the City or its employees, agents or representatives, by acts of God, acts of the public enemy, fire, floods, epidemics, quarantine restrictions, labor disputes, freight embargoes, materials delays when approved by the Engineer, inclement weather or delays of Subcontractors due to such causes provided, that the Contractor shall within five (5) working days from the end of any such delay notify the Engineer in writing of the cause of delay. The Engineer will determine the extent of delay and his findings of the facts thereon shall be final.

In the event the Contractor is delayed in the work by the wrongful act or negligence of the City or its employees, agents or representatives, which said delay is not caused by or the continuance of which is not due to any act or conduct on the part of the Contractor, reimbursement or payment to the Contractor for such delay, if at all, shall be limited to any money actually and necessarily expended on the job during the period of delay, solely by reason of said delay. No reimbursement, payment or allowance will be made for anticipated profits, rental charges for equipment owned by the Contractor, or any overhead or indirect costs.

801.9 **ACCEPTANCE OF PAYMENT DOES NOT CONSTITUTE WAIVER.** If the City accepts any work or makes any payment under this Contract after a default by reason of delays, the payment or payments shall in no respect constitute a waiver or modification of any of the provisions in regard to time of completion and liquidated damages.

801.10 **SUSPENSION OF CONTRACT.** If at any time the Contractor has failed to supply an adequate working force or materials of proper quality, or has failed in any other respect to prosecute the work as intended by the terms of the Contract, notice thereof in writing will be served upon him and his surety by the Engineer. Should the Contractor neglect or refuse to provide means for satisfactory compliance with the Contract within three (3) working days, the Engineer shall have the power to suspend the operations of the Contractor. Upon receiving notice of such suspension, the Contractor shall discontinue said work or such parts of it as the Engineer may designate. Upon such suspension, the Contractor's control of the Work shall terminate. The City or its duly authorized representative, may take possession of all or any part of the Contractor's materials, tools, equipment, and appliances upon the premises, and use the same for the purpose of completing said Contract, and hire such force and buy or rent such additional machinery, tools, appliance and equipment, and buy such additional materials and supplies at the Contractor's expense as may be necessary for the proper conduct of the Work and for the completion thereof. The City may employ other parties to carry the contract to completion, employ the necessary workmen, substitute other machinery or materials, and purchase the materials contracted for, in such manner as the Engineer may deem proper. The City
may annul and cancel the Contract and relet the work or any part thereof.

801.11 **LIABILITY OF CONTRACTOR IN EVENT OF SUSPENSION OR CANCELLATION.** Any excess of cost over and above the contract price because of suspension of the Contract will be charged against the Contractor and his sureties, who will be liable therefor. In the event of such suspension, all moneys due the Contractor or retained under the terms of this Contract shall be forfeited to the City until all obligations of the Contract have been met. Such forfeiture will not release the Contractor or his sureties from liability for failure to fulfill the contract.

The Contractor and his sureties will be credited with any surplus of money so forfeited by the suspension or cancellation of the contract after the completion of the work by the City as above provided. The Contractor or his surety may claim any surplus remaining after all just claims for such completion of the Contract have been paid.

801.12 **DECISION OF COUNCIL BINDING ON ALL PARTIES.** The final determination of the question as to whether there has been non-compliance with the Contract sufficient to warrant the suspension or annulment thereof, rests with the Council. Its decision shall be binding on all parties to the Contract.

801.13 **GUARANTEE.** The Contractor shall guarantee the entire Work constructed by him under the Contract to be free of defects in materials and workmanship for a period of one year after completion and acceptance by the City. The date of initiation of this guarantee period shall be the date of the filing of the Notice of Completion by the City.

The Contractor shall agree to make, at his own expense, any repairs or replacements made necessary by defects in materials and workmanship which become evident within said guarantee period. The Contractor hereby agrees to defend, to indemnify and hold harmless the City, its officers, agents and employees, and its consultants associated with the project (City to provide name of consultant), against and from all claims and liability arising from damage and injury due to said defects. The Contractor shall make all repairs and replacements promptly upon receipt of written order from the Engineer. If the Contractor fails to make the repairs and replacements promptly, the City may do the Work and the Contractor and his surety shall be liable to the City for the cost of such work.

The performance of guarantee and conditions specified above shall be secured by a surety bond which shall be delivered by the Contractor to the City prior to the date on which final payment is made to the Contractor. Said bond shall be in an approved form and executed by a surety company or companies satisfactory to the City, in the amount of 10 percent of the Contract price. Said bond shall remain in force for the duration of the guarantee period.
SECTION 9 - MEASUREMENT AND PAYMENT

901.1  **MEASUREMENT OF QUANTITIES.** For all items of work, other than those to be paid for by lump sum, after the work is completed and before final payment is made therefore, the Engineer shall make final measurements to determine the quantities of various items of work performed as the basis for final settlement. The Contractor, in case of unit price items, will be paid for the actual amount of work performed and for the actual amount of materials in place, in accordance with these Specifications as shown by the final measurements. All work completed under this Contract shall be measured by the Engineer according to the standards of weight and measures recognized by the National Bureau of Standards. A ton shall consist of two thousand (2,000) pounds avoirdupois.

Measurement for items paid for on the basis of lineal or surface area shall be along centerline distances and in horizontal planes. In computing volumes, the method of average end areas will be used with the aid of planimeter. The pay weight for all items to be paid for by weight shall be determined by actual certified scale weight, certified shipping weight or computed weight if so specified.

In order that the City of Berkeley shall have control over materials paid for on a tonnage basis, certain procedures, as outlined below, shall be followed.

1. The Resident Engineer shall be notified **prior** to the delivery of materials which are to be paid for on a tonnage basis.
2. Material delivered must be accompanied by a weight tag at the time of delivery.
3. The Resident Engineer must validate each tag at the time of delivery.
4. Tags will be accepted and initialed **only** on the date shown on the tag, which shall be the date of delivery.
5. Final quantities will be based on initialed tags only.

Materials specified for measurement by tallying of vehicles having predetermined carrying capacity shall be hauled only in approved units, struck off at the top of the carrying unit or to permanent lines at the loading point and tallied at the point of delivery. Unless all vehicles have uniform carry capacity, each hauling unit shall be marked identifying the approved capacity.

901.2 **EXTRA AND FORCE ACCOUNT WORK.** Extra work as defined in Section 401.3, when ordered and accepted, shall be paid for under a Contract change order in accordance with the terms therein provided. Payment for extra work will be made at the unit price or lump sum previously agreed upon by the Contractor and the Engineer; or by force account.

If the work is done on force account, an amount equal to the sum of the following items shall be used as full and proper compensation therefor, and such amount shall be added to the price fixed by the terms of this Contract for the part of the work affected:
1. The actual cost to the Contractor of the material required for the Work as furnished and delivered by him at the site of the Work.

2. The actual cost to the Contractor of the labor (including foremen devoting their exclusive attention to the work in question) required to incorporate all of said material into the Work and to finish the Work in accordance with directions and the cost of workers compensation insurance premiums for said labor.

3. The actual cost to the Contractor of equipment required for the extra work, except that the rate paid shall not exceed the current prevailing equipment rental rates. The charge for equipment shall be only for that time of actual operation devoted exclusively to the work in question.

4. Ten percent (10%) of Item 2, which shall be considered as covering the cost of small tools, plant and superintendence, and clerical work in connection with the changes.

5. Fifteen percent (15%) of the sum of Items 1, 2, and 3, which shall be considered as covering all other expenses and profit.

The City reserves the right to furnish such materials required as it deems expedient, and the Contractor shall have no claim for profit on the cost of such materials.

In order that a proper estimate may be made by the Engineer of the net cost of labor and materials entering into extra work, in accordance with the procedure herein stated, the Contractor shall furnish daily an itemized statement of materials and labor supplied, together with the cost of such material and the wages paid and shall furnish vouchers for quantities and prices of such labor, material or work. In case the Contractor fails to comply with the above provisions, he shall have no claim for compensation against the City for such extra work.

This method of determining the price of work shall not apply to the performance of any work or the furnishing of any materials which is susceptible of classification under the items for which prices are established in this Contract as is required or reasonably implied to be performed or furnished under this Contract.

901.3 PROGRESS PAYMENTS. The Engineer shall, once in each month, cause an estimate in writing to be made of the total amount of work done and the acceptable materials furnished and delivered by the Contractor on the ground and not used to the time of such estimate, and the value thereof according to the schedule of prices contained in the accepted bid for work. The Engineer may make an estimate of such items of work that are only partially completed on a prorating basis and pay for that portion of the item of work completed as work done.

The Contractor may request the Engineer to establish a basis for prorating the unfinished items of work, but must use such a schedule for said prorating as will then be established by the Engineer. In order to receive payment, the Contractor shall make his bills in triplicate and deliver to the office of the Engineer.

901.3.1 BID ITEM BREAKDOWN. The Contractor shall submit proposed bid item
breakdowns for progress payment purpose within 5 days following Award. Engineer shall establish a basis for prorating unfinished items of work utilizing Contractor's proposal, but Engineer shall not be limited to breakdown of items as proposed by the Contractor. Unbalanced or "front loaded" breakdowns shall be rejected.

901.4.1 **RETAINED FUNDS.** Pursuant to Article XI, Section 66 of the City Charter, the City shall retain ten percent (10%) of such estimated value of work done as part security for the fulfillment of this Contract by the Contractor and shall monthly pay to the Contractor, while carrying on the work, the balance not retained, as aforesaid, after deducting therefrom all previous payment and all sums to be kept or retained under the provisions of this Contract. No such estimate or payment shall be required to be made when in the judgment of the Engineer, the work is not proceeding in accordance with the provisions of this Contract or when, in his judgment, the total value of the work done since the last estimate amounts to less than one thousand dollars ($1,000.00).

901.4.2 **PAYMENT OF RETAINED FUNDS.** Attention is directed to Section 901.3 of the General Provisions "Progress Payments" and in particular to the retention provisions of Section 901.4.1 “Retained Funds”.

1. At the request and expense of Contractor, the City will make payments of funds withheld from progress payments to Contractor or to an Escrow Agent, pursuant to the terms of Section 22300 of the Public Contract Code if Contractor deposits with the City or with a state or federally chartered bank as escrow agent an equal value of securities eligible for substitution pursuant to Section 22300 of the Public Contract Code. Contractor agrees that any escrow agreement under this Contract provision must substantially conform to the form escrow agreement in Section 22300 of the Public Contract Code. Securities will be held in the name of the City, with the Contractor as beneficial owner. The City will determine market value of substituted securities. Contractor will deposit additional securities to restore the total market value of deposited securities if the market value decreases below the retention amount.

2. The Contractor shall bear the expense of the Escrow Agent who may be either the City Treasurer or the bank, in connection with the escrow deposit made.

3. The Contractor shall obtain the written consent of the surety to such agreement.

901.5 **FINAL PAYMENTS.** The Engineer shall, after the completion of the requested work in each area, make a final estimate of the amount of work done thereunder, and the value of such work, and the City shall pay the entire sum so found to be due after deducting therefrom all previous payments and all amounts to be kept and all amounts subject to correction in the final estimate and payment.

The final payment shall not be due and payable until the expiration of thirty-five (35) calendar days from the date of acceptance of a specific phase of the work by the Engineer, and upon receipt of a bill for the amount due on the work from the Contractor.

No certificate given or payments made under the Contract, except the final certificates or final payment, shall be conclusive evidence of the performance of the Contract, either wholly or in part,
against any claim of the Contractor, and no payment shall be construed to be an acceptance of any defective work or improper materials.

The payment of the final amounts due under the Contract, and the adjustment and payment for any Work done in accordance with any alterations of same, shall release the City, the Council, and the Engineer from any and all claims or liability on account of work performed under the Contract or any alteration thereof.
PART D
TECHNICAL PROVISIONS

SPECIFICATIONS

FOR

SANITARY SEWER REHABILITATION

NEILSON ST BACKLINE, THOUSAND OAKS BLVD BACKLINE, PORTLAND AVE BACKLINE, PERALTA AVE, SAN LORENZO AVE /WASHINGTON AVE, CAPISTRANO AVE, MIRAMAR AVE BACKLINE, THE ALAMEDA BACKLINE, ARLINGTON AVE BACKLINE, MICHIGAN AVE BACKLINE, ALAMO AVE BACKLINE, SAN DIEGO RD AND BACKLINE, SANTA BARBARA RD AND BACKLINE, SAN LUIS RD BACKLINE, HENRY ST BACKLINE, BERRYMAN ST AND BACKLINE, GRIZZLY PEAK BLVD AND BACKLINE, CYPRESS ST/BUENA AVE, ROSE ST, GRANT ST, EDITH ST, AND MILVIA ST BACKLINE

SPECIFICATION NO. 20-11352-C
AMENDMENT TO THE "REGIONAL STANDARDS" FOR SANITARY SEWER SYSTEM INSTALLATION, REHABILITATION, AND REPAIR, JUNE 30, 2016 EDITION

AND

AMENDMENT TO THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, PARTS 2, 3 AND 5, 2015 EDITION

For Sanitary Sewer Rehabilitation and Relief Sewer Construction
In the City of Berkeley

This Amendment to the “Regional Standards” for Sanitary Sewer System Installation, Rehabilitation, and Repair, June 30, 2016 Edition (“Regional Standards”) and to the Standard Specifications for Public Works Construction, 2015 Edition, Parts 2, 3 and 5 (“Greenbook”) applies to the construction of relief sewers, collection system sewers, and sewer laterals (lower laterals), as well as the rehabilitation of existing sewers and structures in sanitary sewage collection systems, existing sewer lateral connections and sewers laterals.

This Amendment modifies the “Regional Standards” and the “Greenbook,” its provisions take precedence over those Standard Specifications.

Only those materials and construction methods described in the Standard Specifications, as modified by this Amendment, and included in the Contract Documents, will be used by the Contractor. Sanitary sewer pipe types to be used for this project shall be as noted in Section 207-26.
**TABLE OF CONTENTS**

R - Replace Existing Section  
N - New Section  

### PART 2  CONSTRUCTION MATERIALS

#### SECTION 201  CONCRETE, MORTAR AND RELATED MATERIALS

<table>
<thead>
<tr>
<th>N</th>
<th>Section</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>201-10</td>
<td>Manhole, Cleanouts &amp; Appurtenances Material</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>10.2</td>
<td>Manholes</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>10.2.2</td>
<td>Pre-cast Manholes Sections</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>10.2.6</td>
<td>Jointing Manhole Sections</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>10.2.7</td>
<td>Manholes Frames and Covers</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>10.2.8</td>
<td>Watertight Manholes Frames and Bolted Lids</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>10.2.9</td>
<td>Manhole Steps</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>10.3</td>
<td>Cleanouts</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>103.1</td>
<td>Cleanout Frames and Covers</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>10.5</td>
<td>Appurtenant Materials</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>10.5.2</td>
<td>Pipe Stubouts for Service Connections</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>10.5.3</td>
<td>Pipe Stubouts for Future Sewer Connections</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

#### SECTION 207  PIPE

| 207-19 | Polyethylene (PE) Solid Wall Pipe and Liner | 9 |
| 19.1 | General | 9 |
| 19.3 | Pipe Acceptance | 9-10 |
| 19.6 | Dimensions | 10 |
| 207-25 | High Density Polyethylene (HDPE) Gasketed Joint Pipe | 10 |
| 25.1 | General | 10 |
| 25.2 | Material Composition | 10 |
| 25.4 | Marking | 11 |
| 25.6 | Pipe Acceptance | 11 |
| 25.7 | Installation and Field Inspection of HDPE Gasket Joint Pipe | 11 |
| 207-26 | Sanitary Sewer Pipe Types | 12 |
| 26.1 | Trunk and Collector Sewer Main | 12 |
| 26.2 | Lower Laterals | 12 |
| 26.3 | Pipe Rehabilitation Using Trenchless Method | 12 |
| 26.4 | Storm Drain Pipe | 12 |

#### SECTION 217  BEDDING AND BACKFILL MATERIALS

| 217-1 | Resin Impregnated Polyester Felt Pipe Liner | 13 |
| 1.1 | General | 13 |
| 1.2 | Material Composition | 13 |
PART 3  CONSTRUCTION METHODS

SECTION 303  CONCRETE AND MASONRY CONSTRUCTION

| N 303-9 | Installation of Manholes, Cleanout and Appurtenances | 14 |
| N 9.1   | General                                                | 14 |
| N 9.1b  | Rock Base                                              | 14 |
| N 9.1c  | Concrete Manhole e Base                                | 14 |
| N 9.1d  | Placing Precast Manhole Sections                        | 14 |
| N 9.1f  | Drop Manholes                                          | 14 |
| N 9.1g  | Flexible Joints                                        | 15 |
| N 9.1h  | Pipe Stubouts                                          | 15 |
| N 9.1i  | Permanent, Plugs                                       | 15 |
| N 9.1k  | Manhole Frames and Covers                               | 15-16|
| N 9.1l  | Manhole Over Existing Sewers                           | 16 |
| N 9.1m  | Connection to Existing Manholes                        | 16-17|
| N 9.1n  | Special Manholes                                       | 17 |
| N 9.1p  | FRP Manholes                                           | 17 |
| N 9.1q  | Watertight Manholes                                    | 17 |
| N 9.1r  | Manholes Steps                                         | 18 |
| N 9.3   | Payment                                                | 18 |

SECTION 306  OPEN TRENCH CONDUIT CONSTRUCTION

| 306-3   | Trench Excavation                                      | 19 |
| R 3.1   | General                                                | 19 |
| R 3.3   | Removal and Abandonment of Existing Conduits and Structures | 19-20|
| R 3.4   | Minimum and Maximum Pipe Zone Trench Width             | 20 |
| R 306-6 | Bedding                                                | 21 |
| R 6.1   | General                                                | 21-22|
| R 306-7 | Prefabricated Gravity Pipe                             | 22 |
| R 7.4   | Vitrified Clay Pipe (VCP)                              | 22 |
| R 7.4.2.1 | General                                            | 22 |
| R 7.4.2.4 | Special Joints                                       | 22 |
| R 7.7   | Plastic Sewer and Drainage Pipe                        | 22 |
| R 7.7.2.2 | Gasket-Type ABS, CHDPE, and PVC Pipe              | 22 |
| N 7.7.2.3 | Jointing of HDPE Gasketed Pipe                     | 22 |
| R 7.8   | Gravity Pipeline Testing                               | 23 |
| R 7.8.2.1 | General                                          | 23 |
| N 7.8.2.4 | Air Pressure Test                             | 24-25|
| R 7.8.2.6 | Mandrel Test of Plastic Pipe                     | 26 |
| R 306-12 | Backfill                                               | 27 |
| N 12.3  | Mechanically Compacted Backfill                        | 27 |
| R 12.3.1 | General                                                | 27 |
| R 12.3.2 | Compaction Requirements                               | 27 |
| N 12.6  | Conditioning of Backfill Materials                     | 27 |
SECTION 312  SEWER REHABILITATION METHODS

N 312-9  Lateral Rehabilitation  29
N  9.1   General                  29
N  9.2   Investigate Laterals    29-30
N  9.3   Multiservice Laterals   30
N  9.4   Lower Lateral Replacement 30
N  9.5   Upper Lateral Rehabilitation 30-31
N   9.5.1 Access Agreements      31
N   9.5.2 Replace Upper Laterals  31
N   9.5.3 Slip-line Upper Lateral 31-32
N  9.6   Abandoned Laterals      32-33
N  9.7   Cleanout Installation   33
N  9.8   Air Test                 33
N  9.9   Acceptance Testing      33
N  9.10  Payment                 33
N 312-10  Illegal Storm Drain Connections 33

SECTION 313  RESTORATION OF IMPROVEMENTS

N 313-1  Restoration of Improvements  34
N  1.1   Protection of Public and Private Property 34
N  1.2   Document Pre-construction Condition 34
N  1.3   Tree and Plant Protection     34
N  1.4   Sodding                        34-35
N  1.5   Fences                        35
N  1.6   Restoration of Driveways, Sidewalks, Retaining 35-36
    Walls, Curbs, and Gutters
N  1.7   Payment                      36

PART 5    PIPELINE SYSTEM REHABILITATION

SECTION 500  PIPELINE, MANHOLE AND STRUCTURE REHABILITATION

500-1  Pipeline Rehabilitation  37
1.1  Requirements                    37
R   1.1.4 Cleaning and Preliminary Inspection 37-38
R   1.1.5 Television Inspections     38-41
1.2  Pipeline Point Repair/Replacement  41
R   1.2.1 General                    41
R   1.2.5 Notification of Work       41
R   1.2.6 Installation and Field Inspection 41-42
N   1.2.7 Measurement and Payment for Point Repairs 42
1.3 Polyethylene Solid Wall Liner Insertion Procedure

1.3.1 General

1.3.2 Sizing “Pig”

1.3.3 Liner Handling

1.3.4 Liner Installation

1.3.5 Joining Systems

1.3.6 Excavated Pits

1.3.7 Insertion of Liner Pipe

1.3.8 Stress and Strain Relief of PE Liner Pipe After Pulling Operations

1.3.9 Grout Sealing

1.3.10 Liner Testing

1.3.11 Bedding

1.3.12 Service Connection

1.3.13 Liner at Manholes

1.3.14 Backfill and Compaction of Insertion Pits

1.3.15 Payment

1.4 Cured-In-Place Pipe Liner (CIPP)

1.4.1 General

1.4.2 Material Composition

1.4.3 Installation

1.4.4 Curing

1.4.5 Service Connections and End Seals

1.4.6 Post Lining Television Inspection

1.4.7 Payment

1.14 UV-Cured Resin Impregnated Fiberglass Tube

1.14.1 General

1.14.2 Installer Qualifications

1.14.3 Contractor Submittals

1.14.4 Materials

1.14.5 Product Storage and Handling

1.14.6 Liner

1.14.7 Resin

1.14.8 Structural Requirements

1.14.9 Construction Requirements

1.15 Chemical Sealing Installation

1.15.1 General

1.15.2 Equipment

1.15.3 Conditions Required for Joint Sealing

1.15.4 Joint Sealing Procedure

1.15.5 Joint Sealing Verification

1.15.6 Records

1.15.7 Guarantee

1.15.8 Payment

1.16 Sewer Flow Control

1.16.1 General

1.16.2 Plugging, Blocking, and Pumping
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.16.3</td>
<td>Payment</td>
<td>60</td>
</tr>
<tr>
<td>R 500-2</td>
<td>Manhole and Structure Rehabilitation</td>
<td>61</td>
</tr>
<tr>
<td>R 2.1</td>
<td>General</td>
<td>61-62</td>
</tr>
<tr>
<td>R 2.2</td>
<td>Leakage at Frames and Covers</td>
<td>62</td>
</tr>
<tr>
<td>R 2.3</td>
<td>Reconstructing Manhole Base</td>
<td>62</td>
</tr>
<tr>
<td>R 2.4</td>
<td>Sealing of Joint Between Cast Iron Frame and Manhole Wall</td>
<td>64</td>
</tr>
<tr>
<td>R 2.5</td>
<td>Sealing Manhole Walls</td>
<td>65</td>
</tr>
<tr>
<td>R 2.6</td>
<td>Remove and Replace Existing Sewer Structure</td>
<td>65</td>
</tr>
<tr>
<td>R 2.7</td>
<td>Testing</td>
<td>65</td>
</tr>
<tr>
<td>N 2.8</td>
<td>Payment</td>
<td>65</td>
</tr>
<tr>
<td>500-3</td>
<td>Annular Space Grouting</td>
<td>64</td>
</tr>
<tr>
<td>R 3.1</td>
<td>Requirements</td>
<td>64</td>
</tr>
<tr>
<td>R 3.1.3</td>
<td>Planned Vents</td>
<td>64</td>
</tr>
<tr>
<td>R 3.1.4</td>
<td>Materials</td>
<td>64</td>
</tr>
<tr>
<td>R 3.1.7</td>
<td>Injection Procedure and Pressure</td>
<td>64</td>
</tr>
<tr>
<td>R 3.1.8</td>
<td>Onsite Test</td>
<td>64-65</td>
</tr>
<tr>
<td>500-5</td>
<td>Acceptance Testing</td>
<td>65</td>
</tr>
<tr>
<td>R 5.2</td>
<td>Leakage Testing</td>
<td>65</td>
</tr>
<tr>
<td>R 5.4</td>
<td>Acceptance</td>
<td>65</td>
</tr>
<tr>
<td>N 5.5</td>
<td>Payment</td>
<td>66</td>
</tr>
</tbody>
</table>
PART 2 – CONSTRUCTION MATERIALS

SECTION 201 – CONCRETE, MORTAR AND RELATED MATERIALS

201-10 MANHOLES, CLEANOUTS AND APPURTENT MATERIALS.

***ADD PARAGRAPH FOLLOWING FIRST PARAGRAPH OF SUBSECTION 201-10 OF THE “REGIONAL STANDARDS”, TO READ AS FOLLOWS***

Contractor shall remove all existing brick manholes and replace with a standard pre-cast concrete manhole as specified in this section and the standard details.

***REPLACE SUBSECTION 201-10.2.2 OF THE “REGIONAL STANDARDS” WITH THE FOLLOWING***

201-10.2.2 Pre-cast Manhole Sections. Precast manhole sections where not otherwise modified in the Plans, shall conform to ASTM C478 and meet the following requirements:

1. The wall thickness shall not be less than 5 inches for 48-inch diameter barrel sections and 6 inches for 60-inch diameter barrel sections.

2. All sections shall be fully cured and shall not be shipped nor subjected to loading until the design compressive strength has been reached.

3. Precast base sections shall have the base slab integral with the sidewalls. Precast base sections shall be used only if the invert plan and alignment of the sewer connections in the base exactly match the field measured angles between the connecting sewers. Contractor shall field verify all sewer inverts for precast manhole bases prior to ordering base sections. Where base sewer inverts do not match existing sewer inverts, Engineer shall reject base section at his expense without time extension to the Contract.

201-10.2.6 Jointing Manhole Sections.

***ADD THE FOLLOWING AFTER THE LAST SENTENCE OF SUBSECTION 201-10.2.6 OF THE “REGIONAL STANDARDS”***

Contractor shall submit product information for all material in accordance with Part C, Subsection 401.12 of the Specifications.
***ADD NEW SUBSECTIONS 201-10.2.7, 201-10.2.8 AND 201-10.2.9 TO “REGIONAL STANDARDS”, TO READ AS FOLLOWS***

201-10.2.7 Manhole Frames and Covers. Manhole frames and covers shall be in accordance with Subsection 303-8.12 and as shown on the Standard Details.

201-10.2.8 Watertight Manhole Frames and Bolted Lids. Watertight manhole frames and bolted lids shall be in accordance with the requirements in Subsection 303-9.12 for off road areas and Standard Details. Final selection shall be based on approval of the Engineer.

201-10.2.9 Manhole Steps. Manhole steps are not allowed.

***ADD NEW SUBSECTION 201-10.3.1 TO “REGIONAL STANDARDS”, TO READ AS FOLLOWS***

201-10.3.1 Cleanout Frames and Covers. Castings shall conform to Standard Detail. The bearing surfaces of the cover shall seat firmly into the frame without rocking. Unless otherwise specified, exposed surfaces with the castings assembled and disassembled shall be painted with a commercial quality asphalt paint after testing and inspection.

***REPLACE SUBSECTION 201-10.5.2 OF THE “REGIONAL STANDARDS” WITH THE FOLLOWING***

201-10.5.2 Pipe Stubouts For Service Connections. Conform to the requirements for future service connection pipe.

