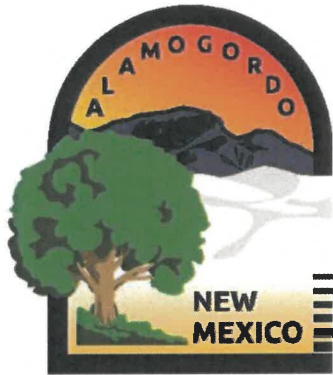


**NEW YORK AVENUE (8TH TO 10TH STREET) WATER
AND SANITARY SEWER REPLACEMENT PROJECT**

SUPPLEMENTAL SPECIFICATIONS



**City of
ALAMOGORDO**



01/18/2024

PUBLIC WORKS BID No. 2024-003

ENGINEERING No. EN2306

JANUARY 18, 2024

SUPPLEMENTAL TECHNICAL STANDARDS

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CHAPTER 12 – SEWER LINE CLEANING

ARTICLE 12-01 – GENERAL

Article 12-01-010 General

- (a) Requirements for pipeline cleaning including pre-rehabilitation point repairs and/or removal of protruding service connections to be performed prior to closed circuit television (CCTV) inspection and pipeline rehabilitation/replacement.
- (b) Requirements for the removal and disposal of debris from the pipeline.

Article 12-01-020 Submittals

- (a) The Contractor shall submit a written Debris Control Plan. The plan shall contain:
 - (1) Sewerline and manhole cleaning plan describing methodology to be used from manhole to manhole.
 - (2) Describe what measures will be implemented to remove the debris generated during the sewerline cleaning operation from continuing downstream in the active sewer.
 - (3) Describe what measures will be implemented during the manhole interior cleaning process to prevent debris from entering the sanitary sewer flow and flowing downstream. Examples are temporary planks spanning the manhole benches or installation of a sturdy net.
 - (4) Describe what measures will be implemented to prevent debris from entering the open manhole(s). Examples are a steel plate covering the open manhole or installation of a sturdy net.
 - (5) Communication plan. Identify who is responsible for enforcing the Plan to all parties, including subcontractors, working at the project site.
- (b) Noise mitigation plan during cleaning operations.
- (c) Pre-rehabilitation host pipe condition analysis report per Article 12-01-030.

Article 12-01-030 Pre-Rehabilitation Host Pipe Condition Analysis

- (a) The Contractor shall review all the post-cleaning digital videos and identify any additional host pipe deficiencies which impact the rehabilitation of the pipeline.

Contractor shall submit a pre-rehabilitation host pipe condition analysis in writing to the Owner. The analysis shall describe the following:

- (1) Any anticipated defects in the trenchless pipeline rehabilitation system due to the current host pipe condition for each pipe segment (list specific locations along the pipe segment).
 - (2) Specific locations along the pipe segment where additional point repairs/obstruction removals are requested.
 - (3) Any modifications to the installation procedures due to the current host pipe condition for each pipe segment.
 - (4) Any concerns pertaining to a specific pipe segment due to host pipe condition.
 - (5) No point repair or obstruction removal shall be performed without written approval from the Owner.
- (b) If Owner rejects a request to perform a point repair or obstruction removal, the Contractor shall perform the pipeline rehabilitation with the host pipe deficiency. The Owner will reimburse the Contractor for a post-rehabilitation point repair/trenchless liner patch (method to be determined) if the liner pipe is found to be unacceptable.

ARTICLE 12-02 – PRODUCTS

Article 12-02-010 Cleaning Methods/Equipment

- (a) High Velocity Jet-Cleaning: Cleaning equipment that uses a high velocity water jet for moving debris shall be capable of producing a minimum volume of 50-gpm with a pressure of 1,500 psi at the pump. Any variations to this pumping must be approved in advance, by the Owner. A working pressure gauge shall be used on the discharge of all high-pressure water pumps. A minimum of 2 or more high-velocity nozzles capable of producing a scouring action from 15 to 45 degrees. The Contractor shall operate the equipment so that the pressurized nozzle(s) continues to move at all times. The pressure nozzle(s) shall be turned off or reduced anytime the hose is held or delayed preventing damage to the line. Equipment shall also include a high-velocity gun for washing and scouring manhole walls and floor. The gun shall be capable of producing flows from a fine spray to a solid stream. The equipment shall carry its own water tank, auxiliary engines, pumps, and hydraulically driven hose reel.