201-10.5.3 Pipe Stubouts For Future Sewer Connections. Pipe stubouts shall be the same type as approved for use in lateral, main, or trunk sewer construction. Strength classifications shall be same class as in adjacent trenches. Where there are two different classes of pipe at a manhole, the higher strength pipe will govern strength classification. Rubber gasketed watertight plugs shall be furnished with each stubout and adequately braced against all hydrostatic or air pressures.
SECTION 207 – GRAVITY PIPE

- Page 130 of Greenbook -

207-19 POLYETHYLENE (PE) SOLID WALL PIPE AND LINER.

- Page 28 of Regional Standards -
- Page 168 of Greenbook -

*** REPLACE SUBSECTION 207-19.1 OF THE “REGIONAL STANDARDS” WITH THE FOLLOWING ***

207-19.1 General. Polyethylene (PE) plastic solid wall pipe and liner for use in gravity flow sanitary sewers, storm drains, and sewer laterals shall comply with ASTM D 3350 or ASTM F 714. Unless otherwise indicated, pipe shall conform to SDR 17. Fittings shall comply with ASTM D2683 or D3261.

Joints shall be butt fusion joints for the main line of pipe and be in accordance with Subsection 500-1.6.4.1. Where PE pipes must be joined in a trench, pipes shall be joined by an electro-fusion coupling. The inside diameter of an electro fusion coupling shall match the outside diameter of the adjoining pipe.

Lateral connections to the main line shall be made with fused branch saddles, electrofusion saddles or using HDPE sewer stub tees or wyes. The inside diameter of the fusion joints shall match the outside diameter of the adjoining pipe.

Fused joints or couplings shall have a 5 year satisfactory history of performance based on information submitted by Contractor for each size and DR of joint or coupling. Joints shall meet AWWA C906 requirements. Joint pressure ratings shall meet or exceed the pipe pressure rating of the adjoining pipe.

*** REPLACE SUBSECTION 207-19.3 OF THE “GREENBOOK” WITH THE FOLLOWING ***

207-19.3 Pipe Acceptance. At the time of manufacture, each lot of pipe, liner, and fittings shall be inspected for defects and tested in accordance with ASTM D3350.

The liner or pipe shall be homogeneous throughout, uniform in color, free of cracks, holes, foreign materials, blisters or deleterious faults.

The Contractor shall submit in accordance with Part C, Subsection 401.12 of the Specifications, certification by the manufacturer that materials used in the manufacture of the pipe and the pipe and the pipe fittings conform to the requirements of these specifications. The Contractor shall also supply written certification that all resins/pellets used in the manufacture of the pipe are from a single producer. Failure to meet this requirement will result in rejection of the pipe.
For testing purposes a production lot shall consist of all pipe or liner having the same marking number. It shall include any and all items produced during any given work shift and must be so identified as opposed to previous or ensuing production.

**ADD NEW SUBSECTION 207-19.6 TO THE “GREENBOOK”, TO READ AS FOLLOWS***

207-19.6 Dimensions. The SDR for liner pipe shall be as shown on the Plans. The inside diameter of the liner shall be the maximum available that satisfies the SDR requirement together with the requirement that the outside diameter shall not exceed 90 percent of the inside diameter of the existing pipe. The Contractor shall be responsible for field verifying the pipe. The Contractor shall be responsible for field verifying the actual internal diameter of the existing sewer for each installation prior to ordering the liner for that reach.

207-25 HIGH DENSITY POLYETHYLENE (HDPE) GASKETED JOINT PIPE.

***REPLACE SUBSECTION 207-25 OF THE “REGIONAL STANDARDS WITH THE FOLLOWING***

207-25.1 General. This subsection covers the requirements of HDPE gasketed joint pipe for use in sanitary sewers, as per ASTM F894. The pipe shall be made by the continuous winding of a special profile wall design onto suitably sized mandrels and shall be constant internal diameters. Joints shall be gasketed joints as per ASTM F477. They shall be molded or produced from an extruded shape approved by the manufacturer and spliced into circular form.

207-25.2 Material Composition. The pipe shall be made of high density, high molecular weight polyethylene pipe material meeting the requirements of Type III, Class C, Category 5, Grade P34, as defined in ASTM D1248. If approved by the Engineer, materials meeting the requirements of cell classification PE 334433 C or higher cell classification in accordance with ASTM D3350 may be used. The high density polyethylene resin compound shall, as a minimum, meet the following requirements:

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
<th>Units</th>
<th>ASTM test number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density (pipe)</td>
<td>0.955</td>
<td>grams/cc</td>
<td>D1505</td>
</tr>
<tr>
<td>Density (natural base resin)</td>
<td>0.944</td>
<td>grams/cc</td>
<td>D1505</td>
</tr>
<tr>
<td>Melt Index (M)</td>
<td>0.14</td>
<td>grams/10 min</td>
<td>D1238 (E)</td>
</tr>
<tr>
<td>High Load Melt Index (HLMI)</td>
<td>11.0</td>
<td>grams/10 min</td>
<td>D1238 (F)</td>
</tr>
<tr>
<td>Melt Flow Ratio (MI/HLMI)</td>
<td>150</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Thermal Stability</td>
<td>260</td>
<td>degrees C</td>
<td>D3350</td>
</tr>
<tr>
<td>Tensile Yield</td>
<td>3625</td>
<td>psi</td>
<td>D638</td>
</tr>
<tr>
<td>Elongation</td>
<td>800</td>
<td>percent</td>
<td>D638</td>
</tr>
<tr>
<td>ESCR (50 degrees C)</td>
<td>1500</td>
<td>F (20 hrs)</td>
<td>D1693 (B)</td>
</tr>
<tr>
<td>ESCR (50% lgepal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexural Modulus (tangent)</td>
<td>136,000</td>
<td>psi</td>
<td>D790</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>D10</td>
</tr>
</tbody>
</table>
207-25.4 Marking. Each standard and random length of pipe shall be marked with a coded number which identifies the manufacturer, size, ring stiffness coefficient, material designation, plant location, machine, manufacture date and shift on which the pipe was extruded.

207-25.6 Pipe Acceptance. The Contractor shall provide the test results indicating that the HDPE pipe and fittings meet or exceed the physical properties specified in Subsection 207-25.2. The permitted tolerance shall be nominal diameter plus or minus ¼ inch. Pipe supply that does not meet this requirement will be rejected.

The pipe and fittings shall be homogeneous throughout, uniform in color, and free from cracks, holes, foreign materials, blisters or deleterious faults.

207-25.7 Installation and Field Inspection of HDPE Gasket Joint Pipe. Pipe shall be installed in conformance with the manufacturer’s recommendations including, but not limited to:

1. Sheeting extending below the top of the pipe shall be cut off above the top of the pipe and left in place. This metal sheeting may be removed with the Engineer’s approval.

2. Trench shields or boxes shall not be placed below the top of the pipe.

3. Bedding shall be shovel-sliced to ensure proper placement under the pipe haunch. Contractor shall compact the bedding material mechanically as needed.

4. Transition pipe support shall be provided at least three diameters long and 12 inches deep at manholes.

5. All manhole connections shall be treated as if the connection is below the water table. The manhole connections shall be per manufacturer’s recommendations. Manhole connections shall be submitted to Engineer for approval.

6. An experienced, competent, factory representative of the manufacturer shall visit the site of the work and inspect, check and approve the pipe installation in accordance with this specification. Arrange for the representative to devote a minimum of 5 non-consecutive days at the site for inspection and instruction of Contractor personnel as scheduled or agreed by the Engineer. The representative shall furnish the Engineer a written report covering the field visits.

Site installation instruction is a prerequisite for payment of installed HDPE pipe. No payment for HDPE pipe shall be made until both the Contractor and the pipe manufacturer have submitted certified documentation that the proper installation instruction has been given and received.

207-26 SANITARY SEWER PIPE TYPES – Sanitary sewer pipe type to be used for this project shall be as follows:

207-26.1 Trunk and Collector Sewer Main. Method “C” – High Density Polyethylene (HDPE) gasketed joint pipe, in accordance with ASTM F894 and subsection 207-25; Polyethylene Pipe (PE) SDR-17 in accordance with Subsection 207-19. The following materials may only be used under special circumstances as approved by the Engineer on a case-by-case basis: Vitrified Clay Pipe (VCP), extra strength, bell and spigot, in accordance with ASTM C700; ASTM D2241; Polyethylene Pipe (PE) SDR 21 in accordance with subsection 207-19.

207-26.2 Lower Laterals. Polyethylene Pipe (PE) SDR-17 in accordance with Subsection 207-19. The following materials may only be used under special circumstances as approved by the Engineer on a case-by-case basis: Polyethylene Pipe (PE) SDR 21 in accordance with subsection 207-19. Vitrified Clay Pipe (VCP), extra strength, bell and spigot, in accordance with ASTM C700.

207-26.3 Pipe Rehabilitation Using Trenchless Method


b) Method “B”. Pipe-breaking, pipe-bursting, pipe-splitting or other comparable method. High Density Polyethylene (HDPE) in accordance with subsection 207-25; Polyethylene Pipe (PE) SDR-17 in accordance with Subsection 207-19. See Special Condition No. 15 and Appendix #1 for additional requirements.

207-26.4 Storm Drain Pipe. Reinforced Concrete Pipe (RCP), Class II in Accordance with ASTM C 76; Polyethylene Pipe (PE) SDR 17 in accordance with Subsection 207-19.
SECTION 217 – BEDDING AND BACKFILL MATERIALS

- Page 253 of Greenbook -

***REPLACE SUBSECTION 217-1.1 OF THE “GREENBOOK” WITH THE FOLLOWING***

217-1.1 General. Unless otherwise specified in the Special Provisions or shown on the Plans, pipeline bedding material shall be in accordance with City of Berkeley Standard Plan No. 8136.

***REPLACE SUBSECTION 217-2.1 OF THE “GREENBOOK” WITH THE FOLLOWING***

217-2.1 General. Unless otherwise specified in the Special Provisions or shown on the Plans, pipeline trench backfill material shall be in accordance with City of Berkeley Standard Plan No. 8136. Trench backfill material, whether native or imported, material shall be free from shale, sod, roots, rubbish, trash, lumber, organic material, ashes and other debris, unusual color, contamination, and sulfide odor.

When native material is unsuitable for use in backfill, it shall be disposed of off the Work site, and suitable material capable of being compacted to required relative densities shall be furnished by the Contractor at their expense.
PART 3 – CONSTRUCTION METHODS

SECTION 303 – CONCRETE AND MASONRY CONSTRUCTION


303-9 INSTALLATION OF MANHOLES, CLEANOUTS AND APPURTEYNANCES.

- Page 29 of Regional Standards -

303-9.1.b  **Rock Base.** Prior to placing the concrete manhole base, a thickness of 8 inches of crushed aggregate as specified in Subsection 201-10.2 shall be placed upon the earth subgrade and compacted to 90 percent relative compaction by mechanical means.

303-9.1.c  **Concrete Manhole Base.** Cast-in-place concrete manhole base shall be constructed as shown on the Plans and Standard Details and shall conform to the applicable requirements of Section 303. Concrete shall be Type II low alkali in accordance with Section 201. The use of Type III (High Early Strength) concrete in lieu of Type II concrete is prohibited. The concrete shall be vibrated to densify and screeded so that the first precast manhole section to be placed has a level uniform bearing surface for the full circumference. An approved metal forming ring shall be used to form a level joint groove in the fresh concrete of the manhole base to receive the first precast manhole section. Contractor shall provide a watertight joint in accordance Subsection 201-10.2.6 between the base and first precast manhole section.

303-9.1.d  **Placing Precast Manhole Sections.** Precast manhole sections shall be carefully inspected prior to installation. Sections with chips or cracks in the tongue shall not be used. Ends of precast manhole sections shall be cleared of foreign materials.

Precast manhole sections shall be installed in a manner that will result in a watertight joint. Rubber “O”-ring gaskets or preformed flexible joint sealant as specified in Subsection 201-10.2.6 shall be installed in strict conformance with the manufacturer’s recommendations. Only pipe primer furnished by the gasket manufacturer will be approved. If leaks appear in the manholes, the inside joint shall be caulked with non-shrink epoxy mortar as specified in Subsection 303-9.1.m, Item No. 5, to the satisfaction of the Engineer, and prior to manhole testing.

***REPLACE SUBSECTIONS 303-9.1.f AND 303-9.1.g OF THE “REGIONAL STANDARDS” WITH THE FOLLOWING***

303-9.1.f  **Drop Manholes.** Drop manholes shall be constructed where necessary to meet the requirements of Standard Detail” Outside Drop Connection – Concrete Encased”. The drop assembly shall be connected to the sewer pipe with an approved adapter. The lower elbow shall be supported by concrete poured monolithically with the manhole base.
**SANITARY SEWER PROJECT**

**SPECIFICATION NO. 20-11352-C**

**303-9.1.g Flexible Joints.** For all manholes flexible joints shall be provided at a distance of not less than 1 foot and not greater than 1-1/2 feet from the manhole outside wall. Flexible joints shall also be provided at the edge of the manhole base for all manholes. Pipes entering manholes shall be laid on firmly compacted base rock, or crushed rock approved by Engineer, on undisturbed earth under each stubout.

***REPLACE SUBSECTIONS 303-9.1.h AND 303-9.1.i OF THE “REGIONAL STANDARDS” WITH THE FOLLOWING***

**303-9.1.h Pipe Stubouts**

**303-9.1.h.1 For Service Connections.** Four and six-inch diameter service connection stubouts shall be provided in manholes where shown on the plans. The service connection stubouts shall be placed in the manhole base. The maximum and minimum length outside the manhole wall shall be as shown on the Standard Details. All stubouts shall be furnished with a watertight gasket pipe plug suitably braced against blowoff. Compacted crushed aggregate as specified hereinbefore shall be placed upon the undisturbed earth.

Unless otherwise directed by the Engineer, the elevation of the inside top of service connection pipe shall match the elevation of the inside top of the outlet pipe.

**303-9.1.h.2 For Future Sewer Connections.** Stubouts from manholes for future sewer connections shall be installed as shown or required by the Engineer. Maximum and minimum length outside the manhole wall shall be as shown on the Standard Details. Pipes in precast walls or manhole base shall be constructed in accordance with details shown on the Plans. Compacted crushed aggregate, as specified hereinbefore shall be placed upon the earth under all stubouts.

Semipermanent plugs shall be installed in the end of stubouts with gasket joints similar to sewer pipe being used. Plugs shall be capable of withstanding all internal or external pressures without leakage. All plugs shall be adequately braced to prevent blowoffs.

**303-9.1.i Permanent Plugs.** Abandoned mains shall be plugged and disconnected from existing manholes per Standard Detail Plan No 8224.

***REPLACE SUBSECTIONS 303-9.1.k, 303-9.1.l, 303-9.1.m, AND 303-9.1.n OF THE “REGIONAL STANDARDS” WITH THE FOLLOWING***

**303-9.1.k Manhole Frames and Covers.** Frames and covers shall be installed on top of manholes to positively prevent all infiltration of surface or groundwater into manholes. Frames shall be set in a bed of mortar with the mortar with the mortar carried over the flange of the ring as shown on the Plans. Set frames so tops of covers are flush with surface of adjoining pavement or ground surface, unless otherwise shown or directed. Provide a concrete manhole collar as shown on the standard Details.

All manholes located in off-road areas shall have bolt down covers, manufactured by Phoenix Iron Works, Model P-1002, Neenah Foundry Company, Model R-1915-G-Type L, or equal. All manhole
covers shall be provided with 1/4-inch neoprene gasket seals and closed pick holes. Bolts, nuts, washers, etc., shall be 316-stainless steel.

**303-9.1.1 Manhole Over Existing Sewers.** Manholes shall be constructed over existing operating sewer lines at locations shown. Excavation shall be as specified hereinbefore.

Flow through existing sewer lines shall be maintained at all times. New concrete and mortar work shall be protected for a period of 3 days after concrete has been placed. Contractor shall submit his plans for diverting sewage flow and obtain Engineer’s approval before starting. Engineer’s approval shall not relieve Contractor of the responsibility for maintaining adequate capacity for flow at all times and adequately protecting new and existing work.

The new base shall be constructed under and around the existing sewer as specified herein.

Prior to concrete placement, Contractor shall cut VCP above the springline for the length of the internal dimensions of the structure. VCP pipe so cut may be left in place after concrete placement. Where PVC or HDPE pipe is used to convey the flow, prior to concrete placement, the pipe shall not be cut at springline. PVC or HDPE pipe shall be removed from within the interior of the structure after the concrete has cured sufficiently.

**303-9.1.m Connection to Existing Manholes.** Sewers shall be connected to existing manholes. Provide all diversion facilities and perform all work necessary to maintain sewage flow in existing sewers during connection to the manholes such that sewer overflows or backups into sewer laterals do not occur. Break out existing manhole bases and ground as necessary to provide smooth flow into and through existing manholes. The connection procedure shall be as follows:

1. Core drill or otherwise cut an opening approximately 6-inches in diameter greater than the outside diameter of the pipe.
2. Form a keyway in the cut edge of the existing wall by chipping approximately 1 inch deep, if the spigot or plain end of the pipe is being inserted.
3. Roughen the surface of the pipe to be encased in the wall by sandblasting or other means. Plastic pipes shall be provided with a waterstop gasket.
4. Coat the surface of the existing wall edge and the area of the pipe to be encased with an epoxy bonding agent such as Sikadur® 32 Hi-Mod Epoxy Adhesive, as manufactured by the Sika chemical Corporation; Concreseeve 1001-LPL, as manufactured by Adhesive Engineering Co.; or equal. The grout must be placed while the bonding agent is still tacky.
5. Fill the space between the pipe and the existing wall with a nonshrink, nonmetallic grout as manufactured by Master Builders, U.S. Grout Corp (5 Star), or equal. The grout shall be in accordance with ASTM C1107 and have 0.00 percent shrinkage when tested according to the requirements of ASTM C827 and US Army Corps of Engineers Spec CRD C621.
6. The pipe shall be shored in place so that there is no possibility of movement during and after the grouting operation. The shoring shall not be removed until the grout has attained a compressive strength of 3000 psi or higher.

303-9.1.n Special Manholes. Special manholes shall be constructed in conformance with the applicable requirements of Section 303 and as shown on the Plans. Shop drawings of specials manholes including appurtenances such as cones, frames, steps and stubouts shall be submitted in accordance with Part C, Subsection 401.12 of the Specifications.


303-9.1.p Plastic Manholes. Plastic manholes (HDPE, or other approved material) may be used in place of precast manholes in the backyard easement areas upon approval of the Engineer. Contractor shall submit the manufactures product information and costs prior to the first manhole installation. Plastic manholes shall not be used in street areas. The manhole shall be watertight, one piece construction, corrosion and chemical resistant to sanitary sewage, and installed per manufacturer’s recommendations.

Pipe connections to the manhole shall be made with a neoprene boot, constructed to the sewer pipe outside diameter, and 316-stainless steel clamps. A shelf shall be constructed within the manhole using sand and a concrete cap. The manholes shall be designed for loadings that may be expected at the installed location.

A concrete base of adequate weight shall be installed to anchor the manhole when the groundwater level is at the surface of the manhole. Attachment of the concrete base to the plastic manhole shall be adequate to withstand the buoyant force described above. Manhole connectors shall be embedded in the plastic material. Any metal connecting devices shall be 316-stainless. Grade rings, concrete collars, frames and covers, and other appurtenances shall be in accordance with Section 303.

Shop drawings are required in accordance with Part C, Section 401.12 of the Specifications.

303-9.1.q Watertight Manholes. Watertight manholes shall be constructed where shown or specified. Watertight manhole frames and covers shall be prevented from blowing off during sewer surcharging by installation of watertight manhole frames bolted lids as shown. Bearing surfaces shall be sealed with neoprene gasket.

303-9.1.r Manhole Steps. Manhole steps are not allowed as shown on the Standard Details, and in accordance with Subsection 206-7.3.

***ADD THE FOLLOWING SUBSECTION 303-9.3 TO THE “REGIONAL STANDARDS”***

303-9.3 Payment. Manholes satisfactorily constructed complete, in place, and tested will be paid for at the unit price for each manhole.
Appurtenances such as manhole cones, frames, covers, gratings, steps, stubouts will be considered part of the manhole and no direct or additional payment will be made therefore.

Special manholes constructed complete, in place, will be paid for at the respective unit prices bid for each. Appurtenances as shown or specified will be considered part of the manhole and no direct or additional payment will be made therefore.

Drop assemblies, regardless of size and depth, constructed complete, in place, will be paid for at the unit price bid for each.

The unit prices in the Bid shall include full compensation for furnishing all labor, supervision materials, tools, and equipment for doing all work, including any rework, involved in, or appurtenant to each item as shown on the Plans or in the Specifications.
SECTION 306 – OPEN TRENCH CONDUIT CONSTRUCTION

306-3 TRENCH EXCAVATION.

306-3.1 General.

***REPLACE THE THIRD PARAGRAPH OF SUBSECTION 306-3.1 OF THE “GREENBOOK” WITH THE FOLLOWING***

Excavation shall include the removal of all water and materials of any nature which interfere with the construction work. The Contractor shall keep excavations reasonably free from sewage and water during construction. The flow level shall be drawn down below the bottom of excavations to maintain the undisturbed state of natural soils and allow the placement of any fill to the specified density. Disposal of all flow shall be made at the nearest downstream manhole and shall not damage property or create a public nuisance. The Contractor shall have on hand pumping equipment and machinery in good working condition for emergencies and shall have workmen available for its operation. Dewatering systems shall operate continuously until backfill has been completed to 1 foot above the normal static groundwater level.

Groundwater shall be controlled to prevent softening of the bottom of excavations, or formation on “quick” conditions. Dewatering systems shall not remove natural soils. Dewatering shall not adversely affect adjacent structures. Any excavation below pipe zone shall be backfilled with bedding material suitably densified. All cost associated with dewatering shall be included in the unit costs listed in the bid proposal for works that require excavation.

***REPLACE THE LAST PARAGRAPH OF SUBSECTION 306-3.1 OF THE “REGIONAL STANDARDS WITH THE FOLLOWING”***

Contractor shall pothole to verify the depths of underground utility crossings, the Contractor shall excavate to locate said underground utility crossings and relay this depth information to the Engineer.

***REPLACE SUBSECTION 306-3.3 OF THE “GREENBOOK” WITH THE FOLLOWING***

306-3.3 Removal and Abandonment of Existing Conduits and Structures.

306-3.3.1 General. All sanitary sewers and storm drains to be abandoned shall be completely filled with Controlled Low Strength Material (CLSM) per Subsection 201-6 of the “Regional Standards”. The CLSM shall be self-leveling, non-shrink, and have minimum unconfined compressive strength of 50 psi and maximum of 150 psi at 28 days. Abandoned mains shall be plugged 5 feet in length at

D19
each end with lean mix (two sacks of cement per cubic yard) concrete. The concrete shall be pumped into the pipe. The exposed end of the plug shall be finished smooth and flush to the end of the pipe.

When a sanitary sewer or storm drain is to be abandoned within specified limits, all structures and appurtenances within said limits shall also be abandoned.

When manholes are to be abandoned, the upper portion shall be excavated to remove the cone, frame, and cover. The manhole shall be perforated at the base to prevent the entrapment of water. The manhole shall be filled with sand meeting the requirements of Subsection 200-1.5.1.

Cover sets, gratings, and other steel components (except reinforcing bars) of removed or abandoned structures shall be salvaged and returned to the agency.

306-3.3.2 Payment. Payment for abandonment of sewers shall include compensation for all labor, material, equipment, excavation, and backfill including imported backfill, and traffic control.

Payment for abandonment or removal of manholes shall include compensation for all labor, material, equipment, excavation, and backfill including imported backfill, and traffic control.

***REPLACE SUBSECTION 306-3.4 OF THE “GREENBOOK” WITH THE FOLLOWING***

306-3.4 Minimum and Maximum Pipe Zone Trench Width.

a) **Rigid Pipe.** For rigid pipe including VCP and RCP, the minimum and maximum width of trench permitted shall be as directed on the Plans or Standard Details.

If the maximum trench width is exceeded, the Contractor shall provide additional bedding, another type of bedding, or a higher strength of pipe, as approved by the Engineer at no additional cost to the Agency.

b) **Flexible Thermoplastic Pipe.** For flexible thermoplastic pipe including PE, trench width shall be in accordance with ASTM D2321 and as indicated on the Plans.
306-6 BEDDING.

- Page 378 of Greenbook –

***REPLACE SUBSECTION 306-6 OF THE “GREENBOOK” WITH THE FOLLOWING

306-6.1 General. Bedding shall be defined as that material supporting, surrounding and extending to between 6 inches and 18 inches above the top of the pipe, as shown in the Details. Bedding shall be crushed aggregate in accordance with Subsection 200-2.2.1. Where it becomes necessary to remove boulders or other interfering objects at subgrade for bedding, any void below such subgrade shall be filled with the bedding material designated on the Plans. Where concrete is specified to cover the pipe, the top of the concrete shall be considered as the top of the bedding.

If soft, spongy, unstable, or other similar material is encountered upon which the bedding material or pipe is to be placed, this unsuitable material shall be removed to a minimum depth of 18 inches beneath the bottom of the pipe and replaced with bedding material suitably densified. The cost for removing and disposing of unsuitable material and providing densified bedding material shall be at Contractor’s expense.

Bedding material shall first be placed so that the pipe is supported for the full length of the barrel with full bearing on the bottom segment of the pipe equal to a minimum of two-fifths times the outside diameter of the barrel. If the pipe is to be laid in a rock cut, there shall be at least 6 inches of bedding below the pipe. Then the remainder of the bedding shall be placed. Bedding shall be compacted to a minimum of 90 percent of ASTM D1557 (AASHTO T-180) prior to backfilling. Unless the sheeting or shoring is to be cut off and left in place, densification of bedding for pipe shall be accomplished after the sheeting or shoring has been removed from the bedding zone.

Densifying by jetting will not be permitted.

In dry trench conditions, bedding material shall be crushed aggregate. Bedding shall be well graded and shall conform to the gradation requirements presented in Subsection 200-2.2.1.

Bedding material and installation of flexible thermoplastic pipe shall also be in accordance with ASTM D2321.

Concrete used for bedding shall be one of the classes of concrete specified in Subsection 201-1. Concrete bedding cure time prior to backfill shall be as specified in Subsection 201-1.1.2.

Unless otherwise specified, special pipe bedding will not be required for ductile iron water pipe, and the trench bottom need not be shaped to the outside diameter of the pipe. However, the trench bottom shall provide firm and uniform bearing.

Continuity of bedding material shall be interrupted by low permeability groundwater barriers to impede passage of water through the embedment. Barrier material shall be low permeability clay material and shall be compacted to 90 percent of maximum density. Material may be suitable job excavated material, free from stones or lumps exceeding 3 inches in greatest dimension, organic
matter, and debris. A groundwater barrier of compacted soil shall be placed at or near each manhole or special structure along the sewer line. The groundwater barrier shall be keyed a minimum of 6 inches into undisturbed material on the top of the pipe embedment. The barrier shall be 18 inches thick.

306-7  PREFABRICATED GRAVITY PIPE.

- Page 31 of Regional Standards –
- Page 380 of Greenbook –

306-7.4 Vitrified Clay Pipe (VCP)

***REPLACE SUBSECTION 306-7.4.2.1 THROUGH 306-7.4.2.4 OF THE “GREENBOOK” WITH THE FOLLOWING***

306-7.4.2.1 General. Except where open joints are shown, joints in vitrified clay pipe shall be made up using a shielded repair coupling with 316 stainless steel clamp bands meeting the requirements of the CSA B602, ASTM D5926, and ASTM C1173.

***REPLACE SUBSECTION 306-7.4.4 OF THE “REGIONAL STANDARDS” WITH THE FOLLOWING***

306-7.4.4 Special Joints. Shielded repair coupling with 316 stainless steel clamp bands meeting the requirements of the CSA B602, ASTM D5926, and ASTM C1173 shall be used to join sections of pipe of dissimilar materials.

306-7.7 Plastic Sewer and Drainage Pipe

***REPLACE SUBSECTION 306-7.7.2.2 OF THE “GREENBOOK” WITH THE FOLLOWING***

306-7.7.2.2. Gasket-Type ABS, CHDPE and PVC Pipe. Joints shall consist of integral bell with factory-assembled rubber ring gasket and show no signs of leakage when tested in accordance with ASTM D3212. The rubber gasket shall meet the requirements of ASTM F477.

The pipe fittings shall be assembled with lubricant supplied by the manufacturer. Where water is encountered during the placement of pipe, a special water-resistant lubricant shall be used. Pipe shall be provided with “home” marks.

***ADD NEW SUBSECTION 306-7.7.2.4 TO THE “GREENBOOK”, TO READ AS FOLLOWS***

306-7.7.2.4 Jointing of HDPE Gasketed Pipe. Field jointing of HDPE gasketed joint pipe shall be in accordance with the approved manufacturer’s printed instructions which shall be furnished to the Engineer. The gasket shall be in accordance with ASTM F477, and the joint shall be in accordance with ASTM D3212.

D22
306-7.8 Gravity Pipeline Testing

***REPLACE SUBSECTION 306-7.8.2.1 OF THE “GREENBOOK” WITH THE FOLLOWING***

306-7.8.2.1 General. All leakage tests and post-installation closed circuit television (CCTV) inspections shall be completed and approved prior to placing permanent resurfacing.

When leakage or infiltration exceeds the amount allowed by the specifications, the Contractor at its expense shall locate the leaks and make the necessary repairs or replacements in accordance with the Specifications to reduce the leakage or infiltration to the specified limits. Any individually detectable leaks shall be repaired, regardless of the results of the tests.

Contractor shall provide the Engineer with 24 hours notification for all activities requiring inspection. Where the Contractor schedules concurrent activities requiring inspection at different locations, Contractor shall be responsible for the cost of additional Inspectors. All persons retained for the purpose of additional inspection shall be selected by the Engineer. No inspection shall be performed on holidays or hours outside of the contract work hours without prior approval of the Engineer and reimbursement by the Contractor of all expenses for additional inspection if warranted by the Engineer. Leakage tests shall be made on completed pipelines as follows:

a) Storm Drains--Not required unless otherwise called for on Plans or in Specifications.

b) Gravity Sanitary Sewers 24 inches (600 mm) or less in diameter where difference in elevation between inverts of adjacent manholes is 10 feet (3 m) or less--Water exfiltration test or air pressure test as directed by Engineer.

c) Gravity Sewers 24 inches (600 mm) or less in diameter where difference in elevation between inverts of adjacent manholes is greater than (10 feet or 3 m) --Air pressure test.

d) Gravity Sewers greater than 24 inches (600 mm) in diameter--Air pressure test or water exfiltration test, as directed by Engineer.

e) Gravity Sanitary Sewers which are in service and a bypass system is not available: The Contractor shall perform post-installation CCTV inspection in accordance with 500-1.1.5. Pipeline cleaning shall be performed prior to CCTV inspection in accordance with 500-1.1.4.

f) Pressure Sewers (force mains) --Water pressure test at 150 percent of maximum operating pressure.

g) Water Pipelines --Water pressure test: Pipe specified by pressure classification, 50 psi (350kPa) over pressure classification. Other type of pipe, 120 percent of maximum operating pressure.
306-7.8.2.4 Air Pressure Test

***ADD THE FOLLOWING AFTER THE LAST PARAGRAPH OF SUBSECTION 306-7.8.2.4 OF THE “GREENBOOK” ***

Testing of 6 inch diameter sewer mains

For 6 inch diameter sewer mains, the final leakage test of the sewer mainline and branching sewer laterals shall be conducted in the presence of the Engineer and in the following manner:

Air shall be introduced into the pipeline until 10 pounds per square inch gauge pressure has been reached, at which time the flow of air shall be reduced and the internal air pressure shall be maintained within plus or minus 0.5 psi (3 kpa) gauge pressure for at least 2 minutes to allow internal air temperature to reach equilibrium. Pressure in the pipeline shall be constantly monitored by a gage and hose arrangement separate from hose used to introduce air into the line. A blowoff valve shall be provided on the test apparatus to prevent over pressurizing the pipeline.

After the temperature has stabilized and no air leaks at the plugs have been found, the air pressure shall be permitted to drop and, when the internal pressure has reached 3.5 psi (27 kpa) gauge pressure, a stopwatch or sweep-second-hand watch shall be used to determine the time lapse required for the air pressure to drop to 1.0 psi (7 kpa) gauge pressure.

If the time (T) in seconds required for the air pressure to decrease the additional 1.0 psi (7kPa) exceeds that shown in the Table below, titled ‘Low Pressure Air Test for 6 inch Sewers’, the pipe shall be presumed to be within acceptance limits for leakage.

If the time lapse is less than that shown in the table, the Contractor shall make the necessary corrections to reduce the leakage to acceptance limits without additional compensation.
Reference to pipe diameter is to the nominal diameter. In the case of slip-liner or inversion-liner, pipe diameter refers to the nominal diameter of the existing pipe.

**LOW PRESSURE AIR TEST FOR 6 INCH SEWERS**

Minimum allowable time (sec) for a 1 psi pressure drop.

<table>
<thead>
<tr>
<th>Total footage of 4-inch diameter lateral</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>100</td>
</tr>
<tr>
<td>150</td>
</tr>
<tr>
<td>200</td>
</tr>
<tr>
<td>250</td>
</tr>
<tr>
<td>300</td>
</tr>
<tr>
<td>350</td>
</tr>
<tr>
<td>400</td>
</tr>
<tr>
<td>450</td>
</tr>
<tr>
<td>500</td>
</tr>
</tbody>
</table>
***ADD SUBSECTION 306-7.8.2.6 OF THE “GREENBOOK” TO READ AS FOLLOWS

306-7.8.2.6 Mandrel Test of Plastic Pipe. Following the placement and densification of backfill by at least 30 days, and prior to the placing of permanent pavement, all reaches of new mainline pipe constructed of plastic materials (PVC, ABS, PE, HDPE) shall be cleaned and then mandrelled to measure for obstructions and pipe deflections. All material dislodged through cleaning shall be removed at the nearest downstream manhole and disposed of per Subsection 312-1.8. A standard, commercially manufactured, rigid, odd-numbered-leg (nine legs minimum) mandrel shall be used. Mandrel diameter shall be listed in the table provided or shall be at least 95 percent of the average sewer diameter. The minimum length of the circular portion of the mandrel shall be equal to the nominal diameter of the pipe.

<table>
<thead>
<tr>
<th>Nominal diameter (in.)</th>
<th>Average pipe inside diameter (in.)</th>
<th>Mandrel diameter (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>6.115</td>
<td>5.809</td>
</tr>
<tr>
<td>8</td>
<td>7.961</td>
<td>7.563</td>
</tr>
<tr>
<td>10</td>
<td>9.924</td>
<td>9.428</td>
</tr>
<tr>
<td>12</td>
<td>11.770</td>
<td>11.182</td>
</tr>
<tr>
<td>18</td>
<td>16.616</td>
<td>15.785</td>
</tr>
<tr>
<td>24</td>
<td>22.154</td>
<td>21.046</td>
</tr>
<tr>
<td>30</td>
<td>27.692</td>
<td>26.307</td>
</tr>
<tr>
<td>33</td>
<td>31.980</td>
<td>31.020</td>
</tr>
</tbody>
</table>

All material, equipment and labor to perform the test shall be provided by the Contractor at no cost to the Agency.

Proof rings for verification of mandrel diameters shall be available at all times during mandrel tests. Rings shall be a standard product of the mandrel manufacturer.

Obstructions encountered by the mandrel shall be corrected by the Contractor at no cost to the Agency. The method employed by the Contractor to correct obstructions shall be subject to the Engineer’s approval prior to its implementation.

The use of a re-rounder to force pipe into round is prohibited. Any pipe that has been re-rounded shall be removed and replaced at the Contractor’s expense.
306-12 BACKFILL.

- Page 421 of Greenbook –

306-12.3 Mechanically Compacted Backfill

306-12.3.1 General

***REPLACE FOURTH PARAGRAPH, OF SUBSECTION 306-12.3.1 OF THE “GREENBOOK” WITH THE FOLLOWING***

Unless otherwise approved by the Engineer, material for mechanically compacted backfill shall be placed in lifts which, prior to compaction, shall not exceed a thickness of 1 foot.

306-12.3.2 Compaction Requirements

***REPLACE SUBSECTION 306-12.3.2 OF THE “GREENBOOK” WITH THE FOLLOWING***

Unless otherwise specified in the Special Provisions, mechanically compacted trench backfill shall be compacted to the following minimum relative compaction:

a) 90 percent relative compaction:
   1) In the bedding zone.
   2) Outside the traveled way and other paved areas (or areas to receive pavement).
   3) Under sidewalks.
   4) Between the pipe zone and the upper 1 foot measured from the bottom of the pavement section (or finished grade where there is no pavement), within the existing or future traveled way, shoulders, and other paved areas (or areas to receive pavement).

b) 95 percent relative compaction:
   1) In the upper 1 foot measure from the bottom of the aggregate base or concrete base within the existing or future traveled way, shoulders, and other paved areas (or areas to receive pavement).
   2) Within engineered embankments.
   3) Where lateral support is required for existing or proposed structures.

***ADD NEW SUBSECTION 306-12.6 TO READ AS FOLLOWS***

306-12.6 Conditioning of Backfill Materials. At no time shall the street be utilized as a backfill materials drying or moisture conditioning area for a period longer than the time that the sewer trench is open each day. All excavated trench material shall either be returned to the trench or removed from the site at the end of each day’s work. The Contractor’s backfill moisture conditioning operations shall at no time interfere with traffic or cause public inconvenience.
306-13 TRENCH RESURFACING.


Temporary resurfacing shall be placed in the top of the trench at the end of each work day. Contractor shall at all times maintain temporary paving so as to provide a smooth and level transition with the existing pavement. Temporary resurfacing shall remain in place and be maintained until testing is completed and the Engineer has given approval for permanent resurfacing.

306-15 PAYMENT.

***REPLACE ITEM M OF SUBSECTION 306-15.1 OF THE “GREENBOOK” WITH THE FOLLOWING***

m) all other work (including providing and maintaining all temporary resurfacing) necessary to install the pipe or conduit, complete in-place.

***ADD ITEM N TO SUBSECTION 306-15.1 OF THE “GREENBOOK”, TO READ AS FOLLOWS***

n) Landscape restoration shall be included in the bid price for pipe installation, and shall cover all materials and work necessary to restore the ground surface to its original condition (including, but not limited to, fencing).
***ADD NEW SUBSECTION 312-9 TO THE “GREENBOOK” TO READ AS FOLLOWS***

312-9 LATERAL REHABILITATION.

312-9.1 General. This subsection covers the work to replace, rehabilitate, or abandon laterals. For this subsection, “lateral” shall mean the sewer from the sewer main to the building plumbing (typically at the cleanout) 5 feet from the building foundation. “Lower lateral” (publicly owned) shall mean the portion of the lateral from the sewer main to behind the curb line as shown on the Plans. “Upper lateral” (privately owned) shall mean the portion of lateral from the upstream end of the lower lateral to 5 feet from the building foundation.

The Contractor shall replace active lower laterals and abandon inactive lower laterals that connect to a sewer main that is rehabilitated or replaced unless otherwise indicated. Unless otherwise indicated in the scope of the contract and plans or directed by the Engineer, the Contractor shall not rehabilitate active upper laterals and leave alone inactive upper laterals. Rehabilitation of upper laterals either by slip-lining or replacement at contractor discretion and in accordance with the specifications. The Contractor shall construct two-way cleanouts at the upstream end of active lower laterals and two-way cleanouts at the upstream end of active upper laterals that are 20 feet or longer or as directed by the Engineer. The Contractor shall locate and identify illegal storm drain and other pipes connected to existing private laterals and inform the Engineer of such findings. The Contractor shall restore improvements on public and private property that he disturbs.

All work shall be carried out in an expeditious fashion so as to inconvenience residents as little as possible. Service shall not be interrupted to any businesses or institutional establishments. Service to a resident shall not be interrupted unless it is temporarily and expressly approved by the Engineer.

No temporary connections shall be made which in the opinion of the Engineer pose a human health hazard. For each temporary connection for which a human health hazard exists between the hours of 5 p.m. and 7 a.m., the Contractor will be fined $50/connection/day or the cost of the repair, whichever is greater, for as long as the problem exists. At no time shall service to a home be interrupted for more than 8 hours unless expressly approved by Engineer. Contractor shall provide bypass pumping as necessary.

Heavy equipment shall not be allowed on private property. Portable or small self-propelled equipment shall be allowed on private property for excavation, cleaning, televising, and restoration. Contractor shall plan on extensive hand digging.

All connections shall be made in such a fashion that no rock, soil, pieces of pipe, or other debris is allowed to enter the sewage collection system.

Contractor shall indicate alignment and depth of each active lower lateral, alignment and rehabilitation method of each active upper lateral, location of each two-way cleanout, and location of abandoned lower lateral on the “as-built” drawings he prepares.

312-9.2 Investigate Laterals. The exact number and location of the active laterals are not known. An active lateral is defined as a lateral which is connected to a sewer main and to a facility or extends
to within 5 feet of the facility (residence or business) irrespective of whether the facility is occupied or utilized. The Contractor shall locate laterals, determine if they are active, and only reconnect active laterals to the sewer mains, unless otherwise indicated. The Agency will provide the Contractor with access to videotapes and logs of the existing sewer mains that are available, help locate laterals; however, the Agency does not guarantee the accuracy or completeness of the information supplied nor does the furnishing of the information preclude the Contractor from making an independent investigation, including television inspection. The Contractor shall have complete responsibility to determine the completeness and accuracy of the information and interpret the information and use it, as applicable, to locate laterals and determine their status.

312-9.3 Multi-service Laterals. Multi-service laterals provide service to more than one building. The Contractor shall investigate each branch of a multi-service lateral to determine if it is active or inactive. The Contractor shall abandon inactive branch lower laterals and shall leave alone inactive branch upper laterals. The Contractor shall reroute active branch laterals as necessary so that each active branch lateral has its own connection to the sewer main. Each active branch lateral shall have a two-way cleanout at 5 feet from the building foundation and a two-way cleanout near the curb as shown on the drawings.

312-9.4 Lower Lateral Replacement. Active lower laterals shall be replaced with high density polyethylene pipe (HDPE). Laterals shall be 4-inch minimum diameter or shall match the size of the existing lateral, whichever is larger.

After replacement, the laterals shall be reconnected to the main sewer line and connected to new cleanouts. Connections to new cleanouts shall be made with mechanical joints or as otherwise directed by the Engineer.

Construction of laterals shall conform to Subsection 306. Maximum deflection with one fitting shall not exceed 22-1/2 degrees. Long-radius bends shall be used for changes in direction except as otherwise allowed by the Engineer.

The Engineer shall determine the line and grade of replacement laterals. Replacement laterals shall be constructed with minimum number of changes in grade and direction possible, regardless of the alignment of the existing lateral. Unless otherwise directed, Contractor shall lay the pipe on a uniform grade between the sewer main and the upstream end of the lateral. Minimum slope shall be ¼ inch per foot unless otherwise permitted by the Engineer.

312-9.5 Upper Lateral Rehabilitation. The Contractor shall replace active upper laterals less than 4 inches in diameter. The Contractor shall at his discretion replace or slipline active upper laterals 4 inches or larger in diameter except as noted below:

1) No access agreement.

2) Required work is shown on the Plans.

3) Engineer directs rehabilitation method at least 1 week prior to scheduled rehabilitation.
4) Lateral is a multi-service lateral.

312-9.5.1 Access Agreements. The Agency has obtained access agreements for rehabilitating some upper laterals. The Contractor shall only rehabilitate active upper laterals for which the Agency has obtained an access agreement within 1 week of the scheduled rehabilitation and filed it with the Engineer. The Contractor shall verify with the Engineer that an access agreement is in effect before rehabilitating an upper lateral.

312-9.5.2 Replace Upper Laterals. Replacement of upper laterals shall conform to Subsection 312-9.4.

312-9.5.3 Slip-line Upper Lateral. Slip-lining of laterals smaller than 4 inches in inside diameter is not permitted. Any such lateral shall be replaced with 4-inch pipe in accordance with Subsection 312-9.4.

The installation of the polyethylene solid wall sewer pipe liner shall conform to Subsection 500-1.3 and to ASTM Specifications F585, D2657, and D2321. No payment shall be made for point repairs, cleaning, or television inspection. Unless otherwise specified or approved, the outside diameter of the liner shall not be less than 85 percent of the inside diameter of existing pipes. The Contractor shall submit shop drawings of proposed materials.

The Contractor shall brace or otherwise protect the lateral, if necessary, to withstand forces generated by equipment used while installing the liner.

After slip-lining, the Contractor shall connect the upper lateral to the lower lateral and the cleanouts, backfill and restore surface improvements and perform acceptance tests.

1) Liner Material. Polyethylene solid wall pipe lines shall be SDR-26.

2) Liner Handling. The liner shall be handled with care to minimize the possibility of it being cut, kinked, gouged, or otherwise damaged. Ropes, fabric, or rubber-protected slings and straps may be used when handling the liner. The use of cables, chains, or hooks will not be permitted. Liners shall be stored on level ground or surface, free of sharp objects which could cause damage. Sections of the liner damaged, cut or gouged shall be repaired by cutting out the section of pipe containing the damaged areas and then rejoining the liner sections as specified herein.

3) Liner Installation. The Contractor shall insert the liner into the pipe in accordance with ASTM F585 and the liner manufacturer’s recommendations. Pounding on the liner is not an acceptable insertion method.

4) Joining Systems.

a) Butt Fusion. Sections of the liner shall be joined into continuous lengths on the job site at ground level above the trench. Joining shall be accomplished by butt fusion performed in accordance with the liner manufacturer’s recommendations and
Butt fusion shall be accomplished by aligning the sections to be joined in a fixture, softening the ends by heat and then joining them together under controlled pressure. All fusion must be done by personnel trained by the pipe supplier and using tools recommended by the pipe supplier and approved by the Engineer. Joints between pipe sections shall be smooth and internal fusion beads in no case shall be greater than 0.10 inch.

Two joints, selected at random by the Engineer from the first total of 1000 linear feet shall be tested in compliance with ASTM D638 to assure that the tensile strength of the joints equals or exceeds that of the material joined. The specimens to be tested shall be obtained by cutting the liner pipe at least 12 inches on each side of the field-made joint. The ends may then be rejoined and work may proceed. One additional test shall be made for each additional 1000 linear feet of line or portion thereof.

b) **Mechanical Joints.** Where the polyethylene liner is reconnected to the sewer main stub-out and to the cleanout, and where the liner must be joined in the trench as approved by the Engineer, the polyethylene pipe shall be joined together with a stainless steel full encirclement clamp.

Clamps shall be 316 stainless steel with a rubber sleeve and shall be of adequate length to protect against pullout. Minimum lengths of clamps are listed below.

<table>
<thead>
<tr>
<th>Approximate Outside Diameter of the Liner Pipe (Inches)</th>
<th>Minimum Length of Clamp (Inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5</td>
<td>7.5</td>
</tr>
<tr>
<td>4.5</td>
<td>10</td>
</tr>
<tr>
<td>5.5</td>
<td>10</td>
</tr>
<tr>
<td>6.5</td>
<td>15</td>
</tr>
<tr>
<td>7.0</td>
<td>15</td>
</tr>
</tbody>
</table>

5) **Insertion of Liner Pipe.** The top of the lateral shall be exposed to the spring-line for the full length of the access pit prior to the removal of the crown portion. ALL sharp edges shall be removed from the exposed pipe opening.

6) **Stress and Strain Relief of Polyethylene Liner Pipe.** Stress and strain relief shall be provided for as part of lateral slip-lining as specified in Subsection 500-1.3.8

7) **Bedding.** Cement-stabilized backfill or concrete shall be placed to a minimum thickness of 6 inches around all exposed portions of the slip-liner.

**312-9.6 Abandoned Laterals.** The Contractor shall be responsible for investigation and identification of inactive laterals. If the Contractor finds a permanent plug or finds that the lateral is inactive, then the lateral shall be abandoned.
Abandonment shall include capping the sewer main stub-out with a watertight and airtight mechanical plug, removal of the abandoned lateral pipe from the sewer main to a distance of at least 1 foot from the sewer main, and removal of the cleanout frame and cover. The lower end of the abandoned lateral shall be plugged with concrete for a length at least 6 inches.

**312-9.7 Cleanout Installation**. All upper laterals that are rehabilitated and all lower laterals that are replaced shall have two-way cleanouts as shown on the Plans. Existing cleanouts shall be removed and shall be replaced with new cleanouts.

Temporary reconnection or pumping shall be made as necessary to maintain service during rehabilitation of laterals. Cleanouts shall not be installed until laterals have been rehabilitated.

If the lateral is slip-lined, the cleanout shall be either PVC pipe or polyethylene liner pipe as approved by the Engineer. All cleanout plumbing shall have an inside diameter within 15 percent of the liner inside diameter. Transition from house plumbing to the cleanout fitting shall be made with a ductile iron or polyethylene fabricated reducer.

Cleanouts shall be constructed as shown in the Standard Details. If the lateral is replaced, the cleanout shall be the same dimension and material as the replacement sewer pipe. All joints shall be made watertight and airtight. The Contractor shall submit to the Engineer shop drawings of all materials used in constructing cleanouts.

**312-9.8 Air Test**. Where directed by the Engineer, Contractor shall perform an air test on either a lower lateral, upper lateral, or entire lateral before replacement or rehabilitation. Testing shall be in accordance with Subsection 306-7.8.2.4. This testing shall not replace acceptance testing.

**312-9.9 Acceptance Testing**. Acceptance testing of laterals and branch connections shall conform to Subsection 312-10.

**312-9.10 Payment**. All items will be measured and paid as listed in the Bid Schedule. Payment for the various items of work enumerated shall be included in the various items of work, and no additional compensation will be allowed therefore. Bid items shall also include payment for record drawings of locations and compensation for any coordination with property owners necessary to locate, investigate, and rehabilitate or replace laterals.

***ADD NEW SUBSECTION 312-10 TO THE “GREENBOOK” TO READ AS FOLLOWS***

**312-10 ILLEGAL STORM DRAIN CONNECTIONS.**

The Contractor shall notify the Agency immediately upon discovery of illegal storm drain and other pipes connections to the sanitary sewer system.
***ADD NEW SECTION 313 TO “GREENBOOK” TO READ AS FOLLOWS***

SECTION 313 – RESTORATION OF IMPROVEMENTS

313-1 RESTORATION OF IMPROVEMENTS.

313-1.1 Protection of Public and Private Property. Contractor shall protect, shore, brace, support, and maintain all underground pipes, conduits, drains, and other underground construction uncovered or otherwise affected by his construction operations. All pavement, surfacing, driveways, curbs, walks, buildings, utility poles, guy wires, fences, and other surface structures affected by construction operations, together with all sod, plantings, and shrubs, shall be restored to match their original condition. All replacements shall be made with new materials.

Contractor will be held responsible for any damage to existing structures, work, materials, or equipment because of his operations and shall repair or replace any damaged structures, work, materials, or equipment to the satisfaction of, and at no additional cost to, the Agency.

313-1.2 Document Pre-construction Condition. Contractor shall provide pre-construction and audio-video surveys to document the condition of existing improvements. The Contractor shall supplement the audio-video tapes with still photographs and other necessary documentation. The Contractor shall be responsible to adequately document the condition for size, kind, quantity and the extent of existing improvements. In addition, the Contractor shall provide not less than one Polaroid type still photograph of each upper lateral location, with date and address noted on back. Photographs shall be for the purpose of documenting the pre-existing condition at the site of work. All photographs and audio-video surveys shall be delivered to the Construction Manager prior to commencing work on any given upper lateral.

313-1.3 Tree and Plant Protection. No trees or cultured plants shall be removed or damaged, unless the Contractor obtains the written permission of the property owner and Engineer. Whenever practicable, Contractor shall tunnel beneath trees when on or near the line of trench. Hand excavation shall be employed as necessary to prevent injury to trees and other plants.

All trees and other vegetation that are removed shall be disposed of by the Contractor as approved by the Engineer. All trees and plants not removed shall be protected against injury from construction operations.

Each tree injured beyond repair or removed shall be replaced with a similar tree of the nearest size possible, up to a maximum of 15-gallon plantings.

All trimming, repair, and replacement of trees and plants shall be performed by qualified nurserymen or horticulturists.

313-1.4 Sodding. All lawn areas that have been disturbed by sewer rehabilitation, by sewer replacement, by point repairs, by parking of equipment, or by any other construction activities shall be restored using sod removed from the original lawn or resodded with a comparable grass mixture. The top surface elevation of the new sod shall match the pre-construction elevation.
The soil used in the repair work shall be commercially available processed topsoil. Sod shall be cut in strips or rectangular sections which may vary in length but shall be of equal width and of a size that will permit the sections to be lifted and rolled without breaking. All sod shall be cut to a thickness of 1/2 to 3/4 inch.

Fertilizer shall be pelleted or granulated or granulated and shall have an analysis of equal parts of available nitrogen, phosphorus, and potassium in percent by weight in order to supply the number of pounds of the pure chemicals per square foot recommended by the manufacturer. Water shall be free from any substances harmful to the growth of grass and shall be from a source approved by the Engineer prior to use.

Sod shall be placed after the soil has been adequately prepared and after the fertilizer has been applied as recommended by the manufacturer. Sod shall be laid smoothly, edge to edge, and with staggered joints.

All sodded areas shall be maintained until final acceptance of the project. Maintenance shall include watering, resodding, repair of erosion damage, and all other operations necessary to obtain an acceptable grass cover. Watering shall be required if natural rainfall is not sufficient to maintain the sod bed in a thoroughly moist condition. Contractor shall provide water for watering. Sodded areas that have turned brown prior to final acceptance of the project shall be resodded. Original grades of the grass-covered areas shall be maintained after commencement of sodding operations and during the maintenance period.

313-1.5 Fences. All existing fences affected by the work shall be maintained by the Contractor until completion of the work. Fences which interfere with construction operations shall not be relocated or dismantled until written permission is obtained from the Engineer and owner of the fence and the period the fence may be left relocated or dismantled has been agreed upon. Where fences must be maintained, adequate gates shall be installed. Gates shall be kept closed and locked at all times when not in use.

On completion of the work across any tract of land, Contractor shall restore all fences to their original or to a better condition and to their original location.

313-1.6 Restoration of Driveways, Sidewalks, Retaining Walls, Curbs, and Gutters. The Contractor shall observe the following requirements.

To the extent possible, laterals shall be installed or rehabilitated without disturbing concrete driveways. All concrete curbs, gutters, aprons, patios, walls, driveways, and sidewalks which are broken, crushed, or damaged by the installation of the improvements shall be reconstructed by and at the expense of the Contractor. All restoration shall be of the same kind of material and of the same dimensions as the original work. The minimum thickness for concrete slabs, etc., shall match existing adjoining pavement in thickness, or as indicated on the Drawings, or as specified, whichever is the greater. The repairs shall be made by removing the damaged portions between joints by concrete saw and by replacing the entire portions. Refinishing the damaged part is not allowed. All work shall match the appearance of the existing improvements as nearly as practicable.
A power-driven pavement saw shall be used to cut existing Portland cement concrete sidewalk, driveway, curb and gutter where it is necessary to remove the concrete. Sidewalk shall be saw-cut at existing score marks. Driveway aprons shall be removed and replaced as a whole without saw-cutting. The kerf shall be a minimum of 1-1/2 inches and straight; and, if two cuts are made, they shall be parallel. The kerf shall be deep enough to permit complete breakage of the concrete without ragged edges.