- (b) **Mechanical Cleaning:** Mechanical cleaning, in addition to normal cleaning when required by the Owner, shall be performed with approved equipment and accessories driven by power winching devices. The Contractor shall submit the equipment manufacturer's operation manual and guidelines to the Owner, which shall be followed strictly, unless modified by the Owner. Experienced operators shall operate all equipment and devices so that they do not damage the pipe in the process of cleaning. Cleaning devices and other debris removing equipment/accessories shall be used as appropriate and necessary in the field, in conjunction with the approved power machine(s). Bucket machines shall operate in pairs with sufficient power to perform the work in an efficient manner. Machines shall be belt operated or have an overload device. Machines with direct drive that could cause damage to the pipe will not be allowed. The use of cleaning devices such as rods, metal pigs, porcupines, root cutters, snakes, scooters, sewer balls, kite, and other approved equipment, in conjunction with hand winching device(s), and/or, gas, electric rod propelled devices, shall be considered normal cleaning equipment.

ARTICLE 12-03 – EXECUTION

Article 12-03-010 Water Usage

The Contractor shall be responsible for obtaining water for cleaning, from the Owner, as described elsewhere in the City of Alamogordo Technical Standards. All related charges for the setup and the water bill shall be considered incidental to the cleaning of the existing sewerlines(s). No fire hydrant shall be obstructed or used when there is a fire in the area. The Contractor shall remove the water meter(s)/piping etc., from all fire hydrants at the end of each working day. Water shall not be wasted on streets and/or alleys.

Article 12-03-020 Cleaning

- (a) All cleaning activities shall be performed by experienced personnel. All cleaning shall be done from the downstream manhole unless otherwise authorized by the Owner.
- (b) The Contractor shall close or cover all open sanitary sewer manholes or access openings in the lines when operations have been suspended for a period of two (2) hours or more to minimize the dispersal of sewer odors. No cleaning shall be done prior to checking both upstream and downstream monitors for flow monitors or other mechanical devices. When utilizing high-velocity hydraulic cleaning equipment independently or in combination with other cleaning methods, a minimum of two (2) passes with the hydraulic nozzle(s) shall be done unless othering approved by the Owner. If cleaning cannot be completed from one manhole, the equipment shall be moved and set up on the other manhole and cleaning shall be re-attempted. If successful cleaning still cannot be performed or

the equipment fails to traverse the entire pipeline section, it shall be assumed that a blockage exists. Efforts to clean the line(s) shall be suspended, and the Contractor shall notify the Owner. Upon removal of the obstruction, the Contractor shall complete the cleaning operation.

- (c) The Contractor shall remove all foreign materials from the interior of the pipeline(s) and manhole(s) including but not limited to debris, roots, solids, sand, grease, and grit thus improving pipe flow as well as facilitating television inspection. Manhole cleaning shall include all surfaces between the pipe invert and a point one foot (1') above the pipe crown to include all manhole bench(es). Experienced personnel shall operate all cleaning equipment and devices. Satisfactory precautions shall be taken to protect the sanitary sewer main(s) and manhole(s) from damage that might be inflicted by the improper use of the cleaning process or equipment. Any manhole and/or frame and cover that is dismantled or damaged during the cleaning process (excluding those manholes for which a new ring and cover are to be installed), shall be repaired at no additional cost and shall be incidental to the cleaning. Any damage done to the sewer by the Contractor shall be repaired by the Contractor at no additional cost to the Owner and to the satisfaction of the Owner. Cleaning shall also include the manhole wall washing by high pressure water jet. The Contractor shall ensure manhole(s) are not damaged due to the forces generated by equipment, water pressure, or air pressure.
- (d) The Contractor, when requested by the Owner, shall demonstrate the performance capabilities of the cleaning equipment proposed for use on the Work. If the results obtained by the proposed sanitary sewer cleaning equipment are not satisfactory, the Contractor shall use different equipment and/or attachments, as required, to meet specifications. More than one (1) type of equipment/attachment(s) may be required at a location. When hydraulic or high velocity cleaning equipment is used, a suitable sand trap, weir, dam, or suction shall be constructed in the downstream manhole in such a manner that all the solids and debris are trapped for removal.
- (e) When hydraulic or high velocity cleaning equipment is used, it is required that the vacuum chute in the downstream manhole to remove all debris loosened in the pipe cleaning operation. Additionally, the Contractor may install a suitable sand trap, weir, dam, or suction device in the downstream manhole so that debris is trapped for removal.
- (f) The Contractor shall take precautions to protect sanitary sewer manhole(s) and pipeline(s) from damage that might occur by improper selection and/or use of cleaning equipment. When using hydraulically propelled devices, take precautions to ensure that the water pressure created does not cause damage to or flooding of public or private property. Do not surcharge any sanitary sewer to an elevation that could cause overflow of sewage including backup into laterals and/or services.