All edges of concrete shall be edged with a cement edger of the size 2-3/4 inches in width with a 3/16-inch radius. All joints or grooves that are indicated on the Plans or required by the Engineer shall be marked with cement groovers or jointers 4 inches in width and having a groove 3/8 inch wide at the top and a depth of ¼ inch to 12 inches.

All new or previously existing concrete surfaces shall be left neat, clean and free from concrete droppings. The Contractor shall be responsible for preventing vandals or others from disfiguring or defacing the finished surfaces. Any new concrete surfaces disfigured due to pouring late in the day, or due to the failure on the part of the Contractor to provide adequate protection or covering to the new surfaces, shall be replaced at the Contractor’s expense.

**313-1.7 Payment.** All costs to the Contractor for protecting, removing, and restoring existing improvements on public and private property shall be included in his Bid. Bid prices shall include restoration of surface as well as subsurface features to their before construction function and appearance as determined by the Engineer. Restoration shall include surface conditions such as street, curb, gutter, sidewalk, retaining walls, patios, driveways, fences, gravel, lawn, dirt, and driveways; underground service utilities such as water, phone, power, gas, cable TV, television; and underground property improvements such as sprinklers and drain pipe.
PART 5 – PIPELINE SYSTEM REHABILITATION

SECTION 500 – PIPELINE, MANHOLE AND STRUCTURE REHABILITATION

SECTION 500-1 PIPELINE REHABILITATION.

500-1.1 Requirements

500-1.1.4 Cleaning and Preliminary Inspection

***REPLACE SUBSECTIONS 500-1.1.4.b, AND 500-1.1.4.c OF THE “GREENBOOK” WITH THE FOLLOWING***

b) High-Velocity Hydraulic (Hydro-Cleaning) Equipment. High-velocity hydraulic cleaning equipment have above ground operating controls and shall have at a minimum have a 1,000 gallon water tank, auxiliary engines, pumps, and a hydraulically driven hose reel with at least 700 feet of high pressure hose. The equipment shall have a selection of 2 or more high velocity nozzles capable of producing a scouring action from 10 to 45 degrees in all size lines designated to be cleaned. The cleaning units shall have high-velocity nozzles for washing and scouring manhole walls and floors. The nozzles shall be capable of producing flows from a fine spray to a solid stream.

c) Mechanically Powered Equipment. Bucket machines shall be used in pairs with sufficient power to perform the work in an efficient manner. Machines shall be V-belt for power transmission or have an overload device. Machines with a direct drive that could cause damage to the pipe will not be allowed. Bucket machines shall not be used on any host or rehabilitated pipeline that is lined with a plastic pipe or material. A power rodding machine shall be either a sectional or continuous-rod type capable of holding a minimum of 750 feet (230 m) of rod. The rod shall be specifically heat-treated steel. The machine shall be fully enclosed and have an automatic safety clutch or relief valve.

***REPLACE PARAGRAPH FOUR OF SUBSECTION 500-1.1.4 OF THE “GREENBOOK” WITH THE FOLLOWING***

The designated sewer manhole sections shall be cleaned using hydraulically propelled, high-velocity jet, or mechanically powered equipment. Selection of the equipment used shall be based on the conditions of the sewer lines at the time the work commences. The equipment and methods selected shall be satisfactory to the Engineer. The equipment shall be capable of removing dirt, grease, rocks, sand, and other materials and obstructions from the sewer lines and manholes. If cleaning of an entire section cannot be successfully performed from one manhole, the equipment shall be set up on the other manhole and cleaning again attempted. If, again, successful cleaning cannot be performed or the equipment fails to traverse the entire manhole section, it will be assumed that a major blockage exists and the Contractor shall, with the Engineer’s approval, excavate and remove the obstruction.
and resume cleaning. The Engineer shall determine based on the method of rehabilitation identified for the sewer reach how and if the line shall be fixed.

***REPLACE THE LAST PARAGRAPH OF SUBSECTION 500-1.1.4 OF THE “GREENBOOK” WITH THE FOLLOWING PARAGRAPHS***

All sludge, dirt, sand, rocks, grease and other solid or semi-solid material resulting from the cleaning operation shall be removed at the adjoining downstream manhole of the section being cleaned. Passing material to downstream sewer reaches shall not be permitted.

All solids or semi-solids resulting from the cleaning operations shall be removed from the site and disposed of at a suitable sanitary landfill site as defined by Titles 22 and 23 of the California Administrative Code. All materials shall be removed from the site no less often than the end of each workday. Under no circumstances will the Contractor be allowed to accumulate debris, etc., on the site of work beyond a single workday, except in totally enclosed containers and as approved by the Engineer.

During sewer cleaning operations, satisfactory precautions shall be taken in the use of cleaning equipment. When hydraulically propelled cleaning tools which depend upon water pressure to provide their cleaning force, or tools which retard the flow in the sewer line are used, precautions shall be taken to ensure that the water pressure created does not damage or cause flooding of public or private property being served by the sewer. Care shall be exercised to avoid pipe damage.

***ADD SUBSECTION 500-1.1.4.1 TO THE “GREENBOOK”, TO READ AS FOLLOWS***

500-1.1.4.1 Roots. All roots shall be removed. Where shown on the Plans and as directed by the Engineer, root intrusion shall be treated with an approved herbicide.

The application of the herbicide to the roots shall be done in accordance with the manufacturer’s recommendations and specifications in such a manner to preclude damage to surrounding vegetation. Any damaged vegetation so designated by the Engineer shall be replaced by the Contractor at no additional cost to the Agency. All safety precautions as recommended by the manufacturer shall be adhered to concerning handling and applications of the herbicide. Herbicide shall be handled by only qualified persons if required by law.

The herbicide and the application method shall be submitted in accordance with Part C, Section 4, Subsection 401.12 of the Specifications.

500-1.1.5 Television Inspections

***INSERT THE FOLLOWING PARAGRAPH AFTER THE FIRST PARAGRAPH OF SUBSECTION 500-1.1.5 OF THE “GREENBOOK”***

Where available, the Agency will provide access to the Contractor the videos of the existing sewer. The Agency does not guarantee the accuracy of the television information supplied, nor does the furnishing of the information including television inspection at his/her cost. This information will be
given to the Contractor to assist in determining the nature and location of point repairs. It shall be the Contractor’s responsibility to interpret the information and to use it, as applicable.

All CCTV work shall conform to current National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP) standards for coding of all defects. CCTV inspections shall be submitted entirely in electronic format and shall be submitted in accordance with Part C, Subsection 401.12 of the Specifications to the Agency and the Engineer.

***INSERT THE FOLLOWING AT THE END OF PARAGRAPH SEVEN OF SUBSECTION 500-1.1.5 OF THE “GREENBOOK”***

In the event the section being televised has substantial flow entering the sewer between manholes, such that inspection of the sewer is impaired, then the Contractor shall coordinate with the owner of the source of flow to have such flow temporarily stopped and/or reschedule television inspection of the particular section to a time when such flow is reduced before proceeding with the television inspection. When sewer line depth of flow at the upstream manhole of the section being televised is above the maximum allowable for television inspection, the Contractor shall reduce the flow in accordance with Subsection 500-1.16 before proceeding with the television inspection.

***REPLACE THE LAST TWO SENTENCES OF PARAGRAPH NINE OF SUBSECTION 500-1.1.5 OF THE “GREENBOOK” WITH THE FOLLOWING***

Any rejected work shall be repaired and re-inspected by CCTV at no additional cost to the Agency. Note that if the image quality is not adequate for post-inspection coding, the Contractor shall be required to repeat the survey at no additional cost to the Agency.

***REPLACE SUBSECTION 500-1.1.5 OF THE “REGIONAL STANDARDS” WITH THE FOLLOWING***

Documentation of the CCTV inspection results shall be as follows:

1) The Contractor shall perform all CCTV inspections in accordance with NASSCO-PACP standards. CCTV inspections will be delivered in electronic format along with two printed copies of the reports and inspection logs. The entire survey shall be recorded in an approved electronic format submitted with electronic links between the data and the video. All television inspection reports shall be within ± two (2) feet of the measured linear footage between manholes along the existing sewer centerline from the start of pipe to end of pipe. All Agency and PACP required header information shall be fully and accurately entered on all CCTV reports. Work not following these specifications may be rejected for payment and the Contractor may be required to redo the work.

2) The Contractor shall provide a PACP certified operator on site at all times during the entire CCTV inspection. If video is to be coded separately from the actual recording, both the onsite Operator and the individual performing the PACP coding shall be PACP certified. The Contractor shall provide proof of certification prior to commencement of the work, prior to change in personnel involved in data collection, and as requested by the Agency.
3) CCTV Reports, logs, electronic reports, and worksheets shall be provided to the Agency and shall include the following information and conform to the applicable guidelines:
   a) CCTV Reports, NASSCO-PACP Certified Database, and electronic worksheets shall accompany all inspection work.
   b) All Agency and NASSCO-PACP required header information shall be fully and accurately entered on all CCTV reports.
   c) Other data of significance including the locations of buildings, proximity to property and/or fence lines, unusual conditions, storm-sewer connections, and other discernible features shall be noted in the CCTV reports.

4) The measurement of distance to defects is critical in confirming the locations of areas to be excavated shown on the Plans. It is recommended that the Contractor use the following procedure in performing the television inspection:
   a) A marker or flag shall be attached to the top of the camera yoke.
   b) The measurements recorded in the log shall be zeroed in alignment with the marker rather than the camera itself, as is the usual practice.

5) Video recording playback shall be the same speed that it was recorded. Slow motion or stop motion playback features may be supplied at the option of the Contractor. Title to the video inspections shall remain with the Agency. The Contractor shall have all necessary video playback equipment readily accessible for on-site review by the Engineer during the project.

6) Video files shall include the following information:
   a) Data view:
      i. Report No.
      ii. Date of TV inspection
      iii. Upstream and downstream manhole numbers
      iv. Current distance along reach (tape counter footage)
      v. Printed labels on tape container and tape cartridge with location information, date, format information, and other descriptive information
   b) Audio:
      i. Date of TV inspection
      ii. Verbal confirmation of upstream and downstream manhole numbers
      iii. Verbal description of pipe size, type and pipe joint length
      iv. Verbal description and location of each defect
      v. Verbal description and location of each service connection

***ADD SUBSECTION 500-1.1.5.1 TO THE “GREENBOOK”, TO READ AS FOLLOWS***

500-1.1.5.1 Payment. Payment for pre-construction video-inspection of reaches which have been previously video-inspected is included in the unit cost for the rehabilitation method performed. Payment for post-construction video-inspection of reaches is included in the unit cost for the rehabilitation method performed. Payment for pre-construction video-inspection of reaches not
previously televised is based on the unit bid price per linear foot of sewer.

500-1.2 Pipeline Point Repair/Replacement

***REPLACE SUBSECTION 500-1.2.1 OF THE “GREENBOOK” WITH THE FOLLOWING***

500-1.2.1 General.

Point repairs (spot repairs) are work required to repair defective sections of existing sewer lines. Surface excavation is required to accomplish these necessary repairs. Generally, the work entails pipe repair at joints and service connections, sagging locations or any obstruction during pipe rehabilitation work that can be done by removal / replacement of short sections of damaged pipe. Flow control of affected reaches of sewer by plugging and/or bypass pumping, if required, shall be performed as described in Subsection 500-1.16.

All point repairs shown on the Plans, discovered through subsequent investigations, and/or directed by the Engineer, shall be completed prior to any pipe rehabilitation. Point repair locations indicated on the Plans are based upon previously conducted CCTV inspections. The Engineer will determine the exact location of the point repairs after the pipe is exposed. The location of the point repair specified or shown shall be considered accurate if it is within five feet of the actual location determined by the Engineer. All work to expose and correct the defects, and the materials and methods used shall conform to the applicable specifications, including excavation; locating all interfering utilities; temporary flow bypassing; trench dewatering; pipe repairs or replacement; placing / compacting bedding and backfill; and surface restoration.

All point repairs shall be visually inspected and measured by the Engineer prior to backfilling.

***REPLACE SUBSECTION 500-1.2.5 OF THE “GREENBOOK” WITH THE FOLLOWING***

500-1.2.5 Notification of Work.

The Contractor shall notify the Engineer not less than 48 hours in advance of the time he/she plans to begin repair work at a particular project location. After the point repair is located and exposed, the Engineer will inspect the damaged pipe and confirm the required repair and methods proposed by the Contractor.

500-1.2.6 Installation and Field Inspection

*** ADD THE FOLLOWING TO THE END OF SUBSECTION 500-1.2.6 OF THE “REGIONAL STANDARDS ***
d) **Other.** Repair defects using methods as shown on the Drawings or described elsewhere in the Specifications. Contractor may suggest alternate point repair methods for consideration by the Engineer.

For mains to be rehabilitated by inversion lining, the repair method for point repairs shown on the Plans or otherwise approved by the Engineer, is described below with exception noted.

e) **The Contractor shall excavate to the defect and remove the necessary length of existing pipe by cutting perpendicular to the pipe axis to leave a plain end. The section shall be replaced with new pipe of the same material and shall be installed after bedding has been prepared along the alignment and slope of the existing sewer in accordance with Subsection 306-6. Connection of the new and existing pipe shall be made using Type “D” couplings with Type 316 stainless steel bands.**

In the case of sewer offset joints and sags, the Contractor at his option may re-align the existing sewer without removal of the section of sewer. Any pipe broken during the operation shall be replaced. With this option, the repair shall conform in all other respects with paragraph 2, above.

***ADD NEW SECTION 500-1.2.7 TO READ AS FOLLOWS***

500-1.2.7 **Measurement and Payment for Point Repairs.** This item will be measured as EACH and paid for at the unit price per for each Point Repair listed in the Bid Schedule. Measurement will be made at the pipe and will be the same length (i.e. 8 feet or less) as the point repair. Payment will be independent of the pipe size upon which point repairs are to be made or the repair method to be used. Payment will include full compensation for all work and materials required to sawcut, excavate, trench shoring, removal of any obstruction object; provide and compact bedding and backfill, bypass sewage and dewater trench, install temporary and permanent resurfacing, including locating all interfering utilities, restoration of ground surface features, traffic control, temporary fencing if required, and all incidental work for one point repair regardless the depth of the excavation, complete in place. Payment will provide complete compensation for furnishing all materials, labor, and incidentals including pipe, repair clamps, couplings, and adapters, heat-shrink sleeves, wyes or tees, sewer flow control, and trench shoring necessary to repair the pipe, complete in place.

***CHANGE SUBSECTION 500-1.3 OF THE GREENBOOK TO READ AS FOLLOWS***

500-1.3 **Polyethylene Solid Wall Liner Insertion Procedure**

500-1.3.1 **General.** The installation of the polyethylene solid wall sewer pipe liner shall conform to this Specification and to ASTM Specifications F714, D2683, D3261, and D3350.

The Contractor shall, in accordance with Section 4, 401.12, submit shop drawings of proposed materials and construction details. The shop drawings shall include insertion pit configuration and details, including sewer flow control, to assure that the work can be accomplished as specified and without sewage spill.
Unless otherwise specified or approved, the outside diameter of the liner shall be the maximum standard size while not exceeding 90 percent of the inside diameter of existing pipe.

The Contractor shall brace or otherwise protect the manholes, of necessary, to withstand forces generated by equipment used while installing the liner.

As opposed to provision of bypass pumping, the Contractor may, at his option, utilize the annular space between the liner and the pipe to temporarily convey sewage during the time that the liner is allowed to relax to its unstressed state. The Contractor shall provide flow control for any excess sewage from upstream reaches, branch sewers, and active laterals in accordance with Subsection 312-2.1 which cannot be conveyed through the annular space. Should the annular space become plugged, the Contractor shall provide full flow control in accordance with Subsection 312-2.1. Upon completion of use of the annular space for flow conveyance, and prior to grouting, the Contractor shall thoroughly flush the annular space with potable water to remove any solids and organic material which may have become lodged or deposited in the annular space.

The Contractor shall clean each reach of sewer main to be lined as specified in Subsection 312-1, and perform all point repairs designated in the Plans in accordance with Subsection 312-7.

Prior to installation, all protruding laterals that may prevent proper insertion of the liner shall be removed. The method shall be submitted with the shop drawings for approval.

**500-1.3.2 Sizing “Pig”**. After completing the point repairs, a sizing “pig” shall be pulled through the existing sewer to ensure that there are no obstructions.

The sizing “pig” shall comprise a pulling head made of steel, attached to a piece of pipe of the same size and material as the liner. A flexible pulling head is not acceptable. The minimum length of the pipe section shall be three joint lengths of the existing sewer. A cable shall be attached to the tail of the “pig” to allow withdrawal if necessary.

If the sizing “pig” encounters an obstruction that cannot be removed by conventional sewer cleaning equipment, a point repair excavation shall be made to uncover and remove or repair the obstruction following procedures outlined in Subsection 312-7.

If the sizing “pig” is scored to a depth equal to or greater than 10 percent of the liner thickness, the protrusion or irregularity that is the cause shall be removed prior to insertion of the liner. In such cases, the pipe portion of the sizing “pig” shall be replaced by a new portion. Insertion of the liner shall not be permitted unless scoring of the sizing “pig” is less than 10 percent of the thickness.

**500-1.3.3 Liner Handling**. The liner shall be handled with care to minimize the possibility of it being cut, kinked, gouged or otherwise damaged. Damage will be assessed in accordance with ASTM F585. Ropes, fabric, rollers, or rubber-protected slings and straps may be used when handling the liner. The use of cables, chains or hooks will not be permitted. Liner shall be stored on level ground or surface, free of sharp objects which could cause damage. The liner shall be pulled on rollers, or otherwise protected from damage during pulling operation. Sections of the liner damaged, cut, or gouged shall
be repaired by cutting out the section of pipe containing the damaged areas and then rejoining the liner sections as specified herein.

500-1.3.4 Liner Installation. The Contractor shall insert the liner into the pipe in accordance with ASTM F714, the manufacturer’s recommendations, and the shop drawings. A thermal crayon shall be used for providing a fail-safe mechanism for the thermometer to assure proper fusion temperature.

500-1.3.5 Joining Systems.

1) **Butt Fusion.** Sections of the liner shall be joined into continuous lengths on the job site at ground level above the trench. Joining shall be accomplished by butt fusion performed in accordance with the liner manufacturer’s recommendations and pertinent sections of ASTM D2657 and D3261.

   Butt fusion shall be accomplished by aligning the sections to be joined in a fixture, trimming, softening the ends by heat, and then joining them together under controlled pressure. All fusion must be done by personnel trained by the pipe supplier or other qualified person, and using tools recommended by the pipe supplier and approved by the Engineer. Joints between pipe sections shall be smooth and internal fusion bead in no case shall be greater than 0.10 inch.

   Two joints, selected at random by the Engineer from the first total of 1,000 linear feet in a project or from the total project length if less than 1,000 feet, shall be tested at the Contractor’s cost in compliance with ASTM D638 to assure that the tensile strength of the joints equals or exceeds that of the materials joined. The specimens to be tested shall be obtained by cutting the liner pipe at least 12 inches on each side of the field-made joint. The ends may then be rejoined and work may proceed. One additional test shall be made also at the Contractor’s cost for each additional 1,000 linear feet of line or portion thereof.

2) **Electrofusion Coupling.** Where the polyethylene liner is inserted at a point between manholes, or in other circumstances approved by the Engineer where the liner must be joined in the trench, the polyethylene pipes shall be joined together using electrofusion couplings. Electrofusion couplings shall comply with ASTM F1055.

3) **Mechanical Joints.** When approved by the Engineer polyethylene pipe may be joined together with a stainless steel full encirclement clamp.

   Clamps shall be 316 stainless steel with a rubber sleeve and shall be of adequate length to protect against pullout. Minimum lengths of clamps are listed below.

<table>
<thead>
<tr>
<th>Approximate outside Diameter of the liner pipe (inches)</th>
<th>Minimum length of clamp (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.500</td>
<td>7.5</td>
</tr>
<tr>
<td>4.500</td>
<td>10</td>
</tr>
</tbody>
</table>

D44
The exposed liner and clamp shall be encased in concrete not less than 6 inches thick all around the clamp.

500-1.3.6 Excavated Pits. The liner shall be installed through insertion pits and sewer laterals shall be reconnected using access pits. All pits shall be adequately shored, braced, and dewatered to ensure safe work areas.

a) Points of Insertion. An insertion pit shall be excavated at each location where polyethylene liner pipe is to be inserted into the existing sewer pipe.

The pits shall be sloped in accordance with ASTM F585 and the manufacturer’s recommendations to facilitate entry of the liner without damage. Slope shall be 2-1/2:1 or flatter and shaped to permit as long a radius in the liner pipe as feasible, both where it enters the excavation and where it enters the existing sewer. This radius shall not be less than 35 times the outside diameter of the line pipe.

b) Service Connections. Access pits will be required at points of connection of the slip-lined sewer main with existing sewer lateral connections. Individual service connections shall be at least three liner pipe diameters apart.

500-1.3.7 Insertion of Liner Pipe. The top of the existing main shall be exposed below the spring-line for the full length of the insertion pit prior to removal of the crown portion. All sharp edges shall be removed from the exposed pipe opening and/or edges of the pipe shall be rounded with mortar to prevent scratching or gouging of liner during the insertion operation.

A power winch shall be connected to the end of the liner pipe by a cable and pulling head or other proven and acceptable arrangement to enable the liner to be pulled into the existing sewer. The winch
shall be equipped with a load gauge to read the developed winching force directly. This force shall be recorded regularly during winching, and at every start or restart. The permissible winching force is calculated by multiplying the cross sectional area of the pipe wall by the permissible short term tensile stress, as stated by pipe manufacturer. A fully rotating eye shall be used on the end of the cable to avoid problems with cable twist.

Length of the liner pipe to be pulled and the pulling speed shall be in accordance with the manufacturer’s recommendations to ensure that the liner is not excessively stretched. Pulling speed shall not exceed 1 foot per second. Butt fused joints shall not be pulled until the set time recommended by the manufacturer has elapsed.

The liner shall be lubricated to reduce friction. The method and materials shall be as recommended by the liner manufacturer.

500-1.3.8 Stress and Strain Relief of Polyethylene Liner Pipe After Pulling Operations. The Contractor shall allow the liner to return to its original length and shape in the unstressed state and then trim the excess liner in the manholes. The liner pipe manufacturer’s recommendations shall be followed regarding the relief and normalization of stress and strain due to temporary stretching or elongation after pulling operations are completed. Time allowed for stress and strain relief shall be not less than 24 hours. The installation of full encirclement clamps and annular space sealing procedures shall not commence until the normalization has taken place. Sewer lateral connections shall be reconnected with flexible couplings as soon as possible.

500-1.3.9 Grout Sealing. Sealing of annular spaces shall not be done until all sewer lateral connection work at the main is complete and a minimum of 24 hours has elapsed from completion of insertion of liner pipe.

a) Sealing Annular Space at Manholes. The annular space between polyethylene liner pipe and the existing sewer main shall be sealed where the liner enters or exits each manhole. For grout sealing, the annular space shall first be caulked with an approved activated oakum. Treated activated oakum shall be placed a minimum of 6 inches (152 mm) from the inside face of the manhole and shall then be activated in accordance with the manufacturer’s recommendations. The remaining annular space between the inside face of the manhole and the caulking shall then be filled with non-shrink grout made with Type V cement. A mechanical sealing device, approved by the Engineer, may be used to seal the annular space at manholes. Sealing device shall be LINK-SEAL manufacturer by GPT, or equal.

b) Sealing Entire Annular Space Between Liner and Pipe Wall. The Contractor shall grout the entire annular space between the liner and pipe wall with Class “E” mortar specified in Subsection 201-5. The grout shall have a water/solids ratio of 0.35 to 0.40. The workability shall be measured by the US Army Corps of Engineers test method C 611, and shall satisfy a range of 10 to 30 seconds.

Grouting procedure shall conform to Subsection 307-2.8 and Subsection 500-3.1. The grout shall be supplied to the pump continuously and shall be placed in such a manner that it will
not place any undue stresses on the polyethylene liner.

The grout shall be pumped into the annular space at existing manholes and previously excavated slip-lining access excavations and point repair excavations. If additional excavations are required for the introduction of the grout to ensure uniform and complete grouting of the annular space, they shall be provided at the Contractor’s expense. In such cases, the injection points shall not be greater than 100 feet apart. In any case, the distance to be pumped shall not exceed the limits recommended by the pump manufacturer.

The Contractor shall utilize special procedures including pressure relief valves on the grout pumping apparatus, as necessary, to ensure that the liner does not rise (float) off the existing sewer invert nor is deflected out-of-round during placement and curing of the grout. The use of water to fill the liner prior to grouting is an acceptable method to prevent flotation.

Grouting shall be considered complete when the quantity of grout pumped is between 90 and 120 percent of the annular space volume. There shall be no extra payment to the Contractor if the quantity exceeds the annular space volume.

A detailed plan of the equipment and procedures proposed for placing grout shall be submitted for approval by the Engineer.

500-1.3.10 Liner Testing. Test the liner and branching sewer laterals for leakage in accordance with Subsection 313-10.

500-1.3.11 Bedding. At all locations where polyethylene liner pipe is exposed, except in manholes, 2,000 psi concrete shall be placed to a minimum of 6 inches above and 12 inches on each side of the existing sewer. In locations where placement of concrete is difficult, the Contractor at his own expense, and with the approval of the Engineer, may substitute with cement stabilized backfill to a minimum of 6 inches above the existing sewer, and across the full width of trench or pit. Cement-stabilized backfill shall consist of a dry mixture of Class “E” mortar using Type V cement. The dry mixture shall be placed and suitably compacted as directed by the Engineer. Flexible connections shall not be encased in concrete.

500-1.3.12 Service Connections. It shall be the Contractor’s responsibility to determine and to assure that all live service connections are reconnected to the sewer main in accordance with the provisions of Subsection 312-9.

Service connections shall be made using polyethylene saddles in accordance with procedures and with materials supplied by the manufacturer of the polyethylene pipe liner. Saddles shall be attached to the pipe liner using heat fusion. Installation of saddles shall be in accordance with pipe suppliers recommendations, and as approved by the Engineer. The saddles shall be additionally secured with Type 316 stainless steel compression bands.

The size of the stub out attached to the saddle, or the “chimney” type connection, shall not be smaller than the nominal size of the service line to which it is to be attached.
Elastomeric couplings or adaptors, equipped with Type 316 stainless steel tightening bands, shall be used to make pipe closures required between the new stub-out and the lower lateral as shown in the Plans.

The entire service connection structure, including the main, saddle, stub-out, and exposed sewer lateral shall be backfilled as specified in Subsection 500-1.3.11. For “chimney” type polyethylene lateral stubs, the ends of which are butted directly against the liner then heat fused, the use of stainless steel band shall not be required.

500-1.3.13 Liner at Manholes. The liner shall be cut out within manholes. The invert of the existing channel shall be roughened to provide bond and an epoxy mortar material applied to provide a smooth and uniform flow-line from the inlet to the outlet liner. The epoxy mortar shall not be applied to a thickness less than the manufacturer’s recommendation. Where necessary, the entire existing channel shall be reconstructed so as to provide a smooth and uniform transition in width and depth from the inlet liner to the outlet liner.

500-1.3.14 Backfill and Compaction of Insertion Pits. All insertion pits shall be backfilled and compacted for their full length, width, and depth in accordance with the requirements of Section 300.

500-1.3.15 Payment. Payment for polyethylene liner insertion shall be in accordance with the unit price listed in the Bid Schedule and shall include full compensation for all labor material, equipment tools, and incidentals required to line the existing sewer with polyethylene pipe including cleaning and sizing of the existing sewer, annular space grouting, testing, sewer flow control, excavation, backfill, sub-grade preparation, temporary resurfacing, permanent trench resurfacing, and all other work necessary to install the liner complete in place.

Payment for reconnecting sewer laterals shall be in accordance with Subsection 312-9.

Payment for point repairs shall be in accordance with Subsection 312-7.

Payment for removal of protruding laterals of inactive laterals to be abandoned shall be in accordance with Subsection 312-7, Point Repairs.

Payment for removal of protruding laterals at active laterals shall be included in the unit price paid for connection of lateral to rehabilitated main sewer.

500-1.4 Cured-In-Place Pipe Liner (CIPP)

500-1.4.1 General.

***ADD THE FOLLOWING TO THE END OF SUBSECTION 500-1.4.1 OF THE “REGIONAL STANDARDS”***

- Prior to commencing work, the Contractor shall provide submittals on all lining materials and resins and shall furnish manufacturer certification that the liner materials complies with the requirements stated herein. The submittals shall include information about all component
materials. The Contractor shall submit in accordance with Part C, Subsection 401.12 of the Specifications, shop drawings of construction details, including complete manufacturer’s recommendations for storage procedures, temperature control, removing roots and protruding laterals, liner handling, and insertion, curing details, re-establishing service connections, trimming and finishing. The shop drawings shall include placement location(s) and method(s) and bypass location(s) with sufficient detail to assure that the work can be accomplished without sewage spill. The Contractor shall also provide manufacturer’s certification, field measurements and pipe-sizing calculations that demonstrate that the liner has been properly sized and designed to avoid the creation of wrinkles or folds and to avoid gaps between the liner and the host pipe. Only manufacturer-licensed and certified contractors shall install CIPP liner.

***REPLACE SUBSECTION 500-1.4.2 OF THE “REGIONAL STANDARDS” WITH THE FOLLOWING***

500-1.4.2 Material Composition. The fabric tubing shall consist of polyester fiber of at least five denier, with sufficient needling and cross-lapping to yield a burst strength of 1,000 pounds per square inch in transverse directions (hoop stress), free from tears, holes, cuts, foreign materials and other defects. Polyurethane or polyvinyl chloride shall be bonded to the inside layer of the fabric tube at 400 grams/square meter forming a nominal (0.010 inch) pin-hole free-coating laying. The fabric tube shall be compatible with and capable of carrying, polyester, epoxy, or epoxy-vinyl-ester resin and be able to withstand installation pressures and curing temperatures.

The approved polyester, epoxy, or epoxy vinyl-ester shall be corrosion resistant with sufficient thixotropic properties to obtain non-draining characteristics when impregnated into the fabric tubing. When properly cured within the tube composite, the resin shall meet the requirements of ASTM F1216. The catalyst shall be compatible with the resin and other materials used in the manufacture of the liner. The non-promoted resin shall be catalyzed by the addition of sufficient catalyst to produce the required physical properties of the cured polyester fabric tube. The initiation temperature for cure shall be as recommended by the resin manufacturer and approved by the Engineer.

The CIPP liner shall comply with ASTM D5813 and shall have, as a minimum, the initial structural properties per Table 500-1.4.2 and Table 500-1.42 (A)

***ADD FOLLOWING FOOTNOTES TO “REGIONAL STANDARDS” TABLE 500-1.4.2(A), TO READ AS FOLLOWS ***

4 The cured liner shall have a minimum impact strength of 1.9 in-lbs per ASTM D256
5 The cured liner shall have a minimum shear strength of 5,500 psi per ASTM D732

500-1.4.5 Installation

***REPLACE THE FIRST PARAGRAPH OF SUBSECTION 500-1.4.5 OF THE “REGIONAL STANDARDS” WITH THE FOLLOWING***
The fiber tube shall be fabricated to tightly and neatly fit the internal perimeter of the conduit to be rehabilitated. The gap between the existing pipe inside diameter and the outside diameter of the installed liner pipe shall not exceed 0.25 inches at any point along the pipeline. The pipe shall be rejected if shrinkage exceeds this amount. Allowance for stretching during insertion shall be made. The minimum length shall be that which continuously spans the distance from the center of the field manhole to the center of the outlet manhole. The Contractor shall verify the lengths in the field before impregnation. Individual inversion runs can include one or more sewer reaches as determined by the Contractor and approved by the Engineer.

***ADD THE FOLLOWING TO THE END OF SUBSECTION 500-1.4.5 OF THE “REGIONAL STANDARDS”***

- The Contractor shall brace or otherwise protect the manholes, if necessary, to withstand forces generated by equipment used while installing the liner.
- The Contractor shall bypass the sewage in accordance with Subsection 500-1.16.
- If an obstruction cannot be removed by conventional sewer cleaning equipment or by other internal means approved by the Engineer, a point repair excavation shall be made to uncover and remove or repair the obstruction as specified in Subsection 500-1.2.
- When both the main sewer and sewer laterals are to be rehabilitated by inversion lining, the main sewer lining must be completed before sewer laterals are lined.

500-1.4.6 Curing

***ADD THE FOLLOWING TO THE END OF SUBSECTION 500-1.4.6 OF THE “GREENBOOK”***

Contractor shall protect vegetation from damage due to heat from hot water lines and other equipment.

***ADD NEW SUBSECTION 500-1.4.6.1 TO THE “GREENBOOK”, TO READ AS FOLLOWS***

500-1.4.6.1 Finished and Cured Liner Properties.

a) The finished lining shall consist of an inner polyurethane or polyvinyl chloride layer and an outer polyester felt layer (or layers) impregnated with a thermosetting resin to fit tightly and neatly against the existing inside pipe wall. The liner shall be fabricated from materials which, when cured, will be chemically resistant when exposed to quantities of hydrogen sulfide, carbon monoxide, methane, petroleum hydrocarbons, moisture saturation, and diluted sulfuric acid.

b) The outside layer of the tube shall be plastic coated with a translucent flexible material that clearly allows inspection of the resin impregnation (wet out) procedure.

c) The tube shall be homogenous across the entire wall thickness containing no intermediate or encapsulated elastomeric layers.

d) The wall color of the interior pipe surface of CIPP after installation shall be a light reflective color so that a clear detailed examination with closed circuit television inspection equipment
may be made.
e) Longitudinal seams in the tube shall be stronger than the unseamed felt. No circumferential seams shall be used.
f) The outside of the tube shall be marked for distance at regular intervals along its entire length, not to exceed 5 feet. Such markings shall include the manufacturer’s name or identifying symbol.

500-1.4.7 Service Connections and End Seals

***ADD THE FOLLOWING TO THE END OF SUBSECTION 500-1.4.7 OF THE “GREENBOOK”***

Liner shall be tested for leakage prior to and after reconnection of sewer laterals in accordance with Subsection 306-7.8.

***ADD SUBSECTIONS 500-1.4.11 AND 500-1.4.12 TO THE “GREENBOOK”, TO READ AS FOLLOWS***

500-1.4.11 Post Lining Television Inspection. The pipe shall be inspected by closed circuit television after lining and may be accomplished in conjunction with the reinstatement of sewer lateral connections. Video tape and written log records shall be made of these inspections and copies shall be given to the Engineer for review prior to acceptance of the lining work.

500-1.4.12 Payment. Payment for inversion lining with resin impregnated polyester felt liner will be based on the unit price listed in the Bid Schedule. Payment shall include full compensation for all labor, material, tools, and incidentals for lining the existing sewer. The price per linear foot of resin impregnated polyester felt pipe lining shall include cleaning, television inspection, and sizing of the existing sewer, testing, and resurfacing.

Payment for sewer laterals shall be in accordance with Subsection 312-9.

Payment for obstruction removal and sewer repair shall be in accordance with Subsection 500-1.2.

The price per linear foot of resin impregnated polyester felt pipe lining shall also include removal of all protruding laterals.

***ADD NEW SUBSECTION 500-1.14 TO READ AS FOLLOWS***

500-1.14 UV-Cured Resin Impregnated Fiberglass Tube

500-1.14.1 General. The following documents form a part of this specification to the extent stated herein.

- ASTM F2019 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic (GRP) Cured-in-Place Resin Pipe (CIPP)
- ASTM F1216 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube.

- ASTM F1743 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pull in and inflate and Curing of a Resin-Impregnated Tube.

- ASTM D543 Test Method for Resistance of Plastics to Chemical Reagents

- ASTM D578 Standard Specification Glass Fiber Strands


- ASTM D2122 Standard 1 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings

- ASTM D3567 Standard Practice for Determining Dimensions of “Fiberglass” (Glass-Fiber- Reinforced Thermosetting Resin) Pipe and Fittings

- ASTM D5813 Standard Specification for Cured-in Place Thermosetting Resin

**500-1.14.2 Installer Qualifications.** The Contractor shall demonstrate that a minimum of 25,000 ft. has been successfully performed by the Contractor’s job Superintendent, who shall be assigned full time to this Project. As an alternative, the Contractor must provide a minimum of 3 manufacturer representatives to assist the contractor with installation for the duration of the project. The proposed CIPP Rehabilitation process shall be proven technology, which is defined as a minimum of 250,000 linear feet of successful sanitary sewer and/or storm water collection system installations in the U.S., documented to the satisfaction of the Engineer.

**500-1.14.3 Contractor Submittals.**

1. The Contractor shall submit, prior to the installation or use of any lining materials or equipment, certified test results from the manufacturers which indicate that all materials conform to the applicable requirements.

2. Chemical resistance submittals – The Contractor shall submit test results of the resin proposed that meet the chemical resistance requirements of ASTM F2019. The chemical resistance tests will be completed in accordance with Test Method D543 or the equivalent

3. CIPP Field Samples – Field sampling procedure shall be in accordance with ASTM 2019.

4. MSDS Sheets – The Contractor shall submit Material Safety Data Sheets for all resins, and other additives such as accelerants, colorants, and lubricants utilized in the pipe liner/lining process.
5. Manufacturer Protocols - The Contractor shall submit manufacturer information that describes the materials, curing speeds, curing installation processes, installation pressures, temperature limitations, and recommended post curing documentation.

500-1.14.4 Materials. Neither the CIPP product, nor its installation, shall cause adverse effects to any of the City processes or facilities. The use of the product shall not result in the formation or production of any detrimental compounds or by-products at the wastewater treatment plant or be released into the pipe after curing. This specifically includes water by-products used in curing. The Contractor shall notify the City and identify any by-products produced as a result of the operations, shall test and monitor the levels, and shall comply with any and all local waste discharge requirements including the testing of curing water before its discharge to insure all curing by-products have dissipated.

500-1.14.5 Product Storage And Handling. All materials shall be accompanied by test reports certifying that the material conforms to the ASTM standards listed herein. Materials shall be shipped, stored, and handled in a manner consistent with written recommendations of the manufacturer. All damaged materials rejected by the Engineer shall be promptly removed from the project site at the Contractor’s expense and disposed of in accordance with current applicable regulations.

500-1.14.6 Liner. The fiberglass within the Liner shall be non-corrosion (E-CR Glass) material and shall be free from tears, holes, cuts, foreign materials and other surface defects. Its glass fibers must extend in a longitudinal direction to insure no longitudinal stretching during the pull-in process.

1. The Liner shall be constructed to withstand installation pressures as required by Manufacturer’s recommendations.

2. The Liner shall be manufactured to a size that when installed will tightly fit the internal circumference and the length of the original pipe. The tube be able to stretch to fit irregular pipe sections and negotiate bends of up to 20 degrees and shall have sufficient strength to bridge missing pipe sections, with the use of a canvas sleeve if necessary.

3. Liner shall be constructed in accordance with ASTM F2019. This construction insures that the liner can be pulled in place using its own glass construction design without the aid of additional filler materials inserted into the liner. The tube shall consist of at least two separate tubes made of corrosion resistant (E-CR) glass fibers. The glass fibers shall extend in a longitudinal direction to ensure no longitudinal stretching during the pull-in process. The tube shall be impregnated with the aid of a vacuum process to insure no air enters the resin. A vacuum bath impregnation is prohibited.

4. Interior and exterior plastics shall be styrene resistant to protect and contain the resin used in the Liner.

5. The exterior plastic shall be ultra violet light resistant and translucent to allow visual
inspection of the impregnation of the resin within the glass fibers.

6. The wall color of the interior pipe surface of CIPP after installation shall be a light reflective color so that a clear detailed examination with CCTV inspection may be made.

7. The nominal Liner wall thickness shall be constructed to the nearest 0.5mm increment.

500-1.14.7 Resin. The resin used to impregnate the Liner shall produce a cured liner pipe resistant to shrinkage, corrosion, and abrasion and shall have a proven resistance to municipal wastewater.

1. The resin shall be a chemically resistant UV cured isophthalic polyester resin or vinyl ester resin (as determined by the Engineer). When cured the resin/liner system shall meet the structural and chemical resistance requirements of ASTM F2019. No resin fillers are to be allowed.

500-1.14.8 Structural Requirements.

1. The thickness of each Liner installed shall be determined using calculation methods that are consistent with applicable ASTM’s. The Contractor shall submit stamped and signed designs prior to the installation of any Liner. The designs shall include a step by step calculation that shows all equations, defines all variables, lists all assumptions, and clearly indicates all values used for the design.

2. The long term (50 year extrapolated) Creep Retention Factor of the initial design flexural modulus as determined by ASTM D790 test method shall be set to 50%.

3. The cured in place pipe material (CIPP) shall conform to the structural properties as listed below.

<table>
<thead>
<tr>
<th>MINIMUM PHYSICAL PROPERTIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall Thickness: ASTM D2122 per ASTM F2019</td>
</tr>
<tr>
<td>Flexural Modulus of Elasticity ASTM D-790 (short term): 725,000 psi</td>
</tr>
<tr>
<td>Flexural Strength ASTM D-790: 6,500 psi</td>
</tr>
</tbody>
</table>

4. The required structural CIPP wall thickness shall be based as a minimum on the physical properties indicated above, the Design Equations in the appendix of ASTM F1216, and the following design parameters:

Design Safety Factor: 2.0
Creep Retention Factor: 60% (UV fiberglass liners typically tests at >65%)
Ovality: 2%
Modulus of passive soil reaction: 500 psi
Groundwater Depth: Same as soil cover unless stated otherwise by the Engineer in writing.
Soil Depth (above the crown): See Plan
Poisson’s ratio: 0.3
Live Load: H-20 (Highway Loading)
Soil Load: 120 lb/cu. Ft.
Pipe Condition: Fully Deteriorated
Minimum service life 50 years

500-1.14.9 Construction Requirements.

1. Preparatory Work.
   a. The Contractor shall verify the lengths of pipe to be relined and the inside diameters.
   b. The fabric tube shall be fully impregnated with resin (wet-out). The impregnation equipment shall contain devices to secure a proper distribution of the resin. Following the impregnation, the fabric tube shall be exposed to a resin thickening procedure. Certification documentation concerning date, type of resin (manufacturer, trade name and lot number), resin calculation, and volume of resin used shall be attached to the impregnated fabric tube.

2. Pipe Liner Installation.

   The CIPP Liner shall be installed in the host pipe per the manufacturer’s specifications as submitted in these Specifications.

   CIPP installation shall be in accordance with applicable ASTM F2019 and the following:

   a. Final Cleaning and Inspection -- The existing host pipe shall be cleaned just prior to insertion of the Liner. A maximum of one hour may elapse between this final cleaning/flushing pass and the insertion of the Liner. After the cleaning is complete, a recorded video inspection shall be made to verify the cleanliness of the line, shall be available to the Engineer upon request.

   b. Liner protection – Prior to inserting the Liner, a plastic sheet 10 mil thick will be pulled into the host pipe to protect the Liner from damage as the Liner is pulled in.

   c. Liner Insertion – The Liner shall be pulled-in through an existing manhole or approved access point and fully extend to the next designated manhole or termination point. The pulling speed shall not exceed 15 ft/min. Care shall be exercised not to damage the tube during the pulling phase.

   d. Liner Inflation – The Liner shall then be inflated with air with sufficient pressure to hold the Liner tight to the host pipe wall.

   e. Liner Inspection – The Contractor will video record the Liner prior to commencement of the curing process, and make the recording available to the
Engineer upon request. The light-curing device must have two cameras to ensure that 100% of the liner is inspected and one camera on the front of the light train and one camera on the back of the light train.

3. Curing for Ultraviolet Light.

CIPP curing shall be in accordance with applicable ASTM F2019, with the following modifications:

a. The ultraviolet curing lamps shall operate in a sufficient frequency range to insure the curing of the resin.

b. The light curing device must have two cameras to ensure that 100% of the liner is inspected and one camera on the front of the light train and one camera on the back of the light train.

c. Curing logs: Include liner manufacturer recommended curing citations for each submittal. Store electronically on data logger. Submit printed copy with Post CCTV. Logged data shall include, but not be limited to, the curing speed (feet per minute), light source (number of lamps, intensity and wattage), inner air pressure (psi), and curing temperatures (degrees Fahrenheit) per unit time over length of liner.

4. Finished Pipe Liner.

a. The cured Liner shall be continuous over the entire length of an installation run and be free of material defects. The lining shall be impervious and free of any leakage from the pipe to the surrounding ground or from the ground to inside the lined pipe.

b. Any defect, which will or could affect the structural integrity, strength, capacity, or future maintenance of the installed Liner, shall be repaired at the Contractor’s expense, in a manner approved by the Engineer.

c. Both ends of the cured Liner shall be cut flush at the inlet and outlet points in the manhole, and sealed with an epoxy or resin mixture compatible with the Liner/resin system, providing a watertight seal. Sealing material and installation method shall be submitted and approved by the Engineer prior to start of construction. Hydraulic cements and quick-set cement products are not acceptable.

5. Internal Reinstatement of Side Sewers.

After the Liner has been properly cured, the Contractor shall internally reinstate the existing side sewer laterals. Internal reinstatement of laterals shall be performed by a qualified individual with experience in successful internal lateral cuttings. The cutting
device shall produce a neat, clean and smooth opening of at least 95% of the existing side sewer lateral circumference.


Because there is negligible shrinkage of UV fiberglass liners after curing, and because the liners are of such strength that roots are not able to affect them, no lateral seals are required to be made except when there is damage to the lateral itself. Only those laterals identified by the Engineer as defective and needing seals will be sealed by the contractor.

7. Final Acceptance.

a. The Contractor shall perform a CCTV inspection in accordance with ASTM F2019, Section 7.3 after installation of the CIPP Liner and reconnection of the active side sewer laterals. The quality of the post-installation CCTV inspection shall be held to the same standards as the preinstallation CCTV inspection.

b. The Contractor shall submit to the Engineer, for acceptance and approval, two (2) copies of unedited post-installation CD/DVDs and associated curing reports for each sewer main segment within 10 working days of the Liner installation. No more than one sewer main segment shall be included on a post-installation Inspection CD/DVD or curing report. Sampling and Laboratory Testing The physical properties of the installed CIPP Liner shall meet the minimum physical properties per ASTM 2019.

***ADD SUBSECTION 500-1.15 TO THE “GREENBOOK”, TO READ AS FOLLOWS***

500-1.15 Chemical Sealing Installation

500-1.15.1 General. Joints showing visible leakage or joints that have failed the joint test as specified in Subsection 208-2.3.3 shall be sealed with chemical sealing materials as specified in Subsection 208-2.3

500-1.15.2 Equipment. All equipment required to perform the work shall be subject to approval by the Engineer. The basic equipment shall consist of a closed-circuit television system as specified in Section 500-1.1.5, necessary chemical sealant containers, pumps, regulators, valves, hoses, etc., and joint sealing packers for the various sizes of sewer pipes. The packer shall be cylindrical and have a diameter less than the pipe size and have a diameter less than the pipe size and have cables attached at each end to pull it through the line. The packer device shall be constructed in a manner to allow a restricted amount of sewage to flow. Generally, the equipment shall be capable of performing the specified operations in sewers where flows do not exceed the maximum depth of flow for joint testing/sealing as specified in Subsection 500-1.16.

500-1.15.3 Conditions Required for Joint Sealing. Sealing shall not be performed in pipe which has roots, debris on the invert, corrosion at the crown, excessive roughness, cracks, breaks,
misalignments, or other conditions which prevent the inflatable sleeves of the packer from making continuous contact with sound pipe on each side of the joint.

**500-1.15.4 Joint Sealing Procedure.** Joint sealing shall be accomplished by forcing chemical sealing materials into or through faulty joints by a system of pumps, hoses, and sealing packers. Jetting or driving pipes from the surface that could damage or cause undermining of the pipe lines shall not be allowed. Uncovering the pipe by excavation of pavement and soil which could disrupt traffic, undermine adjacent utilities and structures, and cause further damage to the pipe lines being repaired shall not be allowed. The packer shall be positioned over the faulty joint by means of a measuring device and the closed-circuit television camera in the line. The procedure used by the Contractor for positioning the packer shall be accurate to avoid over-pulling the packer and thus not effectively sealing the intended joint. The packer ends shall be expanded using controlled pressure. The expanded ends shall seal against the inside periphery of the pipe to form a void area at the faulty joint, now completely isolated from the remainder of the pipe line. Into this isolated area, sealant materials shall be pumped through the hose system at controlled pressures which are in excess of groundwater pressures. The pumping unit, metering equipment, and the packer device shall be designed so that proportions and quantities of materials can be regulated in accordance with the type and size of the leak being sealed. Pumps, fittings and hoses shall be designed to transport a high viscosity material, shall be capable of supplying an uninterrupted continuous flow of the sealing material at rates of between one-quarter and 10 gallons per minute at a minimum pressure of 60 psi, for a continuous period of up to 10 minutes.

**500-1.15.5 Joint Sealing Verification.** Upon completing the sealing of a pipeline reach, all loose and residual sealing material shall be removed from the interior of the pipe using high velocity hydro-cleaning equipment. The sealed joints shall be left “flush” with the existing pipe surface. All joints sealed shall then be tested as specified Subsection 208-2.3.3. Joints that fail to meet the specified test criteria shall be resealed and retested until the test criteria can be met in order to receive payment.

**500-1.15.6 Records.** Complete records shall be kept of joint sealing performed in each manhole section (reach). The records shall identify the pipeline reach in which the sealing was done, the location of each joint sealed, and the joint sealing verification results as specified in Subsection 208-2.3.3.

A final “check-out” video inspection shall be performed after the completion of all grouting and pressure testing operation in the pipe.”

**500-1.15.7 Guarantee.** All sewer pipe joint sealing work performed shall be guaranteed against faulty workmanship and/or materials for a period of one year after the completion and acceptance of the work.

Prior to the expiration of the guarantee period, but no more than 10 months after completion of work, an initial retest area consisting of specific manhole sections shall be selected by the Engineer/Owner. Manhole sections to be retested shall be randomly selected throughout the project area and shall be considered representative of the majority of the sealing work originally performed. The initial retest area shall consist of 5 percent of the linear feet contained in the original project.
Within the initial retest area, the Contractor shall retest all previously sealed joints as specified. Any joints failing the retest shall be resealed. If the failure rate of the retested joints is less than 5 percent of the joint retested, the work shall be considered satisfactory and no future testing will be required.

If, in the initial retest area, the failure rate of the retested joints exceeds 5 percent of the joints retested, an additional retest area of equivalent size shall be selected and all previously sealed joints shall be retested. This additional testing and sealing, if necessary, will continue until a failure rate of less than 5 percent is met.

Should as much as 20 percent of the original project be retested and fail to meet the 5 percent requirement, the Contractor will be required to mobilize to provide the same number of crews as utilized in the original work in order to complete the entire project in a timely manner. In this event all joints previously sealed shall be tested and all joints failing a test shall be properly sealed.

The cost for retesting should be included in the original project pertinent bid items. No compensation shall be provided for resealing (grouting) joints that fail.

500-1.15.8 Payment.

500-1.15.8.1 Chemical Sealing Preparation. Chemical sealing preparation will be paid for at the unit price bid prepared for chemical sealing.

The unit price in the Bid shall include full compensation for furnishing all labor, materials, tools and equipment and for doing all the work involved prior to chemical sealing, including sewer-line cleaning, sewer flow control, television inspection and pipe joint testing; and doing whatever else is appurtenant to chemical sealing preparation as shown on the Plans and Specifications.

500-1.15.8.2 Chemical Sealing. Chemical sealing of pipe joint will be paid for at the unit price bid. Contract shall furnish detailed log documenting the exact location of each joint sealed and final test results. The unit price in the Bid shall include full compensation for furnishing all labor, materials, tools and equipment and for doing all the work involved in joint sealing, including sealing verification, residual sealing material removal, records keeping; compliance with guarantee requirements, and doing whatever else is appurtenant to chemical sealing preparation as shown on the Plans and Specifications.

***ADD SUBSECTION 500-1.16 TO THE “GREENBOOK”, TO READ AS FOLLOWS***

500-1.16 Sewer Flow Control

500-1.16.1 General. When depth of flow in the pipe upstream of the manhole section being worked, is above the maximum allowable for television inspection, joint testing and/or sealing; or when necessary to accomplish the specified sewer line rehabilitation; the flow shall be reduced to the required level by plugging or blocking of the flow, and by pumping the flow around the section being worked.

Depth of flow shall not exceed that shown below for the respective pipe sizes as measured in the...
manhole when performing television inspection, joint testing and/or sealing.

### Maximum Depth of Flow in Inches

<table>
<thead>
<tr>
<th>Pipe Sizes in Inches</th>
<th>Television Inspection</th>
<th>Joint Testing/Sealing</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>1.20</td>
<td>1.50</td>
</tr>
<tr>
<td>8</td>
<td>1.60</td>
<td>2.00</td>
</tr>
<tr>
<td>10</td>
<td>2.00</td>
<td>2.50</td>
</tr>
<tr>
<td>12</td>
<td>3.00</td>
<td>3.00</td>
</tr>
<tr>
<td>15</td>
<td>3.75</td>
<td>4.50</td>
</tr>
<tr>
<td>18</td>
<td>4.50</td>
<td>5.40</td>
</tr>
<tr>
<td>21</td>
<td>5.25</td>
<td>6.30</td>
</tr>
<tr>
<td>24</td>
<td>6.00</td>
<td>7.20</td>
</tr>
<tr>
<td>27</td>
<td>8.10</td>
<td>9.45</td>
</tr>
<tr>
<td>30</td>
<td>9.00</td>
<td>10.50</td>
</tr>
<tr>
<td>33 and up</td>
<td>30% of Pipe Diameter</td>
<td>35% of Pipe Diameter</td>
</tr>
</tbody>
</table>

Amount of the flow allowed in sewer line to be rehabilitated by slip-lining or other rehabilitation methods shall be in accordance with the manufacturer’s recommendations and as approved by the Engineer.

### 500-1.16.2 Plugging, Blocking, and Pumping

When sewer flow control is required, the Contractor shall furnish, install, and operate pumps, plugs, conduits, and other equipment to divert the flow of sewage around the pipeline reach in which work is to be performed. The plug shall be so designed that all or any portion of the sewage can be immediately released from the ground surface. The plug shall be provided with a tag line. The pumping system shall be of sufficient capacity to handle wet-weather flow for the project area. The Contractor may request flow data, if available, from the Agency. The Agency does not guarantee the accuracy or reliability of the data. If pumping is required on a 24-hour basis, engines shall be equipped in a manner to keep noise to a minimum. Standby pumps shall be provided as required. Pumping shall be done by the Contractor in such a manner as will not damage public or private property or create a nuisance or health menace. Pumped sewage shall be conveyed in an enclosed hose or pipe and shall be returned to the sanitary sewer system. Sewage shall not be allowed to free flow in gutters, street or over sidewalks, etc. nor shall any sewage be allowed to flow into the storm inlets or conduits. After the work has been completed, flow shall be restored to normal.