- (g) Where possible, use the flow of wastewater present in the sanitary sewer pipeline to provide the fluid for hydraulic cleaning.
- (h) The Contractor shall operate high velocity cleaning equipment so that the pressurized nozzle(s) moves continuously. Turn-off or reduce the flow to the nozzle(s) to prevent damage to the pipeline any time the nozzle(s) becomes stationary.

Article 12-03-030 Removal and Disposal of Debris

- (a) All sludge, dirt, sand, rocks, grease, and other solid or semi-solid material resulting from the cleaning operation shall be removed at the downstream manhole of the section being cleaned. Passing of debris from upstream manhole section to downstream manhole section will not be allowed. All debris from the manholes shall be loaded into an enclosed container that is approved by the New Mexico Environment Department (NMED) for liquid waste hauling.
- (b) The Contractor is not allowed to accumulate debris, and/or liquid waste, sludge, etc. on the site except in enclosed containers approved by the NMED. All waste shall be disposed of at a legally permitted disposal site.

Article 12-03-040 Pre-Rehabilitation Point Repair/Obstruction Removal

- (a) This section specifies the point repair/replacement of host pipeline(s) and/or obstruction removal from host pipeline(s) due to the host pipe deficiencies which impact the rehabilitation of the pipeline. The Contractor shall repair the pipeline where point repair(s) or obstruction removal(s) are shown on the Contract Documents and/or approved by the Owner (as identified in Article 12-01-030) prior to the rehabilitation.
- (b) **Pre-Rehabilitation Point Repair:** A point repair shall include up to twelve feet (12') of pipeline replacement by excavation. Remove only the amount of sanitary sewer pipe or sewer service connection which will impact the pipeline rehabilitation. The new sewer pipe shall be Chapter 06 of the City of Alamogordo Technical Standards. Transitions shall be flexible couplings with stainless steel bands. The new sewer pipe and flexible couplings shall be backfilled with lean (flowable) flow or concrete to a thickness of twelve-inches (12") from the pipe exterior, from the pipe spring line and down.
- (c) **Pre-Rehabilitation Obstruction Removal:** An obstruction removal shall be performed with a remote device (robot) which can remove the obstruction by entering the pipeline from a manhole. An obstruction shall be defined as:

- (1) A protruding service more than one inch (1”) into the main.
- (2) A miscellaneous obstruction that cannot be removed by one of the cleaning methods or equipment identified in the Chapter, as demonstrated by the Contractor.

END OF CHAPTER 12

CHAPTER 13 – TELEVISION INSPECTION OF SEWERS

ARTICLE 13-01 – GENERAL

Article 13-01-010 General

Requirements for closed circuit television (CCTV) inspection of gravity pipelines including identification of all active service laterals. CCTV inspections shall be performed by personnel trained and certified in the use of National Association of Sewer Service Companies (NASSCO's) Pipeline Assessment and Condition Program (PACP).