### 500-1.16.3 Payment

Payment for sewer flow control will be included in the price paid for other work.
SECTION 500-2 MANHOLE AND STRUCTURE REHABILITATION.

***REPLACE SUBSECTION 500-2.1 OF THE “REGIONAL STANDARDS” WITH THE FOLLOWING***

500-2.1 General. This section covers repairs and rehabilitation of existing manholes and appurtenances. Included are the sealing of manhole walls; manhole covers, and annular spaces around pipes entering and leaving manholes; repairing and rebuilding bases; elimination of leakage at junction of walls and base and at wall and frame; replacement of cast iron frames and/or covers; rebuilding manhole walls; and other related miscellaneous work.

Sewer flow control, as necessary, shall be performed in accordance with Subsection 500-1.16.

All manhole rehabilitation materials shall be submitted to the Engineer and are subject to the approval of the Engineer. The manufacturer shall provide certification that all materials proposed for use are compatible with one another. All materials that shall contact the sewer environment shall be specifically designed for chemical resistance to the sewer environment. The manufacturer shall certify that the materials are resistant to the sanitary sewer environment and to the following: 5% nitric acid, 5% sulfuric acid, 10% phosphoric acid, 100% ASTM fuel C, 100% vegetable oil, 0.1% detergent, 0.1% soap, 5% sodium hydroxide, and 1% ferric chloride.

Each manhole that is designated for rehabilitation shall be reconstructed as follows:

1) The invert channel shall be reconstructed to provide a smooth transition between different size pipes and bends. The channel width and height shall be at a minimum equal to the diameter of the largest pipe.

2) The ledge shall be sloped to prevent ponding.

3) Voids at pipe connections shall be patched.

4) Abandoned stub-outs shall be plugged.

5) Cracks and deteriorated joints in the manhole shall be sealed.

6) Manhole steps are not allowed. Existing manhole steps shall be removed (cut and ground flush to the interior wall of the manhole) prior to manhole rehabilitation.

7) The frame and cover shall be adjusted such that the cover seats properly into the frame and there is no “rocking”.

8) If the manhole cover were depressed below the adjoining surface, all vent holes shall be
plugged.

9) Manholes in off-road areas shall have bolt down covers with neoprene gaskets.

After performing the above work, each manhole shall be vacuum tested in accordance with Subsection 303-9.2. If the rehabilitated manhole does not pass the vacuum test, the Contractor, at no added cost to the Agency, shall perform any and all work necessary to satisfy the testing requirement. The Contractor may choose, at no additional cost to the Agency, to replace rather than rehabilitate a manhole. This is permissible on approval of the Engineer. Payment for manholes replaced in lieu of rehabilitation shall be made at the unit cost for manhole rehabilitation. All casting shall be salvaged and returned to the Agency. The manholes designated for rehabilitation are shown on the Plans.

**500-2.2 Leakage at Frames and Covers**

**500-2.2.1 Replace Cover**

***ADD THE FOLLOWING TO THE END OF SUBSECTION 500-2.2.1 OF THE “REGIONAL STANDARDS”***

Manholes located in off-road areas shall be drilled and taped to construct a bolt down cover with neoprene gasket similar to those specified in Subsection 303-9.12. The Contractor has the option of replacing the cover with the type specified in Subsection 303-9.12.

***ADD NEW SUBSECTIONS 500-2.3 AND 500-2.4 TO THE “REGIONAL STANDARDS”, TO READ AS FOLLOWS***

**500-2.3 Reconstructing Manhole Base.** When the invert and shelf of the manhole consists of built-up mortar or grout, with or without bricks, and groundwater enters the manhole throughout around its periphery, the Contractor shall completely remove the shelf and channels. If the concrete base is found to be structurally sound, it shall be thoroughly cleaned and a new invert or floor built, complete with channels, in accordance with the requirements for new manholes in Subsection 303-9. When an existing stub-out, poorly plugged or capped outside the manhole, permits groundwater to enter, it shall be plugged by inserting a wooden bulkhead one foot up the pipe and the pipe filled with cement grout between the bulkhead and the inside face of the manhole.

Other methods and materials for sealing the joint at the junction of manhole walls and base may be used by the Contractor with prior approval by the Engineer.

**500-2.4 Sealing of Joint Between Cast Iron Frame and Manhole Wall.** This repair consists of removing and replacing the manhole frame and the grade rings. This shall be accomplished by excavating as necessary, lifting off the frame and grade rings, 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 replacing the existing frame and grade rings as specified for new manholes in Subsection 303-9.
500-2.5 Sealing Manhole Walls. *See Subsection 500-2.3 of “Regional Standards”*

500-2.6 Remove and Replace Existing Sewer Structure. *See Subsection 500-2.4 of “Regional Standards”*

500-2.7 Testing. *See Subsection 500-2.5 of “Regional Standards”*

***ADD NEW SUBSECTION 500-2.8 TO THE “REGIONAL STANDARDS”, TO READ AS FOLLOWS***

500-2.8 Payment. Rehabilitation of manholes will be paid at the unit price for manhole rehabilitation listed in the Bid Schedule. Replacement where specified or shown shall be paid at the unit price for new manholes listed in the Bid Schedule. Where the Contractor replaces, by his choice, a manhole designated for rehabilitation it shall be paid at the unit price listed in the Bid Schedule for manhole rehabilitation.
SECTION 500-3  ANNULAR SPACE GROUTING.

-Page 498 of Greenbook-

500-3.1 Requirements

500-3.1.3 Planned Vents

***APPEND THE FOLLOWING AFTER THE FIRST PARAGRAPH OF SUBSECTION 500-3.1.3***

During grouting, the annular space shall be vented to the atmosphere by tapping the existing casing pipe at multiple locations not to exceed a maximum distance of one hundred (100) feet. Vents shall be a minimum dimension of six (6) inches diameter for purposes of releasing air and monitoring the grouting process to assure that the annular space is filled. Engineer shall approve procedure to verify that the annular space is completely filled.

If the casing pipe at the vent is filled with grout and grouting needs to continue upstream or downstream along the annular space, the Contractor shall temporarily seal the vents as required to hold the pressure and allow continued grouting. Temporary vent seals shall allow no more than one (1) cubic foot of grout to be released at any one vent.

Approved temporary methods of sealing vents include bolted plates fitting the outside dimensions of the casing pipe, or sandbags with additional weight as required to meet these requirements. Alternate methods of sealing vents are subject to the approval of the Engineer.

500-3.1.4 Materials

***APPEND THE FOLLOWING TO SUBSECTION 500-3.1.4.(c)***

7) Initial set will not be less than three (3) hours.
8) The slurry shall have a minimum density of 55 PCF, and a maximum of 60 PCF.
9) The material will not bleed or segregate.

500-3.1.7 Injection Procedure and Pressure

***REPLACE THE FIRST SENTENCE OF THE SECOND PARAGRAPH OF SUBSECTION 500-3.1.7 AS FOLLOWS***

Grouting shall not proceed without appropriate gauges in place and in working order. Provide one pressure gauge and recorder at the point of injection, and one pressure gauge at the grout pump.

500-3.1.8 Onsite Test

***APPEND THE FOLLOWING AFTER THE LAST PARAGRAPH OF SUBSECTION 500-3.1.7***

D64
The following items shall be observed as part of the grouting process:

1) Notify Engineer at least 24 hours in advance of grouting operations.

2) Place grout for a given pipeline segment between bulkheads. Place bulkheads at the ends of each pipeline segment to seal the annular space from sewer flow. Do not remove bulkheads until after grout has set.

3) Equip slipliner pipes with weirs to fill the pipes with water to prevent flotation during grouting operations.

4) Remove or control standing or running water in annular spaces to maintain the correct water ratio of the grout mixture. Grout the annular space by injecting grout from one end of the pipeline segment, allowing it to flow toward the other end. Vent the annular space to assure uniform filling of the void space.

5) Limit pressure on the annular space to prevent damage to the liner; do not exceed 5 psi. Regardless of the pressure, Contractor shall be solely responsible for any damage or distortion to slipliner pipe due to grouting. At the bulkhead opposite to the point of grouting, provide and monitor an open-ended high point tap or equivalent vent.

SECTION 500-5 ACCEPTANCE TESTING.

500-5.2 Leakage Testing

***ADD THE FOLLOWING TO THE END OF SUBSECTION 500-5.2 OF THE “REGIONAL STANDARDS”***

Groundwater levels in each sewer reach shall be measured prior to leakage testing. Measurements of groundwater will be made at the manholes and at other supplementary points as specified herein or otherwise directed by the Engineer. Hydrostatic pressure of the groundwater to be used in determining leakage test procedures will be calculated by the Contractor and approved by the Engineer.

500-5.4 Acceptance

***ADD THE FOLLOWING TO THE END OF SUBSECTION 500-5.4 OF THE “REGIONAL STANDARDS”***

Within the warranty period, where rehabilitation or replaced sewer, manholes and appurtenances are found leaking, or that subsequent failure of the pipeline has occurred, the Contractor shall promptly correct such failures in a manner approved by the Engineer and at no cost to the Agency.
***ADD NEW SUBSECTION 500-5.5 TO THE “REGIONAL STANDARDS”, TO READ AS FOLLOWS***

500-5.5 Payment. Acceptance testing is incidental to the rehabilitation work. Payment, therefore, is included in the price listed in the Bid Schedule for the work to be tested. Payment will be full compensation for furnishing all labor, materials, and equipment to complete the testing work, including services provided to aid the Agency in performing miscellaneous testing.
PART E
REGIONAL STANDARDS

SPECIFICATIONS

FOR

SANITARY SEWER REHABILITATION

NEILSON ST BACKLINE, THOUSAND OAKS BLVD BACKLINE, PORTLAND AVE BACKLINE, PERALTA AVE, SAN LORENZO AVE/WASHINGTON AVE, CAPISTRANO AVE, MIRAMAR AVE BACKLINE, THE ALAMEDA BACKLINE, ARLINGTON AVE BACKLINE, MICHIGAN AVE BACKLINE, ALAMO AVE BACKLINE, SAN DIEGO RD AND BACKLINE, SANTA BARBARA RD AND BACKLINE, SAN LUIS RD BACKLINE, HENRY ST BACKLINE, BERRYMAN ST AND BACKLINE, GRIZZLY PEAK BLVD AND BACKLINE, CYPRESS ST/BUENA AVE, ROSE ST, GRANT ST, EDITH ST, AND MILVIA ST BACKLINE

SPECIFICATION NO. 20-11352-C
"East Bay Communities"
City of Alameda
City of Albany
City of Berkeley
City of Emeryville
City of Oakland
City of Piedmont
East Bay Municipal Utility District (EBMUD)
Stege Sanitary District

REGIONAL STANDARDS
for Sanitary Sewer System Installation, Rehabilitation and Repair
June 30, 2016

Table of Contents

List of Abbreviations
1. Introduction ......................................................................................................................... 1
2. Background Information .................................................................................................. 1
3. Regional Standards Development ...................................................................................... 2
4. Future Standards Revisions and Reporting ....................................................................... 3

Figures
Figure 1. EBMUD Service Area, Satellite Boundaries, and Facilities ................................. 2

List of Attachments
Attachment A. Best Management Practices (BMPs) ............................................................ 5
Attachment B. Amendment to Green Book Standard Specifications ................................. 17
List of Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMIP</td>
<td>Asset Management Implementation Plan</td>
</tr>
<tr>
<td>ASTM</td>
<td>American Society for Testing and Materials</td>
</tr>
<tr>
<td>AWWA</td>
<td>American Water Works Association</td>
</tr>
<tr>
<td>BMP</td>
<td>Best Management Practice</td>
</tr>
<tr>
<td>CCTV</td>
<td>Closed Circuit Television</td>
</tr>
<tr>
<td>CD</td>
<td>Consent Decree</td>
</tr>
<tr>
<td>CIPP</td>
<td>Cured-In-Place Pipe</td>
</tr>
<tr>
<td>CLSM</td>
<td>Controlled Low Strength Material</td>
</tr>
<tr>
<td>EBC</td>
<td>East Bay Communities</td>
</tr>
<tr>
<td>EBMUD</td>
<td>East Bay Municipal Utility District</td>
</tr>
<tr>
<td>EPA</td>
<td>United States Environmental Protection Agency</td>
</tr>
<tr>
<td>GB</td>
<td>Green Book</td>
</tr>
<tr>
<td>HDPE</td>
<td>High Density Polyethylene</td>
</tr>
<tr>
<td>I/I</td>
<td>Inflow and Infiltration</td>
</tr>
<tr>
<td>LF</td>
<td>Linear Feet</td>
</tr>
<tr>
<td>MH</td>
<td>Manhole</td>
</tr>
<tr>
<td>MWWTP</td>
<td>Main Wastewater Treatment Plant</td>
</tr>
<tr>
<td>PE</td>
<td>Polyethylene</td>
</tr>
<tr>
<td>PSL</td>
<td>Private Sewer Lateral</td>
</tr>
<tr>
<td>RTSP</td>
<td>Regional Technical Support Program</td>
</tr>
<tr>
<td>SSO</td>
<td>Sanitary Sewer Overflow</td>
</tr>
<tr>
<td>UPC</td>
<td>Uniform Plumbing Code</td>
</tr>
<tr>
<td>VCP</td>
<td>Vitrified Clay Pipe</td>
</tr>
<tr>
<td>WWF</td>
<td>Wet Weather Facility</td>
</tr>
</tbody>
</table>
(PAGES 1 THROUGH 18 of REGIONAL STANDARDS HAVE BEEN OMITTED FROM SPECIFICATIONS)
AMENDMENT - TABLE OF CONTENTS

PART 1 – GENERAL PROVISIONS
2-5.2 Precedence of Contract Documents

PART 2 – CONSTRUCTION MATERIALS

201-6 CONTROLLED LOW STRENGTH MATERIAL (CLSM)
201-6.1 General and Quality Assurance
201-6.1.1 Cementitious Material
201-6.1.2 Mix Proportions
201-6.1.3 Strength and Density
201-6.1.4 Mixture
201-6.1.5 Native and Imported Soils
201-6.2 Mix Design
201-6.2.1 Submittals-Mix Design and Testing
201-6.3 Materials
201-6.4 Execution - Batching and Mixing, and Installation
201-6.4.1 Batching and Mixing
201-6.4.2 Installation

201-10 MANHOLES, CLEANOUTS AND APPURTENANT MATERIALS
201-10.1 Materials
201-10.1.1 Rock Base
201-10.1.2 Cement Mortar.
201-10.2 Manholes
201-10.2.1 Cast-In-Place Concrete Manholes
201-10.2.2 Pre-cast Manhole Sections
201-10.2.3 Manhole Bases
201-10.2.4 Plastic Pipe Connections
201-10.2.5 Manhole Extensions
201-10.2.6 Jointing Manhole Sections
201-10.3 Cleanouts
201-10.4 Lampholes
201-10.5 Appurtenant Materials
201-10.5.1 Pipe and Fittings
201-10.5.2 Pipe Stubouts for Future Sewer Connections
201-10.6.1 Sealing Manhole Walls
201-10.6.1 (a) Cement-Epoxy Mixtures
201-10.6.1 (b) Chemical Grout
201-10.6.1 (c) Polyurethane Coatings
201-10.6.1 (d) Modified Polyester/Polymorphic Coatings
201-10.6.1 (e) Epoxy Coating
201-10.6.1 (f) Fiberglass Liners
201-10.6.1 (g) HDPE Liners
201-10.6.1 (h) Cementitious Crystalline Waterproofing

207-19 POLYETHYLENE (PE) SOLID WALL GRAVITY PIPE
207-19.1 General

207-25 POLYETHYLENE (PE) LARGE DIAMETER (36 INCH DIAMETER OR GREATER) PROFILE WALL PIPE
207-25.1 General
207-25.2 Material Composition
207-25.3 Test Requirements
207-25.4 Marking
207-25.5 Dimensions

PART 3 – CONSTRUCTION METHODS

303-9 INSTALLATION OF MANHOLES, CLEANOUTS AND APPURTENANCES
303-9.1 General
303-9.1.a Structure Excavation and Backfill
303-9.1.b Rock Base
303-9.1.c Concrete Manhole Base
303-9.1.d Placing Precast Manhole Sections
303-9.1.e Manhole Channels
303-9.1.f Drop Manholes/Drop Connection Manholes
303-9.1.g Flexible Joints
303-9.1.h Pipe Stubouts for Future Sewer Connections
303-9.1.i Permanent Plugs.
303-9.1.j Manhole Extensions
303-9.1.k Manhole Frames and Covers
303-9.1.l Manhole over Existing Sewers
303-9.1.m Connection to Existing Manholes
303-9.1.n Special Manholes.
303-9.1.o Sewer Cleanouts
303-9.2 Structure Testing
303-9.2.a Vacuum Testing.
303-9.2.b Hydrostatic Testing

306-3 TRENCH EXCAVATION
306-3.1 General
306-3.5 Maximum Length of Open Trench
306-7 Prefabricated Gravity Pipe
306-7.4 Vitrified Clay Pipe (VCP)
306-7.4.4 Special Joints
306-7.8.2.1(e) Pressure Testing and Leakage Inspection
306-16 BUILDING SEWERS
306-16.1 General
306-16.1.1 Records to be Kept
306-16.2 Material

PART 5 – PIPELINE SYSTEM REHABILITATION

500-1 PIPELINE REHABILITATION.
500-1.1.5 Television Inspection
500-1.1.6 Sampling, Testing and Installation
500-1.1.7 Miscellaneous
500-1.1.7 a) Service Connections
500-1.2.6 Installation and Field Inspection
500-1.3 High Density Polyethylene (HDPE) Solid Wall Liner
500-1.3.1 General
500-1.4 Cured-in-Place Pipe Liner (CIPP) Liner
500-1.4.1 General
500-1.4.2 Material Composition and Testing

TABLE 500-1.4.2 (A)
CIPP Liner Minimum Flexural Requirements for Polyester Resin

500-1.4.4 Chemical Resistance
500-1.4.5 Installation
500-1.4.8 Repair and Rejection
500-1.4.9 Material Testing
500-1.4.10 Spill Prevention in Curing Process

500-1.5 Polyvinyl Chloride (PVC) Pipe Lining System

500-1.6 Pipe-Bursting Method
500-1.6.1 General
500-1.6.1.1 Preliminary Surface Inspection
500-1.6.2 Contractor Qualifications
500-1.6.2.1 Field Supervisory Qualifications
500-1.6.3 Contractor Submittals
500-1.6.3.1 Contractor Qualifications
500-1.6.3.2 Drawings and Documents

500-1.6-4 Materials
500-1.6.4.1 High Density Polyethylene (HDPE) Pipe
500-1.6.5 Pipe Joining for Sections of HDPE Pipe
500-1.6.6 Service Connection Materials
500-1.6.7 Sealing Connections at Manholes
500-1.6.8 Pipe Bursting Equipment
500-1.6.9 Execution of Work - General
500-1.6.10 Preparation of Work
500-1.6.11 Insertion of the HDPE Pipe
500-1.6.12 Service Reconnections
500-1.6.13 Testing and Acceptance

500-1.7 Deformed/Reformed HDPE Liner

500-1.9 External In-Place Wrap

500-1.10 Folded and Re-formed PVC Pipe Liner

500-1.12 Polyvinyl Chloride (PVC) Closed Profile Liner Pipe

500-1.13 Machine Spiral Wound Polyvinyl Chloride (PVC) Pipe Liner

500-2 MANHOLE AND STRUCTURE REHABILITATION.
500-2.1 General
500-2.2 Leakage at Frames and Covers
500-2.2.1 Replace Cover
500-2.2.2 Adjust Frame and Cover
500-2.2.3 Replace Frame and Cover
500-2.3 Sealing Manhole Walls
500-2.4 Remove and Replace Existing Sewer Structure
500-2.5 Testing

500-5 ACCEPTANCE TESTING
500-5.1 General
500-5.2 Leakage Testing
500-5.3 Miscellaneous Testing
500-5.4 Acceptance
Part 1 – GENERAL PROVISIONS
Section 2 – Scope and Control of Work

REPLACE SUBSECTION 2-5.2 WITH THE FOLLOWING:

2-5.2 Precedence of Contract Documents.

The principal contract specifications for this project are the "Standard Specifications for Public Works Construction, 2015 edition", commonly referred to as the Green Book. The Contractor shall note that the Green Book is not reproduced in this document, but is self-contained under separate cover and the Contractor shall obtain it separately.

The East Bay Communities Amendment to the Standard Specifications for Public Works Construction, 2015 edition contains modifications and additions to the Green Book that are specific to collection system work. These provisions shall take precedence over the Green Book.

If there is a conflict between any of the Contract Documents, the document highest in the order of precedence shall control. The order of precedence from highest to lowest, shall be as follows:

a) Permits issued by jurisdictional/regulatory agencies
b) Change Orders and Supplemental Agreements; whichever occurs last
c) Contract/Agreement
d) Addenda
e) Bid/Proposal
f) Special Provisions
g) Plans (Project)
h) East Bay Communities Amendment to the Standard Specifications for Public Works Construction, 2015 edition (Green Book) and 2015 edition of the Green Book (if Agency uses the Green Book as its Standards specifications)
i) Standard Plans and Details (Agency)
j) Standard Specifications (Agency)
k) Reference Specifications
Part 2 – CONSTRUCTION MATERIALS

REPLACE SECTION 201-6 WITH THE FOLLOWING:

201-6  CONTROLLED LOW STRENGTH MATERIAL (CLSM).

201-6.1 General and Quality Assurance.

201-6.1.1 Cementitious Material. CLSM shall be composed of a cementitious material, water and suitable native or imported soils as described in this section.

   The cementitious materials shall be Portland cement. Fly ash may be substituted for cement provided the requirements of this section are met.

201-6.1.2 Mix Proportions. The appropriate CLSM mix proportions shall be determined by preparing test batches and testing trial cylinders in accordance with 201-6.2.

201-6.1.3 Strength and Density. CLSM shall have an unconfined compressive 28 day strength from 50 psi to a maximum of 150 psi and a density of 110 to 130 pounds per cubic foot.

201-6.1.4 Mixture. The mixture shall have a consistency such that the CLSM completely fills the space between the pipe and the excavated trench walls without bleeding or segregation of soil materials.

   The CLSM mixture shall contain no particles larger than 3 inches.

201-6.1.5 Native and Imported Soils:

   The soil shall be free of organic impurities.

   The amount of material passing a #200 sieve shall not exceed 30 percent.

   The plasticity index of the soil shall not exceed 3. The sand equivalent of the soil shall be at least 15. For native material with a sand equivalent between 10 and 15, approval shall be dependent on production and successful testing of a sample batch of CLSM.

During full-scale CLSM placement, the Engineer will take samples and perform tests to determine compliance with the specified unconfined compressive strength requirements.

201-6.2 Mix Design. The design of the CLSM mix shall be the responsibility of the Contractor, and shall be subject to review and approval by the Engineer before a full-scale field mix is used. Mix shall result in a final product that meets the requirements of this section.

201-6.2.1 Submittals - Mix Design and Testing. CLSM mix shall be designed, in accordance with ASTM D4832-02 Standard Test Method for Preparation and Testing of Controlled Low Strength Material Test Cylinders. The CLSM used in test cylinders shall be prepared using the same equipment proposed for full-scale batching and mixing.

   The testing laboratory shall submit certified copies of all laboratory trial mix reports to the Engineer.

   CLSM shall not be used prior to the Engineer's review of test reports and approval of the mix design.

   The minimum cement content for the mix design shall be 3 percent by dry mass of the soil. Cementitious fly ash (Class C or F) may be used in the mix provided the strength and consistency requirements in 201-6.1 are met.

   Air entraining admixtures may be used in the mix provided the strength and consistency requirements in 201-6.1 are met.

   The CLSM shall be sampled according to ASTM D5971.

   The following tests shall be conducted on the native soils proposed for use in preparing CLSM: ASTM D422 and ASTM D4318.

   The following tests shall be conducted for each CLSM trial batch: ASTM D4832, ASTM D6023, ASTM D6024.

   The Contractor shall submit the results of the laboratory testing program and the selected design mix for full-scale field production for review and approval by the Engineer. After acceptance, the batch and mix process or native soil source material shall not be changed without submitting new test information.
The Contractor shall provide a submittal showing the proposed methods to support the pipe during CLSM placement.

The Contractor shall provide a submittal showing the proposed methods to prevent pipe flotation during CLSM placement.

The Contractor shall provide a submittal detailing the proposed batching and mixing process including the following:

The proposed equipment and methods to process native soils into source material in compliance with 201-6.1.

The proposed staging and batch plant mixing areas relative to the work areas where the CLSM will be placed.

The proposed means of transport for mixed CLSM material from the batching and mixing area to the work where the CLSM will be placed.

201-6.3 Materials.

Cement shall conform to ASTM C150, Type II.

Cementitious fly ash (Class F or C) may be used in the mix provided that the strength and consistency requirements in 201-6.1 are met. The fly ash shall conform to ASTM C618 and shall not contain more than 3% carbon (low).

Air entraining admixtures may be used in the mix provided that the strength and consistency requirements in 201-6.1 are met.

Native soils used in the CLSM mix shall be predominantly granular and meet the requirements of 201-6.1.

Water shall be free from oil, salts and other impurities that would have an adverse effect on the quality of the CLSM.

201-6.4 Execution - Batching and Mixing, and Installation.

201-6.4.1 Batching and Mixing: Batch and mix the CLSM in the field with the processed native soils similar to that used in the trial mix program.

201-6.4.2 Installation:

Use sufficient shores or other supports to prevent soil from caving onto pipe. Remove soil fallen into trench before placing CLSM.

CLSM shall be placed on one side of the pipe and allowed to flow under until it is seen on the other side.

The CLSM shall be brought uniformly to the elevation as shown on the drawings.

Place CLSM between the trench bottom and 0.15 D above the bottom of the pipe as part of a single lift, where D is the diameter of the pipe.

The CLSM shall be placed so there is complete contact between the pipe and excavated pipe trench walls.

Prevent CLSM from entering bell holes before joint coating and testing are complete.

If CLSM is placed near a joint before application and testing of joint coating, place a blanket or cover over joint to prevent CLSM spatter onto joint area.

The support materials used to haunch the pipe and contain the CLSM during placement shall not exceed the compressive strength of the CLSM.

The Contractor shall take the necessary measures to prevent flotation of the pipe during CLSM placement.

CLSM shall not be placed when the air temperature is below 4°C (40°F).

Allow CLSM to set before placing backfill above CLSM.

No equipment or traffic shall be allowed on the CLSM until the surface of the CLSM will withstand the weight of the equipment or traffic without displacement or damage. Suitability for load applications shall be determined by ASTM D6024.

If necessary to prevent displacement or damage, provide steel trench plates that span the trench or other means that prevent equipment or traffic contact with CLSM.
ADD NEW SUBSECTION 201-10 TO READ AS FOLLOWS:

**201-10 MANHOLES, CLEANOUTS AND APPURTEINANT MATERIALS.**

Material quality, the manufacture process, and the finished sections shall be subject to the Engineer’s inspection and approval. Such inspection may be made at the manufacture place and/or on the job site after delivery. The materials shall be subject to rejection at any time for failure to meet any of the Specification requirements even though samples may have been accepted as satisfactory at the manufacture place. Materials rejected after delivery to the job site shall be marked for identification and shall be removed at once from the job site. All materials damaged after delivery and prior to project acceptance by City shall be rejected, even if installed. The Engineer’s judgment on the materials shall be final. The Contractor may attempt to make acceptable repairs on installed material(s), if the Engineer so agrees. However, the Engineer’s judgment on the repairs’ acceptability will be final. Unsatisfactory material shall be removed and replaced with satisfactory material entirely at the Contractor’s expense. The Engineer may accept a certification indicating compliance with the specifications in lieu of inspection.

### 201-10.1 Materials.

#### 201-10.1.1 Rock Base.  
Rock base shall conform to the requirements of 200-1.2 and shall be the ¾” inch mix according to Table 200-1.2 (A).

#### 201-10.1.2 Cement Mortar.  
Cement mortar shall conform to the requirements of 201-5.

#### 201-10.2 Manholes

**201-10.2.1 Cast-In-Place Concrete Manholes.** Materials used in cast-in-place concrete manholes shall be as shown on the plans and in accordance with the applicable requirements of 201.

**201-10.2.2 Pre-cast Manhole Sections.** Pre-cast manhole sections, where not otherwise modified in the Plans, shall conform to ASTM C478 and meet the following requirements:

a. The wall thickness shall not be less than 5 inches.

b. All sections shall be fully cured and shall not be shipped nor subjected to loading until the design compressive strength has been reached.

c. Pre-cast base sections shall have the base slab integral with the sidewalls. Pre-cast base sections may only be used if the invert plan and base alignment of the sewer connections exactly match the field-measured angles between the connecting sewers.

**201-10.2.3 Manhole Bases.** Materials used in cast-in-place concrete manhole bases shall be in accordance with the applicable requirements of Section 201. At the Contractor’s option and with the Engineer’s approval, pre-cast base sections with integral floor conforming to ASTM C478 may be used.

**201-10.2.4 Pipe Connections.** Pipe connections to manholes shall have a rubber waterstop tightly banded to the pipe and cast into the manhole base. Banding materials shall be 316 stainless steel or other approved corrosion resistant materials secured with Type 316 stainless steel nuts and bolts. See Section 500-1.6.7, Sealing Connections at Manholes, for HDPE pipe.

**201-10.2.5 Manhole Extensions.** Concrete grade rings for extensions shall be a maximum of six inches thick. In general, manhole extensions will be used on all manholes in roads, streets or other locations where a subsequent change in existing grade may be likely. Extensions will be limited to a maximum height of 12inches.

**201-10.2.6 Jointing Manhole Sections.** Male and female joints of manhole sections shall be sealed with a round rubber "O" ring gasket or a preformed flexible joint sealant. The "O" ring shall conform to ASTM C443. The preformed flexible joint sealant shall conform to Federal Specifications SS-S00210, and shall be Kent Seal No. 2 as manufactured by Hamilton-Kent; Ram-Nek as manufactured by K. T. Snyder Company; or equal. The size of the preformed joint sealant shall be as recommended by the manufacturer of the pre-cast manhole sections

**201-10.3 Cleanouts.** Cleanouts shall be as shown on the Plans or the Standard Details and shall be the same material type as approved for use in main or building sewer construction.

**201-10.4 Lampholes.** Lampholes shall be as shown on the Plans or the Standard Details and shall be the same material type as approved for use in main sewer or building connection sewer construction.
201-10.5 Appurtenant Materials.
201-10.5.1 Pipe and Fittings. Pipefittings, including material for drop connections at the manhole, shall be the type and dimensions as shown on the Plans or Agency Standard Details, as applicable, or as specified in these specification amendments.

201-10.5.2 Pipe Stubouts for Future Sewer Connections. Pipe stubouts shall be the same type as approved for use in lateral, main, or trunk sewer construction. Strength classifications shall be same class as in adjacent trenches. Where there are two different pipe classes at a manhole, the higher strength pipe will govern strength classification. Rubber-gasketed watertight plugs shall be furnished with each stub-out and shall be adequately braced against all hydrostatic or air pressures.

201-10.6.1 Sealing Manhole Walls. Manhole walls shall be sealed where shown or specified, or as directed by the Engineer. Sealing of the manhole walls shall be accomplished by any of the methods specified below:

201-10.6.1.a Cement-Epoxy Mixtures. Openings, cracks, and deteriorated joints in manhole walls shall be repaired and sealed by utilizing cement-epoxy mixtures manufactured for this purpose, such as those manufactured and/or supplied by Standard Dry Wall Products; Water-Wastewater Products & Systems, Inc.; IPA Systems, Inc.; Stonehard, Inc.; or approved equal.

201-10.6.1.b Chemical Grout. Openings, cracks, and deteriorated joints in manhole walls shall be repaired and sealed using chemical grout and applicable procedures specified for sewer system rehabilitation.

201-10.6.1.c Polyurethane Coatings. Sprayable polyurethane coating shall be used to seal manhole walls. The coating shall be a high-build polyurethane specifically formulated for use in a sewer system environment. The minimum thickness of the dry coating shall be 125 mils.

201-10.6.1.d Modified Polyester/Polymeric Coatings. Spray-applied modified polyester/polymeric resin shall be used to seal manhole walls. The coating shall be a two-component, 100% solids system. Prior to applying the prime coat, the manhole surface shall be sandblasted or hydroblasted and properly dried.

201-10.6.1.e Epoxy Coating. Sprayable or brushable epoxy coatings may be used to seal manhole walls. The coating shall be a high-build epoxy, Mainstay DS-5 or approved equal, specifically formulated for use in the sewer system and applied in accordance with manufacturer's recommendations and guidelines and at 50-125 mils thickness in one or two coats. Prior to coating, the manhole walls shall be thoroughly sandblasted or hydroblasted and cleaned as recommended by the manufacturer to ensure complete coverage and bonding. Openings and cracks larger than 1/8 inch in the manhole walls shall be filled with mortar, Mainstay ML-72 or ML-72F, or approved equal, at one-half to one inch thickness, prior to trimming and applying the epoxy coating.

201-10.6.1.f Fiberglass Liners. Existing manhole walls shall be thoroughly sandblasted and cleaned or primed as recommended by the materials manufacturer to ensure complete coverage and bonding. Openings and cracks larger than 1/8 inch in the manhole walls shall be filled with mortar prior to priming and applying the fiberglass.

   i) Factory-Manufactured Fiberglass Liners. Manhole liners shall be made of fiberglass reinforced plastic (FRP), having an inside diameter of not less than 42 inches. Manhole liners shall meet the requirements of ASTM D3753. The liner shall be installed in accordance with manufacturer's recommendations including removal of the existing cone, grouting of the annular space between the liners and existing manhole walls, rebuilding or replacing the cones, backfilling, installing steps, and installing cast iron frames and covers.

   ii) Field-Fabricated Fiberglass Liners. Manhole liners shall be field-fabricated by applying glass fibers and resin to the manhole walls. The completed lining thickness shall be not less than 1/4 inch at any location.
HDPE Liners. Lining manufacturer shall be GSE “Studliner”, GU-International AGRU "Suregrip" or equal. Polymer mortar shall consist of a primer if recommended by the manufacturer and a liquid binder and a dry aggregate mixed together to make a mortar of consistency as required for the application. The mortar shall be designed for application to vertical or overhead surfaces and must be accepted by the lining manufacturer. The liquid binder shall be chemical and oil resistant, stress relieved, low modulus, moisture insensitive, two-component epoxy-resin compound. The consistency shall be similar to lightweight oil for proper mixing with aggregate. Material shall conform to ASTM C881, type 3, Grade 1, Sika Corporation Sikadur 22 Lo-Mod Series or equal.

i) HDPE lining, joint strips and angle strips (hereinafter collectively referred to as "lining") shall be made from minimum 97 percent virgin high density polyethylene (HDPE). Color shall be gray.

ii) Lining shall be impermeable to sewage gases and liquids and shall be nonconductive to bacterial or fungal growth. All linings shall be factory checked to ensure freedom from porosity.

iii) Lining shall have good impact resistance, shall be flexible, and shall have elongation sufficient to bridge up to ¼ inch settling crack.

iv) Once cast into the concrete of the manhole wall, lining shall be permanently and physically attached to the concrete by the lining studs and shall not rely on an adhesive bond unless otherwise specified at a specific location.

v) Locking studs shall be made of the same material as the lining and integrally extruded with the sheet. Stud spacing shall be on approximately 1.25-inch centers, such that there are approximately 110 studs per square foot.

vi) Plasticizer shall not be added to the resin formation.

vii) Lining shall be free of holes, pinholes, bubbles, blisters, excessive contamination by foreign matter, and nicks and cuts on roll edges.

viii) Adhesive to bond HDPE lining to metal shall be in accordance with the recommendations of the HDPE lining manufacturer.

ix) All work shall be in strict conformity with all applicable specifications, instructions, and recommendations of the lining manufacturer.

x) Prior to shipping lined precast manhole sections and then again after field welding is complete, the lining shall be spark tested in the presence of the Engineer. The spark test shall be done with an approved electrical holiday detector (Turnhert Rasor, model AP-W with power pack or equal) with the instrument set at a minimum of 20,000 volts. Any imperfection shall be repaired in accordance with the manufacturer's recommendations and with the approval of the Engineer.

Cementitious Crystalline Waterproofing. Waterproofing manufacturer shall be Xypex Chemical Corporation, Xypex Concentrate, Modified, Patch’n Plug or equal. Application shall be in accordance with Xypex recommended specifications.

i) For use in new manholes, the Xypex materials Admix C-500, Admix C-1000, Admix C-2000 or equal shall be used.

POLYETHYLENE (PE) SOLID WALL GRAVITY PIPE.

207-19.1 General.

ADD THE FOLLOWING TWO SENTENCES TO THE END OF THE SUBSECTION:
HDPE pipe used for direct burial shall be a minimum of SDR 17. HDPE pipe used for the pipe-expanding method of Subsection 500-1.6 shall be SDR 17.

ADD NEW SUBSECTION 207-25 TO READ AS FOLLOWS:

POLYETHYLENE (PE) LARGE DIAMETER (36 INCH DIAMETER OR GREATER) PROFILE WALL PIPE.

207-25.1 General. Polyethylene (PE) profile wall pipe and fittings for use in gravity flow sanitary sewers and storm drains, and for use as liners for sanitary sewers shall comply with ASTM F894.
207-25.2 Material Composition. Pipe fittings shall be made from a plastic compound meeting the requirements of type III, class C, category 5, grade P 34 as defined in ASTM D1248 and with established hydrostatic design basis (HDB) of not less than 1250 psi for water at 73.4 degrees F determined in accordance with method ASTM D2837. Materials meeting the requirements of cell classification PE 334433 C or higher cell classification in accordance with ASTM D3350 are also suitable.

Materials other than those specified above may be used as part of the profile construction (for example, as a core tube to support the shape of the profile during the processing, provided that these materials are compatible with the PE material, are completely encapsulated in the finished product, and in no way compromise the performance of the PE pipe product in the intended use.

Materials shall meet the chemical resistance tests of 210-2.3.3.

207-25.3 Test Requirements. Pipe fittings shall meet the requirements of the section titled “Requirements” of ASTM F894. The Engineer will require certification by the manufacturer that the test results comply with specifications requirements. Sampling and inspection shall meet the requirements of the section titled “Sampling, Inspection, and Retest” of ASTM F894.

207-25.4 Marking. Each standard and random length of pipe shall be clearly marked with the following information: the nominal pipe size (in inches); the legend “PE sewer and drain pipe”; the RSC classification; the material designation: P-34 grade or cell classification; the manufacturer’s name; the production code and plant location; and manufacture date.

207-25.5 Dimensions. Pipe dimensions shall comply with dimensions given in Table I of ASTM F894. Pipe shall have a RSC as shown on the Plans. RSC is defined in ASTM F894.

Part 3 – CONSTRUCTION METHODS

ADD NEW SUBSECTION 303-9 TO READ AS FOLLOWS:

303-9 INSTALLATION OF MANHOLES, CLEANOUTS AND APPURTENANCES.

303-9.1 General.

303-9.1.a Structure Excavation and Backfill. Structure excavation and backfill shall conform to the applicable requirements of 300-3 and 306-1.

303-9.1.b Rock Base. Prior to placing the concrete manhole base, a minimum of six inches of rock base or crushed rock approved by the Engineer shall be placed upon the earth subgrade and compacted to 90 percent (90%) relative compaction by mechanical means.

303-9.1.c Concrete Manhole Base. Concrete manhole base shall be constructed as shown on the Plans and Agency Standard Details, as applicable, and shall conform to the applicable requirements of Section 303. The concrete shall be vibrated to density and screened so that the first precast manhole section will be placed on a level uniform bearing surface for the full circumference. An approved metal forming ring shall be used to form a level joint groove in the fresh concrete of the manhole base to receive the first precast manhole section. Sufficient mortar or Ram-Nek shall be deposited on the base to assure a watertight seal between base and manhole wall or the first precast manhole section shall be placed on the concrete base before the concrete has set. The first section shall be properly located and plumbed.

303-9.1.d Placing Precast Manhole Sections. Precast manhole sections shall be carefully inspected prior to installation. Sections with chips or cracks in the tongue shall not be used. The ends of precast manhole sections shall be cleared of foreign materials.

The precast sections shall be installed in a manner that will result in a watertight joint. Rubber "O" Ring gaskets or preformed flexible joint sealant shall be installed in strict conformance with the manufacturer's recommendations. Only pipe primer furnished by the gasket manufacturer shall be used. If leaks appear in the manholes, the inside joint shall be caulked with non-shrink epoxy mortar to the satisfaction of the Engineer.
303-9.1.e Manhole Channels. Manhole channels shall be constructed as shown on the Plans and Agency Standard Details, as applicable, and with smooth transitions to ensure unobstructed flow through the manhole. All sharp edges or rough sections that tend to obstruct flow shall be removed. Where a full section of pipe is laid through a manhole, a neatly cut half pipe shall be laid to form the channel. The exposed edge of the pipe shall be completely covered with mortar. All mortar surfaces shall be troweled smooth. Breaking out the top half section of pipe after installation is not acceptable.

303-9.1.f Drop Manholes/Drop Connection Manholes. Drop manholes and drop connection manholes shall be constructed at locations indicated and as shown on the plans. The drop assembly shall be connected to the sewer pipe with an adapter approved by the Engineer. The lower elbow shall be supported by concrete poured monolithically with the manhole base.

303-9.1.g Flexible Joints. Flexible joints shall be provided not more than 1-1/2 feet from manhole walls. Pipes entering manholes shall be installed on firmly compacted base rock or crushed rock approved by Engineer.

303-9.1.h Pipe Stubouts for Future Sewer Connections. Manhole stubouts for future sewer connections shall be installed as shown on Plans or required by the Engineer. Maximum and minimum length outside the manhole wall shall be as shown on the Agency's Standard Details, as applicable. Pipes in precast walls or manhole base shall be constructed in accordance with details shown on the Plans. Compacted base rock or crushed rock approved by Engineer as specified herein before shall be placed upon the earth under all stubouts.

Semi-permanent plugs shall be installed in the stubout ends with gasket joints similar to the sewer pipe being used. Plugs shall be capable of withstanding all internal or external pressures without leakage and remain watertight. All plugs shall be adequately braced to prevent blowoffs.

303-9.1.i Permanent Plugs. Interior contact surfaces of all pipes to be cut off or abandoned shall be cleaned. Concrete plugs shall be constructed in the end of all pipe 18 inches or less in diameter. Minimum length of concrete plugs shall be 8 inches. All plugs shall be watertight and capable of withstanding all internal and external pressures without leakage, as approved by the Engineer.

303-9.1.j Manhole Extensions. Extensions shall be installed in conformance with the details shown on the Plans and to a height to match finished grade. Grade rings shall be lined in mortar with the sides plumb and tops level. Joints shall be sealed as specified for manhole sections. Extensions shall be watertight.

303-9.1.k Manhole Frames and Covers. Frames and covers shall be installed on top of manholes to prevent all infiltration of surface water or groundwater into manholes. Frames shall be set in a bed of mortar with mortar carried over the flange of the ring as shown on the Plans. Frames shall be set so cover tops are flush with surface of adjoining pavement or ground surface, unless otherwise shown or directed. Concrete manhole collars shall be provided and installed as shown on the Plans and Agency's Standard Details, as applicable. Manhole covers and frames for manholes identified as ones likely to be periodically submerged in wet weather events shall be prevented from blowing off during sewer surcharging by installation of manhole frames with bolted lids, and bearing surfaces shall be sealed with a neoprene gasket, if shown on plans.

303-9.1.l Manhole over Existing Sewers. Manholes shall be constructed over existing operating sewer lines at locations indicated. Excavation shall be as specified. Flow through existing sewer lines shall be maintained at all times. New concrete and mortar work shall be protected for a period of seven days after concrete has been placed. The Contractor shall advise Engineer of plans for diverting sewage flow and obtain the Engineer's approval before starting. The Engineer's approval shall not relieve the Contractor of the responsibility for maintaining adequate flow capacity at all times and adequately protecting new and existing work.

The new manhole base shall be constructed under and around the existing sewer as specified herein. The top half of the existing pipe shall be neatly removed within the new manhole, the edges covered with mortar, and troweled smooth.

303-9.1.m Connection to Existing Manholes. Sewers shall be connected to existing manholes at locations indicated. The Contractor shall provide all diversion facilities and perform all work necessary to maintain sewage flow in existing sewers during connection to the manholes. The Contractor shall break out existing manhole bases or grouting as necessary and regrout to provide smooth flow into and through existing manholes.
303-9.1.n Special Manholes. Special manholes shall be constructed in conformance with the applicable requirements of Section 303 and as shown on the Plans.

303-9.1.o Sewer Cleanouts. Cleanout construction shall be as shown on the Plans and Agency's Standard Details, as applicable. The cleanout shall be the same material as the main line sewer unless approved otherwise by the Engineer.

303-9.2 Structure Testing.

303-9.2.a Vacuum Testing. All project manholes shall be vacuum tested. The Contractor shall furnish all materials, equipment and labor for making a vacuum test. Vacuum test procedures and requirements shall be as follows:

1. All manhole openings shall be sealed with plugs and a rubber ring "donut" type plug inserted inside the cone opening.
2. A small vacuum pump shall be attached to a hose connected to the plug and 4 psi of vacuum shall be applied.
3. The vacuum shall be permitted to stabilize at 3.5 psi for one minute; then the test shall begin. The manhole must maintain vacuum such that no greater then 0.5-psi of vacuum shall be lost during the specified test period.
4. The specified test period is as follows:
   
<table>
<thead>
<tr>
<th>Manhole Depth (FL)</th>
<th>Test Period (Min.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>4.5</td>
</tr>
<tr>
<td>5-10</td>
<td>5.5</td>
</tr>
<tr>
<td>10-15</td>
<td>6.0</td>
</tr>
<tr>
<td>Greater than 15</td>
<td>6.5</td>
</tr>
</tbody>
</table>

6. Manholes failing the test shall be patched as required and re-tested.
7. A vacuum regulator shall be provided on the vacuum pump such that no pressure greater than 10 psi can be applied to the manhole during the test. All manholes not meeting the leakage test or are unsatisfactory from a visual inspection shall be repaired to the Engineer's satisfaction.

303-9.2.b Hydrostatic Testing. At the Contractor's option and with the Engineer's approval, hydrostatic testing may be substituted for vacuum testing. The test shall consist of plugging all inlets and outlets and filling the manhole with water to a height determined by the Engineer. Leakage in each manhole shall not exceed 0.1 gallon per hour per foot of head above the invert. All manholes that do not meet the leakage test or are unsatisfactory from a visual inspection shall be repaired to the Engineer's satisfaction. Contractor is responsible for supplying water for testing.

306-3 TRENCH EXCAVATION.

306-3.1 General.

Add the following paragraph to the end of Subsection 306-3.1:

Where directed to pothole to verify the depths of underground utility crossings, the Contractor shall excavate to locate said underground utility crossings and relay this depth information to the Engineer.

Replace Subsection 306-3.5 with the following:

306-3.5 Maximum Length of Open Trench. Except with the Engineer’s written permission, the maximum length of open trench at any one time shall be 300 feet (91 meters).

306-7 PREFABRICATED GRAVITY PIPE.

306-7.4 Vitrified Clay Pipe (VCP).

Add new Subsection 306-7.4.4 to read:

306-7.4.4 Special Joints. Type "D" joints shall be used to join sections of pipe of dissimilar material.

306-7.8.2.1(e) Pressure Testing and Leakage Inspection.

Add the following to the end of Subsection 306-7.8.2.1(e)

Pipeline cleaning shall be performed prior to CCTV inspection in accordance with 500-1.1.4.
ADD NEW SUBSECTION 306-16 TO READ:

306-16 BUILDING SEWERS.

306-16.1 General. Building sewer work shall consist of reconnecting existing building sewers to the new pipe or rehabilitated sewer main in accordance with 500-1.1.7(a), the Standard Specifications, and as specified herein.

The two uppermost lateral connections on a sewer main below a cleanout, lamphole or manhole with no upstream sewer shall be connected with a wye-connection.

306-16.1.1 Records to be Kept. The Contractor shall maintain a list of the active/inactive building sewers showing:

1. Approximate distance from upstream manhole on public sewer
2. Building sewer status: active or inactive
3. Address being served by active building sewer

The Contractor shall deliver to the Engineer two copies of the completed logs prior to acceptance of work. Logs shall be provided in an electronic format, acceptable for incorporation with existing geospatial information systems.

306-16.2 Material. Pipe for building sewers shall be vitrified clay, high density polyethylene, cast iron, or any other material approved by the Engineer. Connections of building sewers to public sewer mains shall be made only by using a Wye branch, a Tee branch, a drilled tap or saddle as approved by the Engineer.

The size of any building sewer shall be at least as large as the existing building sewer to which it connects, but in no case less than four inches (102 mm).

When an existing five-inch (127 mm) building sewer is encountered, the Contractor shall install a six-inch (152 mm) connection to the main and construct six-inch (152 mm) building sewer to the reconnection point. At the reconnection point, a five-inch to six-inch increaser shall be used.

PART 5 – PIPELINE SYSTEM REHABILITATION

500-1 PIPELINE REHABILITATION.

500-1.1.5 Television Inspection.

ADD THE FOLLOWING TO THE END OF THE SUBSECTION:

All inspections shall be documented with written reports that include a NASSCO Pipeline Assessment Certification Program (PACP) coding of all defects, or the Agency's standard coding of defects if different than NASSCO. The PACP coding shall be accomplished by an operator or worker who holds current PACP certification.

500-1.1.6 Sampling, Testing and Installation.

ADD THE FOLLOWING THREE PARAGRAPHS TO THE END OF THE SUBSECTION:

Prior to beginning work, Contractor shall clean sewer pipe of any obstruction and debris including roots in accordance with 500-1.1.4. The Contractor shall provide pre-rehabilitation CCTV inspection in accordance with 500-1.1.5. Point Repairs, if required, shall be performed as specified in 500-1.2.

All insertion processes shall be carried out in compliance with all applicable Cal-OSHA requirements. The installation Contractor shall have the necessary Cal-OSHA licenses before the work commences. Special attention shall be paid to the safety requirements involving work in confined spaces and work with steam.

The Contractor shall remove all protruding laterals that may prevent proper liner insertion. The removal method for protruding laterals shall be submitted with the shop drawings for approval.
500-1.1.7 Miscellaneous.
500-1.1.7 a) Service Connections.
ADD THE FOLLOWING TO THE END OF SUBSECTION 500-1.1.7a).

External Service Reconnections. The Contractor shall expose the building sewer and make arrangements with the occupant and/or owner to access all the plumbing fixtures in each building and perform dye tests to determine if the exposed building connection sewer is active. If the occupant or owner denies access to the building, the exposed building connection sewer shall be assumed active unless otherwise directed by the Engineer and shall be reconnected in accordance with these specifications.

If the service connection is to be re-established with an external reconnection, the existing service connections shall be excavated and disconnected at the joint. The existing sewer (now the host or carrier pipe for the liner) shall be carefully broken/removed to expose the liner to the extent necessary without damaging the liner. The liner pipe shall be allowed to normalize to ambient temperature and to cool down before a hole is drilled out. This (and any other) “coupon” shall be retrieved and handed over to the Engineer for inspection of liner integrity, if requested by the Engineer. A pre-fabricated polyethylene saddle equipped with a neoprene gasket and a protruding stub-out shall be installed onto the exposed liner with an epoxy-bonding agent over the cut out. The saddle’s attached stub-out must protrude into the liner a distance equal to the liner’s wall thickness. The strap-on saddle shall then be tightened with two Type 301 stainless steel or higher-grade bands, one on each side. The nuts and bolts shall be Type 305 stainless steel. The new stub-out, or lateral, shall be connected to the existing service line with a flexible coupling. The stubout attached to the saddle shall not be smaller than the nominal size of the service line to which it is to be attached. All exposed liner shall be encased in concrete. The entire connection structure, including the main, saddle, stub-out, and exposed building connection sewer shall be backfilled as specified in 500-1.3.6.3.

For service reconnection locations in the street, all CIPP lined sewers shall have service connections reconnected externally. The Contractor may elect to temporary reconnect the lateral by internal method, but no additional payment shall be made for the temporary connection.

Internal Service Reconnections. For service reconnections locations in the sidewalks and in easements where CIPP lined sewers are installed, Internal service reconnections shall be. Internal service reconnections use a remote-control cutting device operating within small diameter pipe or directly for man-entry pipe. A color, pivot head CCTV camera shall be attached to the cutting device for precise location of service connections and inspection of the liner pipe. The CCTV inspection shall be performed in the same direction as the CCTV inspection performed before liner insertion.

The Contractor shall have a fully operation backup device for the remote-control cutting device. If the Contractor is unable for any reason to re-establish remotely the service connections, the Contractor shall re-establish each service connection by open excavation at no additional cost.

The remote-control cutting device must provide nearly full-diameter holes, free from burrs or projections, each hole providing a minimum of 95% and a maximum of 100% of the original service connection diameter and area. The new hole edges shall be smooth and crack free with no loose material. The service connection invert shall match the bottom of the reinstated service opening.
REPLACE SUBSECTION 500-1.2.6 WITH THE FOLLOWING:

500-1.2.6 Installation and Field Inspection. The installation of the replacement pipe and/or repair work shall conform to Section 306. One or a combination of the following three point repair methods shall be used. The selected method shall be subject to the Engineer’s approval prior to implementation.

a) Repair Clamp. Install full circle repair clamps as recommended by the manufacturer and approved by the Engineer. All full circle repair clamps shall be of Type 316 stainless steel fastened with Type 305 stainless steel nuts and bolts.

b) Heat-Shrink Sleeve. Install in accordance with manufacturer’s recommendations.

c) Remove and Replace Pipe or Fittings. Remove defective pipe or fittings to the nearest joint or by cutting perpendicular to the pipe axis to leave a plain end. Prepare a replacement section of like pipe material (or as otherwise approved by the Engineer or shown on the drawings). Make connections using shielded couplings, or heat-shrink sleeves.

500-1.3 High Density Polyethylene (HDPE) Solid Wall Liner.

REPLACE SUBSECTION 500-1.3.1 TO READ:

500-1.3.1 General. HDPE solid-wall liner pipe shall comply with ASTM D3350 and ASTM F714. Fittings shall comply with ASTM D2683 or ASTM D3261. Fittings fabricated by mitered, butt fusions are also permitted. Unless otherwise specified or approved, the outside diameter of the line shall not be less than 90 percent of the inside diameter of existing pipes, and the standard dimension ratio (SDR) of the liner for sliplining shall be equal to 26.

500-1.4 Cured-in-Place Pipe Liner (CIPP) Liner.