Article 13-01-020 Submittals

- (a) Copy of personnel's certification for NASSCO's PACP.
- (b) Specification of the CCTV inspection system to be used for the inspection(s).
- (c) Each digital CCTV inspection submittal shall include the following (digital naming convention: upstream manhole ID "to" downstream manhole ID "-pre-rehab" or "-post-rehab").
 - (1) JPEG photos (snapshots) of each observation identified during the inspection.
 - (2) Digital video (*.wmv) of the inspection.
 - (3) Transmittal of digital CCTV Inspection data to the Owner for review shall be one of the following:
 - (A) CD or DVD delivered to the Owner.
 - (B) USB flash drive delivered to the Owner (flash drive will be given back to the Contractor after the data is downloaded).
 - (C) Download from Cloud Storage accessible to the Owner.
 - (4) Contractor shall provide the Post-Rebab CCTV data within fourteen (14) days of approval by the Owner.

ARTICLE 13-02 - PRODUCTS

Article 13-02-010 CCTV Video Format

- (a) Videos shall be prepared and submitted in H.264 formatted MPEG-4 (.mp4) with a minimum resolution of 640 x 480.

- (b) **Audio Requirements:** The recording shall include an audio portion describing the condition of the sewer with the video image. The audio portion shall be in English and be sufficiently free of background noise to produce an oral report that is clear and easily discernible. At the beginning of each inspection run, the audio shall identify the Contractor name, date, time, street or alley location, pipe size, pipe type/material, direction of inspection (upstream or downstream), and the manhole numbers at the beginning and end of each run. The audio shall note the location and condition of pipe defects; including all cracks, breaks, cracked or misaligned joints, root intrusions, infiltration, missing pieces of pipe, corrosion, deposits, obstructions, dips in the pipe which cause the camera to go underwater, and any other items which reflect the condition of the pipeline. The audio shall also note the location of the connections to the nearest foot, clock positions of the connections, condition of the connections, and whether the connection is in service.

Article 13-02-020 Digital Recording

Continuous digital recording of the inspection view as it appears on the monitor shall be stored. The operator shall pause the digital recording at any time there is a delay in the inspection. The pause shall in no way affect, freeze, or interrupt the replay of the video and shall not close the video file during the inspection. The data shall be time coded using the elapsed time from the video file.

Article 13-02-030 CCTV Inspection Equipment

- (a) CCTV system equipment shall include television camera, a television monitor, cables, power source, and other equipment.
- (1) The camera lens shall not have less than a 65-degree viewing angle and shall have either automatic or remote focus and iris controls.
 - (2) The remote-reading footage counter shall be accurate to less than one percent (1%) error over the length of the section of pipeline being inspected. This distance shall be measured from the centerline of the manhole to the centerline of the next manhole.
 - (3) The camera and television monitor shall produce a minimum of 400 vertical lines of resolution and 460 horizontal lines of resolution.
 - (4) Telephones, radios, or other suitable means of communication shall be set up to ensure that adequate communication exists between members of the crew.

- (b) The CCTV inspection camera utilized shall be specifically designed and constructed for sewer inspection.
 - (1) The CCTV inspection camera shall be operative in one hundred percent (100%) humidity conditions.
 - (2) Lighting for the camera shall minimize reflective glare and be sufficient and bright enough to make clear assessment of the condition of the pipe.
 - (3) Lighting and picture quality shall be suitable to provide a clear, in-focus picture of the entire periphery of the pipeline for all conditions encountered during the Work.
 - (4) The camera itself shall have a minimum of 3-lux illumination sensitivity.
 - (5) The CCTV camera(s) shall be mounted on a skid, floatable raft system, or transporter/crawler, based upon the conditions of the pipeline to be televised. The camera and mounting system shall be capable of televising six-inch through seventy-two-inch (6" – 72") sanitary sewer pipe in one hundred percent (100%) humidity conditions.

ARTICLE 13-03 – EXECUTION

Article 13-03-010 General

- (a) The CCTV camera(s) shall be a pan/tilt and rotating head camera capable of providing a full view of the inside of all connections and any pipe defects. Recording shall be in color and shall have the best quality possible. The image shall always be in focus. The recording shall be done with adequate lighting to provide a clear view of the entire periphery of the sewer including any defects while keeping glare to a minimum. The image shall not be obscured by "fog" in the sewer. If any submitted recording has unacceptable focus, lighting, sound, data, imagery, or interferences the sewer shall be re-inspected at the Contractor's expense.
- (b) The CCTV camera(s) shall pause for a sufficient length of time to adequately document and provide accurate distance measurements of all the defects in the pipe and connections observed in the pipeline. The camera shall rotate and look directly at each defect and look into each connection to thoroughly document the conditions and determine if the connection is in service. In the same manner, the Contractor shall identify all sewer connections at each manhole including the manholes at the beginning and end of setup and all intermediate manholes. The Contractor shall capture photos of all observations noted in the inspection report.