REPLACE THE WORDS “epoxy or epoxy vinyl-ester resin” WITH “epoxy, or epoxy vinyl-ester resin” WHEREVER THEY APPEAR IN SUBSECTION 500-1.4.

500-1.4.1 General.

REPLACE SUBSECTION 500-1.4.1 WITH THE FOLLOWING:

500-1.4.1 General.

• CIPP liner for pipeline rehabilitation shall be either of two types:
  Type A – inversion process in compliance with ASTM F1216 or
  Type B – pull-in-place process in compliance with ASTM F1743.

• The CIPP liner shall use an approved epoxy, or epoxy vinyl-ester resin-impregnated flexible fabric tube.

• The minimum liner thickness shall be 0.236 inch (6.0 mm).

• Prior to commencing work, the Contractor shall provide submittals on all lining materials and resins and shall furnish manufacturer certification that the liner material complies with the requirements stated herein. The submittals shall include information about all component materials. In accordance with 2-5.3, the Contractor shall submit shop drawings of construction details, including complete manufacturer’s recommendations for storage procedures, temperature control, removing roots and protruding laterals, liner handling and insertion, curing details, re-establishing service connections, trimming and finishing. The shop drawings shall include placement location(s) and method(s) and bypass location(s) with sufficient detail to assure that the work can be accomplished without sewage spill. The Contractor shall also provide manufacturer’s certification, field measurements and pipe-sizing calculations that demonstrate that the liner has been properly sized to avoid the creation of wrinkles or folds and to avoid gaps between the liner and the host pipe. Only manufacturer-licensed and certified contractors shall install CIPP liner.

500-1.4.2 Material Composition and Testing.

REPLACE THE WORDS “epoxy or epoxy vinyl-ester resin” WITH “epoxy, or epoxy vinyl-ester resin” WHEREEVER THEY APPEAR IN SUBSECTION 500-1.4.2.
ADD THE FOLLOWING TO THE END OF THE SECOND PARAGRAPH OF SUBSECTION 500-1.4.2:

The certified test results shall be from liner samples that have undergone the same curing process, formulation, size and thickness as that proposed to be installed. All material testing shall be performed at the Contractor's expense by a registered, independent, third party laboratory approved by the Engineer. A certificate of compliance and certified test results from an independent third-party laboratory shall also be provided for long-term flexural modulus.

ADD TABLE 500-1.4.2 (A) TO READ:

<table>
<thead>
<tr>
<th>CIPP Liner Minimum Flexural Requirements for Polyester Resin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Polyester Resin</td>
</tr>
<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>Enhanced</td>
</tr>
<tr>
<td>Standard</td>
</tr>
</tbody>
</table>

\(^1\) Only one type of resin shall be used for this project.
\(^2\) The initial flexural modulus is defined in ASTM D790.
\(^3\) The long-term flexural modulus is defined as fifty years and is determined by ASTM D2990 Test Method.

The Engineer may, at any time prior to installation, direct the Contractor to obtain cured samples and test them in accordance with the appropriate ASTM standards.

REPLACE SUBSECTION 500-1.4.4 WITH THE FOLLOWING:

500-1.4.4 Chemical Resistance.

The CIPP liner furnished shall meet the chemical resistance requirements of ASTM D5813. The CIPP liner shall also meet the chemical resistance requirements of ASTM F1216 or ASTM F1743, depending upon the installation method. The Contractor shall submit to the Engineer verification that the CIPP liner complies with the ASTM testing requirements. This verification of compliance shall be in written form of a finalized, signed, and dated independent laboratory report. The date on this report shall constitute the compliance date.

REPLACE SUBSECTION 500-1.4.5 WITH THE FOLLOWING:

500-1.4.5 Installation

- The outer diameter of the tube shall be properly sized to allow for expansion to ensure that the CIPP can fit snugly against the host pipe. The installed CIPP liner shall tightly fit the internal circumference and length of the original pipe. The gap between the existing pipe ID (inside diameter), and the OD (outside diameter) of the installed liner pipe shall not exceed 0.25 inches at any point along the pipeline. The pipe shall be rejected if shrinkage exceeds this amount.
- The CIPP shall be installed in accordance with the manufacturer’s recommendations as approved by the Engineer and ASTM F1216 or ASTM F1743. Immediately prior to installation, the CIPP liner tube shall be saturated with resin (on or off the job site) and stored / transported at a cool temperature as recommended by the resin manufacturer.
- Before tube installation, the manufacturer shall provide data on the tube’s maximum allowable stresses and elongation. The exterior of the manufactured tube shall be marked along its length at regular intervals not exceeding five feet. These marks shall be used as a gauge to measure elongation during installation. Any tube length experiencing overall elongation greater than five percent shall be rejected and replaced at the Contractor's expense.
• If the cured pipe does not fit tightly against the host pipe at its termination point(s), the void shall be sealed by filling with a resin mixture compatible with the CIPP Liner.
• Wrinkles in the finished liner pipe that cause a backwater, reduce the pipe's hydraulic capacity or structural stability, or create voids between the liner and pipe wall are unacceptable and shall be removed and repaired at the Contractor’s expense.
• Measurements to confirm that the liner’s outside diameter is within the acceptable tolerance shall be made at the lateral connections, manholes and terminal ends after liner stabilization has occurred and prior to re-establishing the service connections.
• Laterals shall be reconnected the same day of the liner installation.

REPLACE SUBSECTION 500-1.4.8 WITH THE FOLLOWING:

500-1.4.8 Repair and Rejection. The Contractor shall replace the pipeline in any reaches that the liner samples fail to meet the standard specifications.

ADD SUBSECTION 500-1.4.9 TO READ:

500-1.4.9 Material Testing. The Contractor shall provide certified test results of the short term structural properties of the cured lining material from the actual installed liner at a minimum of one location per each liner insertion setup as part of the acceptance requirements. All material testing shall be performed by a registered, independent, third party laboratory approved by the Engineer at the Contractor's expense.

The cured liner shall be sampled and tested for flexural strength and flexural modulus (short term) in accordance with the requirements of ASTM F1216 or ASTM F1743 and ASTM D790. The liner shall be in conformance with the structural properties specified in 500-1.4.2.

In addition, the Contractor shall furnish all liner ends for each installation to the Engineer for inspection and thickness verification. These samples shall be used to confirm the liner’s thickness meets the specified requirement.

The Contractor shall replace the pipeline in any reach that the liner samples fail to meet the project specifications.

ADD NEW SUBSECTION 500-1.4.10 TO READ:

500-1.4.10 Spill Prevention in Curing Process. In addition to the Spill Prevention and Control in section 7-8.6, the Contractor is required to submit a plan for review by the Engineer to prevent and contain any water leak/spill during curing process. No water from the boiler is allowed to spill into street, gutters, storm drains or creek.

500-1.5 Polyvinyl Chloride (PVC) Pipe Lining Systems.
DELETE THE SUBSECTION.

500-1.6 Pipe-Bursting Method.

500-1.6.1 General. The pipe bursting method is a type of trenchless construction in which a bursting tool splits/fractures the existing pipe while simultaneously installing a new polyethylene pipe of the same size or larger using a static or pneumatic pipe bursting technique. The Contractor shall furnish all labor, equipment, materials, tools, and appurtenances necessary or proper for the performance and completion of pipe bursting work.

500-1.6.1.1 Preliminary Surface Inspection. The Contractor shall make a careful preliminary surface inspection of the site along which the operation is run. Special note shall be taken and a photographic record shall be kept of the following:

1) Signs of surface cracks in roadways, sidewalks, and other paved areas;
2) Evidence of cracks and misalignments in boundary walls and structure walls near the trench;
3) Evidence of recent road work;
4) Current work in progress by other contractors;
5) Signs of possible leakage from water or gas mains; and
6) Other relevant features present before operations commence.
The preliminary surface inspection work shall be considered part of the sewer installation work and no separate payment will be made.

500-1.6.2 Contractor Qualifications. The Pipe Bursting Contractor shall have experience and qualifications in the installation of pipe using pipe bursting as required by the Agency.

500-1.6.2.1 Field Supervisory Qualifications. Field supervisory personnel employed by the pipe bursting contractor shall have at least three (3) years of documented experience in the performance of the work and tasks as stated in contract documents.

500-1.6.3 Contractor Submittals.
500-1.6.3.1 Contractor Qualifications. The Contractor shall submit, with other bid documents, documentation of their project and personnel experience with other projects similar in size and nature to the project specified in the contract documents.

500-1.6.3.2 Drawings and Documents. Shop drawings, catalog data, and manufacturer's technical data showing complete information on material composition, physical properties, and dimensions of new pipe and fittings shall be submitted prior to installation. A manufacturer's compliance certificate for these specifications shall be provided by the Contractor for all material furnished under this specification. Prior to beginning pipe installation the Contractor shall provide a certificate of conformance to the applicable ASTM specifications.

500-1.6.4 Materials.
500-1.6.4.1 High Density Polyethylene (HDPE) Pipe. Polyethylene pipe shall be high density polyethylene pipe (HDPE) and meet applicable requirements of ASTM F714 and ASTM D3035. HDPE pipe and fittings shall be used in accordance with the material specifications. All additional appurtenances (manholes, tees, gaskets, etc.) shall meet the material specifications.

Pipe Joining. All pipe installed by pipe bursting shall be joined by butt fusion, electro fusion (per ASTM F2620), or full circle clamp as detailed in 500-1.6.5, Pipe Joining.

Pipe Production. HDPE pipe shall be produced from resins meeting the requirements of ASTM D1248, designation PE3408, ASTM D3350 cell classification PE345444C, and will meet the requirements of AWWA C901 and C906. HDPE pipe shall meet the minimum stability requirements of ASTM D3350.

Pipe Markings. Pipe shall be legibly marked at intervals of no more than five (5) feet with the manufacturer's name, trademark, pipe size, HDPE cell classification, appropriate legend such as SDR 17, ASTM D3035, AWWA C901 or C906, date of manufacture and point of origin.

Pipe Material. All pipe shall be made of virgin material. No rework material except that obtained from the manufacturer's own production of the same formulation shall be used. The pipe shall be homogeneous throughout and shall be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.

Pipe Color and Quality. For CCTV inspection purposes, the HDPE pipe shall have a light-colored interior achieved with a homogeneous, light-colored material throughout or with a fully-bonded light-colored interior meeting the above specifications.

Liner Pipe Dimensions. The minimum wall thickness shall conform to Standard Dimension Ratio (SDR) of 17 when measured in accordance with ASTM D2122. The minimum inside diameter (ID) of new pipe to be installed shall be as specified in the plans. Depending on the availability of pipe product, the nearest size to the specified pipe shall be required, upon the Engineer's approval.

Pipe - General. All HDPE pipe without an ultraviolet inhibitor shall not be stored uncovered outside. The Contractor shall exercise care during the unloading, handling, and storage of all polyethylene pipe to ensure that the pipe is not cut, gouged, scored, or otherwise damaged.
500-1.6.5 Pipe Joining for Sections of HDPE Pipe. The polyethylene pipe shall be assembled and joined at the site using the butt-fusion method to provide a leak-proof joint, and in conformance with ASTM D2620. Insertion of pipe shall be in accordance with ASTM F585. Threaded or solvent-cement joints and connections are not permitted. All equipment and procedures used shall be in strict compliance with the manufacturer's recommendations. Fusing shall be accomplished by personnel certified as fusion technicians by a manufacturer of polyethylene pipe and/or fusing equipment.

Terminal Sections. Terminal sections may also be joined by Electrofuse Couplings, Friatec, or approved equal. Terminal sections may also be joined by full circle repair clamps by Smith Blair, JCM, or approved equal.

500-1.6.6 Service Connection Materials. The preferred method of sewer service connections to the HDPE sewer main shall be the use of electrofusion saddles by Central Plastics, Friatec, or equal as approved by the Engineer. Mechanical taps, Inserta Tees made by Fowler Manufacturing or approved equal, may also be used for sewer service connections if approved by the Engineer. Depending upon site conditions and if approved by the Engineer, sewer service connections to the HDPE main may be made by plastic saddles with stainless steel straps, by GPK, or approved equal, or rubber saddles with stainless steel straps by Fernco Company, DFW, or approved equal.

500-1.6.7 Sealing Connections at Manholes. The annular space at each manhole may also be sealed with a waterstop gasket by Fernco Company or approved equal, and finished with a quick setting grout. Pipe to manhole connections shall be made with ISCO HDPE thermal-fused pipe restraints or approved equal. Pipe shall be allowed to relax in accordance with 506-1.6.11.d.

500-1.6.8 Pipe Bursting Equipment. The pipe bursting unit shall be designed and manufactured to force its way through the existing line by fracturing the pipe and compressing the broken pieces into the surrounding soil as the equipment progresses. The bursting unit shall generate sufficient force to burst and compact the existing pipeline. In each case the pipe bursting unit shall pull the polyethylene pipe with it as it moves forward.

500-1.6.9 Execution of Work - General. Bypass pumping shall be accomplished when and where necessary. The Contractor shall provide flow diversion with pumps adequate in size and capacity to handle all flows generated during the pipe bursting process. All costs for bypass pumping shall be incidental unless specific pay items for this work are included in the bid and pay schedule. Excavation of insertion pits shall be at locations determined by the Contractor. Insertion pits shall be of sufficient length to allow the bursting head and new HDPE pipe to enter the host pipe at an angle that will maintain the grade of the existing sanitary sewer.

500-1.6.10 Preparation of Work. All sewer service connections shall be located prior to pipe bursting the main, by pre-CCTV inspection, and then exposed prior to pipe bursting. If the pre-inspection reveals obstructions or pipe materials that will prevent the existing pipe from being pipe burst properly and cannot be removed by conventional cleaning equipment, a point repair will be made by the Contractor, with approval from the Engineer. If the pre-CCTV inspection reveals a sag or hump, sag or hump removal shall be made by the Contractor, with approval from the Engineer.

500-1.6.11 Insertion of the HDPE Pipe.
500-1.6.11.a. The polyethylene pipe shall be assembled and joined at the site using the butt-fusion method to provide a leak-proof joint. Threaded or solvent-cement joints and connections are not permitted. All equipment and procedures used shall be in compliance with the manufacturer's recommendations. Fusing shall be accomplished by personnel certified as fusion technicians by a manufacturer of HDPE pipe and/or fusing equipment.
500-1.6.11.b. Insertion shall be in accordance with ASTM F585. The butt-fused joint shall be in true alignment and shall have uniform rollback beads resulting from the use of proper temperature and pressure. The joint shall be allowed adequate cooling time before removal of pressure. The fused joint shall be watertight and shall have tensile strength equal to that of the pipe. All defective joints shall be cut out and replaced at the expense of the Contractor. The inside weld bead shall be removed by cutting the bead away without scoring the inside wall of the pipe, to the satisfaction of the Engineer.

500-1.6.11.c. Service connections to the HDPE pipe shall be made with materials submitted and approved in accordance with 500-1.6.6.

500-1.6.11.d. A relaxation period shall be allowed prior to making service connections and connections to manholes. The relaxation period shall be appropriate with and dependent upon site conditions, but not less than eighteen (18) hours unless otherwise determined by the Contractor.

500-1.6.11.e. If concrete encasements are encountered, a point repair shall be performed, with the approval of the Owner, to excavate and break out concrete prior to the pipe bursting operation to allow the steady and free passage of the pipe bursting head.

500-1.6.11.f. The new HDPE pipe shall be inserted immediately behind the pipe bursting head in accordance with the manufacturer's recommended procedures. The bursting tool shall be specifically designed and manufactured for the type of insertion process being used. It shall be utilized to guide and assist the bursting head during the operation. A pushing machine may be utilized to aid pipe insertion from the rear.

500-1.6.11.g. New HDPE pipe shall extend into each manhole, a maximum of two inches after pipe relaxation and prior to installation of any restraints. The annular space shall be sealed in accordance with 500-1.6.7.

500-1.6.12 Service Reconnections. Service connections to the HDPE pipe shall be made with materials submitted and approved in accordance with 500-1.6.6. After the new HDPE pipe has been installed and tested, the Contractor shall be responsible for reconnecting existing sewer services in accordance with 500-1.1.7.a. All service lines shall be the size indicated in the plans and specifications.

500-1.6.13 Testing and Acceptance. After the new HDPE pipe is installed and all services are reconnected, the pipe shall be inspected by CCTV. Post-CCTV video shall be submitted to the Engineer for approval and acceptance of the new pipe. Leakage testing will also be performed and both this testing and CCTV inspection shall be in accordance with 500-5, Acceptance Testing.

500-1.7 Deformed/Reformed HDPE Liner.
ADD THE FOLLOWING TWO PARAGRAPHS TO SUBSECTION 1.7.1:

Only manufacturer-licensed and certified contractors shall install Deformed/Reformed HDPE Liner.

The HDPE liner minimum wall thickness shall conform to the Standard Dimension Ratio (SDR) of 26 when measured in accordance with ASTM D2122.

500-1.9 External In-Place Wrap.
DELETE THE SUBSECTION.

500-1.10 Folded and Re-formed PVC Pipe Liner.
DELETE THE SUBSECTION.

500-1.12 Polyvinyl Chloride (PVC) Closed Profile Liner Pipe.
DELETE THE SUBSECTION.
500-1.13 Machine Spiral Wound Polyvinyl Chloride (PVC) Pipe Liner.

DELETE THE SUBSECTION.

REPLACE SUBSECTION 500-2 WITH THE FOLLOWING:

500-2 MANHOLE AND STRUCTURE REHABILITATION.

500-2.1 General.

- The section covers repair and rehabilitation of existing manholes, lampholes, cleanouts, and appurtenances. Rehabilitation methods include sealing of walls, covers, pipes entering and leaving manholes; replacing cast iron frames and/or covers; replacing manhole steps; rebuilding manhole walls; removing and replacing the entire structure; and other related miscellaneous work. Sewer flow control, as necessary, shall be performed in accordance with 500-1.1.4c.

- All manhole rehabilitation materials shall be submitted to the Engineer and are subject to the approval of the Engineer. The manufacturer shall provide certification that the materials proposed for use are compatible with one another. All materials that shall contact the sewer environment shall be specifically designed for chemical resistance to the sewer environment. The manufacturer shall certify that the materials are resistant to the sanitary sewer environment and to the following: 5% nitric acid, 5% sulfuric acid, 10% phosphoric acid, 100% ASTM fuel C, 100% vegetable oil, 0.1% detergent, 0.1% soap, 5% sodium hydroxide, and 1% ferric chloride.

500-2.2 Leakage at Frames and Covers. Leakage at cast iron frames and covers shall be eliminated by one of the following methods of this subsection, or as directed by the Engineer.

500-2.2.1 Replace Cover. When an existing frame is in good, sound condition but the cover is broken or otherwise determined to be unusable (for example because of vent holes which allow infiltration), it shall be removed and replaced as shown or specified. It shall be replaced with a new cast iron manhole cover of approximately the same thickness and weight conforming to 206-7. The seating surface shall be machined to permit it to rest tightly against the surface of the frame without "rocking " under vehicular traffic. The cover's configuration must be such as to mate closely with that of the frame.

500-2.2.2 Adjust Frame and Cover. Structure frames and covers shall be adjusted where shown or specified. This repair consists of removing and replacing the manhole frame and the grade rings. This shall be accomplished by excavating as necessary, lifting off the frame and grade rings as directed, thoroughly cleaning the frame's bottom bearing surface, removing the old mortar from the manhole cone and grade rings, and replacing the existing frame and rings to the new grade as specified for new manholes in 303-9.

500-2.2.3 Replace Frame and Cover. When shown or specified, or when the condition of the frame is satisfactory but a replacement cover meeting the requirements described above is not available, the Contractor shall remove and replace the entire assembly with a new frame and cover in accordance with 201-8 and 303-9.

500-2.3 Sealing Manhole Walls. Manhole walls shall be sealed where shown or specified, or as directed by the Engineer. Sealing of the manhole walls shall be accomplished by any of the methods specified in sections 201-10.6.1, including:

- Cement-Epoxy Mixtures. Openings, cracks, and deteriorated joints in manhole walls shall be repaired and sealed by utilizing cement-epoxy mixtures manufactured for this purpose, such as those manufactured and/or supplied by Standard Dry Wall Products; Water-Wastewater Products & Systems, Inc.; IPA Systems, Inc.; Stonehard, Inc.; or approved equal.

- Chemical Grout. Openings, cracks, and deteriorated joints in manhole walls shall be repaired and sealed using chemical grout and applicable procedures specified for sewer system rehabilitation.

- Polyurethane Coatings. Sprayable polyurethane coating shall be used to seal manhole walls. The coating shall be a high-build polyurethane specifically formulated for use in a sewer system environment. The minimum thickness of the dry coating shall be 125 mils.
**Modified Polyester/Polymorphic Coatings.** Spray-applied modified polyester/polymorphic resin shall be used to seal manhole walls. The coating shall be a two-component, 100% solids system. Prior to applying the prime coat, the manhole surface shall be sandblasted or hydroblasted and properly dried.

**Epoxy Coating.** Sprayable or brushable epoxy coatings may be used to seal manhole walls. The coating shall be a high-build epoxy, Mainstay DS-5 or approved equal, specifically formulated for use in the sewer system and applied in accordance with manufacturer's recommendations and guidelines and at 50-125 mils thickness in one or two coats. Prior to coating, the manhole walls shall be thoroughly sandblasted or hydroblasted and cleaned as recommended by the manufacturer to ensure complete coverage and bonding. Openings and cracks larger than 1/8 inch in the manhole walls shall be filled with mortar, Mainstay ML-72 or ML-72F, or approved equal, at one-half to one inch thickness, prior to trimming and applying the epoxy coating.

**Fiberglass Liners.** Existing manhole walls shall be thoroughly sandblasted and cleaned or primed as recommended by the materials manufacturer to ensure complete coverage and bonding. Openings and cracks larger than 1/8 inch in the manhole walls shall be filled with mortar prior to priming and applying the fiberglass.

i) **Factory-Manufactured Fiberglass Liners.** Manhole liners shall be made of fiberglass reinforced plastic (FRP), having an inside diameter of not less than 42 inches. Manhole liners shall meet the requirements of ASTM D3753. The liner shall be installed in accordance with manufacturer's recommendations including removal of the existing cone, grouting of the annular space between the liners and existing manhole walls, rebuilding or replacing the cones, backfilling, installing steps, and installing cast iron frames and covers.

ii) **Field-Fabricated Fiberglass Liners.** Manhole liners shall be field-fabricated by applying glass fibers and resin to the manhole walls. The completed lining thickness shall be not less than 1/4 inch at any location.

**HDPE Liners.** Lining manufacturer shall be GSE "Studliner", GU-International AGRU "Suregrip" or equal. Polymer mortar shall consist of a primer if recommended by the manufacturer and a liquid binder and a dry aggregate mixed together to make a mortar of consistency as required for the application. The mortar shall be designed for application to vertical or overhead surfaces and must be accepted by the lining manufacturer. The liquid binder shall be chemical and oil resistant, stress relieved, low modulus, moisture insensitive, two-component epoxy-resin compound. The consistency shall be similar to lightweight oil for proper mixing with aggregate. Material shall conform to ASTM C881, type 3, Grade 1, Sika Corporation Sikadur 22 Lo-Mod Series or equal.

i) HDPE lining, joint strips and angle strips (hereinafter collectively referred to as "lining") shall be made from minimum 97 percent virgin high density polyethylene (HDPE). Color shall be gray.

ii) Lining shall be impermeable to sewage gases and liquids and shall be nonconductive to bacterial or fungal growth. All linings shall be factory checked to ensure freedom from porosity.

iii) Lining shall have good impact resistance, shall be flexible, and shall have elongation sufficient to bridge up to ¼ inch settling crack.

iv) Once cast into the concrete of the manhole wall, lining shall be permanently and physically attached to the concrete by the lining studs and shall not rely on an adhesive bond unless otherwise specified at a specific location.

v) Locking studs shall be made of the same material as the lining and integrally extruded with the sheet. Stud spacing shall be on approximately 1.25-inch centers, such that there are approximately 110 studs per square foot.

vi) Plasticizer shall not be added to the resin formation.

vii) Lining shall be free of holes, pinholes, bubbles, blisters, excessive contamination by foreign matter, and nicks and cuts on roll edges.

viii) Adhesive to bond HDPE lining to metal shall be in accordance with the recommendations of the HDPE lining manufacturer.

ix) All work shall be in strict conformity with all applicable specifications, instructions, and recommendations of the lining manufacturer.
x) Prior to shipping lined precast manhole sections and then again after field welding is complete, the lining shall be spark tested in the presence of the Engineer. The spark test shall be done with an approved electrical holiday detector (Turnhert Rasor, model AP-W with power pack or equal) with the instrument set at a minimum of 20,000 volts. Any imperfection shall be repaired in accordance with the manufacturer's recommendations and with the approval of the Engineer.

**Cementitious Crystalline Waterproofing.** Waterproofing manufacturer shall be Xypex Chemical Corporation, Xypex Concentrate, Modified, Patch'n Plug or equal. Application shall be in accordance with Xypex recommended specifications.

i) For use in new manholes, the Xypex materials Admix C-500, Admix C-1000, Admix C-2000 or equal shall be used.

**500-2.4 Remove and Replace Existing Sewer Structure.** Where specified or shown, or directed by the Engineer, existing sewer structures shall be removed and new structures built in their place in conformance with the applicable specifications and details.

**500-2.5 Testing.** After rehabilitation work at each manhole has been completed, the manhole shall be tested for leakage in accordance with 303-9.2. Manholes rehabilitated only from the cover to the top of the cone will not require testing. Replaced lampholes and cleanouts shall be tested for leakage as an integral part of the sewer pipe system.

ADD NEW SUBSECTION 500-5 TO READ:

**500-5 ACCEPTANCE TESTING.**

**500-5.1 General.** The Contractor shall perform acceptance tests on all repaired, rehabilitated, or new facilities. Unless otherwise noted, no separate compensation will be paid for testing; the testing cost is to be included in the related pay items. If the work should fail to pass the tests, it is the Contractor's responsibility to correct the work and re-test with no additional compensation.

If, within the warranty period, any section of the sewer system is not acceptable due to subsequent excessive leakage or any other defects, although originally accepted, the Contractor shall repair or replace the affected portion at no cost to the Agency. It is understood that if the Contractor fails to do such work as required, the Surety shall be liable for said costs of repair or replacement.

**500-5.2 Leakage Testing.** All new sewers and those sewers rehabilitated by pipe expanding and cured-in-place lining methods shall be tested for leakage in accordance with 306-7.8.2. Sewer mains and building connection sewers in each reach shall be tested for leakage together, as an integral system, except as otherwise specified herein.

**500-5.3 Miscellaneous Testing.** The Agency, at its discretion, may perform tests to check compliance with the specifications as they pertain to backfill compaction, concrete strength, and other such items where test performance is not specified as the Contractor's responsibility. The Contractor shall cooperate with the Agency by providing samples, making necessary excavations, and other related services necessary to carry out the testing, at no cost to the Agency. In the event of failed tests, the Contractor shall bear the cost of correction and re-testing.

**500-5.4 Acceptance.** Prior to the Engineer's final acceptance of the sewer system, the Contractor shall flush and clean all system parts. The Contractor shall remove all accumulated construction debris, rocks, gravel, sand, silt, and other foreign material from the sewer system at or near the closest downstream manhole. If necessary, the Contractor shall use mechanical rodding or bucketing equipment. A collection basket shall be used to capture all debris.

Following completion of the work, including cleaning and testing, the Contractor shall conduct a CCTV inspection of the sewers as specified in 500-1.1.5. The Contractor shall correct all defects discovered by this procedure before the work under the contract will be considered for final acceptance.