- (c) The CCTV camera(s) shall be moved through the pipeline, from upstream to downstream, at a uniform rate of not more than thirty-five (35) feet per minute, achieving no less than 450 feet per hour. Distance of sewer between adjacent manholes shall be measured and recorded. The distance measurements shall be made from the centerline of the manhole that the camera is traveling from and shall be accurate to within two feet (2') for 1,000 feet inspected. If more than one (1) manhole reach is inspected in a single run, the footage counter shall be reset to zero (0) at the center of all intermediate manholes.
- (d) If, during CCTV inspection, the television camera(s) will not pass through the entire pipeline section, the Contractor shall set up their equipment at the downstream manhole and attempt to inspect the section of the pipe from the opposite direction. If the camera(s) fails to pass through the entire section, it shall be assumed that an obstruction exists. Efforts to televise the section of pipeline shall be suspended and the Contractor shall notify the City. If the Owner agrees the inspection cannot be completed, the Contractor shall submit the completed inspection and payment shall be made for the inspected footage.
- (e) The equipment and skill of the operators shall be capable of providing a continuous clear recorded and viewed picture of the entire length of the pipeline under all normally expected pipe atmospheric conditions and flow conditions. The Contractor shall have adequate cabling and wiring equipment to perform CCTV inspection of pipeline mains up to a length of 1,600 feet without causing degradation of recorded and viewed picture quality.
- (f) Televising shall provide a clear, definitive recorded and viewed TV picture. The recording shall not contain intervals of more than twenty (20) seconds where the camera(s) is stationary. When the tape is stopped due to obstruction or equipment malfunction and then restarted, the TV operator shall state the length of time or delay and the reason for the delay. The importance of accurate distance measurement is emphasized. The remote reading footage counter shall be accurate to plus or minus two-tenths of a percent ($\pm 0.20\%$) over the length of the section being inspected. Each pipeline segment shall be defined as one manhole to manhole run, and pipe lengths shall be defined as the intervening distance between the centers of manholes along a line parallel to the pipe invert. Accuracy of the distance meter shall be checked by use of a walking meter, roll-a-tape, or other suitable device and the accuracy shall be satisfactory to the Owner.
- (g) All equipment and all Contractor operations shall be conducted at a low noise level suitable for nighttime CCTV inspection in residential areas.
- (h) The Contractor may inspect through existing manholes.

Article 13-03-020 Pre/Post Rehabilitation

- (a) Pre-Rehabilitation: CCTV inspection shall be completed immediately after cleaning to confirm cleaning, location of all service lateral connection, and to identify any additional point repair(s) or obstruction removal(s) which may impact the rehabilitation of the pipeline. Contractor shall complete a pre-rehabilitation CCTV inspection of the entire segment prior to rehabilitation after obstruction removal(s) has been completed.

- (b) Post-Rehabilitation: CCTV inspection is required and shall be completed after rehabilitation of the pipeline to confirm compliance with the Contract Documents.

END OF CHAPTER 13

CHAPTER 14 – PIPE BURSTING

ARTICLE 14-01 – GENERAL

Article 14-01-010 General

Requirements for the rehabilitation of gravity sanitary sewer pipelines by pipe bursting methodology including reinstatement of service lateral connections.

Article 14-01-020 Submittals

- (a) Pipe Installation Plan: The Contractor shall prepare and submit a plan with installation procedures and the locations of insertion/access pits for review and approval a minimum of thirty (30) days prior to commencing the Work. This plan may include a dewatering plan if groundwater is identified to be present.
- (b) Project specific engineering pipe design calculations for each sanitary sewer pipeline segment the liner system will be applied thereto. Pipe design shall be calculated and stamped by a professional Engineer licensed in the United States and verified by the pipe manufacturer in accordance with ANSI, ASTM, and AWWA Standards. Calculations shall include, but not be limited to; soil loads, live loads, hydrostatic loads, pipe stiffness, Standard Dimension Ratio (SDR), pipe wall crushing strength, initial and long term (50 years) values of pipe deflection, pipe bonding strain, hydrostatic collapse resistance, constrained buckling strength, and allowable pulling force and length.
- (c) Shop drawings, catalog data, MSDS sheets, and manufacturer's technical data showing the complete information on material composition, physical properties, and dimensions of new pipe and fittings pertinent to this project demonstrating compliance.
- (d) Pipe bursting equipment specifications and methodology.
- (e) Certification of personnel for the butt fusion of high-density polyethylene (HDPE) pipe and operation of the pipe bursting equipment.
- (f) Identification/Notification of any host pipe defects which will impact the pipe bursting operation and a proposed pre-rehabilitation repair method for each defect.

Article 14-01-030 Quality Assurance

The Contractor shall provide documentation showing that personnel have three (3) years of Pipe Bursting experience with a list of a minimum of 50,000 linear feet installed by the company including three (3) sewer main projects similar or greater in scope and value to

the Work shown in the Contract Documents. Information for each supervisor and the company must include, but not be limited to, date of work, location, pipe information (length, diameter, depth of installation, pipe material, etc.), project Owner information (name, address, telephone number, and contact person).

Article 14-01-040 Pipe Design Criteria

Pipe design shall be based on the following Design Conditions (gravity service):

Height of Water Above Top of Pipe, ft	=	1.0 ft
Fluid Temperature, F°	=	80° F
Soil Density, pcf	=	130 pcf
Live Load, psi	=	H-20 Highway
Dead Load, psi	=	Dead Load/Depth of Cover: As indicated on the Contract Documents. Vertical deflection not to exceed three-percent (3%) in short term (30 days) and five-percent (5%) thereafter.
Modulus of Soil Reaction, psi	=	800 psi

ARTICLE 14-02 – PRODUCTS

Article 14-02-010 Materials

(a) High Density Polyethylene (HDPE) Pipe

- (1) HDPE pipe shall meet the applicable requirements of ASTM F714. Inside color shall be white or an alternative light color suitable for illumination during television inspection. Outside color may be different provided the pipe is a homogenous material and all colors are integral to the HDPE material (not painted or coated).
- (2) HDPE Pipe and Fittings: Will be used in accordance with the material specifications. All additional appurtenances (manholes, tees, gaskets, etc.) will meet the material specifications. All pipe installed by pipe bursting will be joined by butt fusion, electro fusion, or full circle repair clamp as detailed in the pipe joining part of this Chapter.
- (3) HDPE pipe will 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 will meet the minimum stability requirements of ASTM D3350.

Pipe will be legibly marked at intervals of no more than five-feet (5') with the manufacturer's name, trademark, pipe size, HDPE cell classification, SDR rating, ASTM D3035, AWWA C901 or C906, date of manufacture, and point of origin.

- (4) HDPE pipe shall be made of virgin material. No rework material except that obtained by the manufacturer's own production of the same formulation shall be used.
 - (5) HDPE pipe shall be homogeneous throughout and shall be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.
 - (6) HDPE pipe shall be Iron Pipe Size (IPS).
 - (7) Dimension Ratios: The minimum wall thickness of the HDPE pipe is DR 17.
 - (8) Pipe Joining for Terminal Sections of HDPE Pipe:
 - (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 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. The Owner may require the Contractor to use a data logger to store butt-fusion joint data.
 - (B) Terminal sections may also be joined by electro fusion couplings as approved by the Owner.
 - (C) Terminal sections may also be joined by Stainless Steel Full Circle Repair Clamps as approved by the Owner.
- (b) Materials for Sealing Pipe at Manholes: A quick setting grout, non-shrink grout, or a quick setting epoxy used for sanitary sewer applications that is chemical resistant.

Article 14-02-020 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.

ARTICLE 14-03 – EXECUTION

Article 14-03-010 Examination

- (a) Proceeding with Work specified herein shall be interpreted to mean that all conditions, including site conditions, were determined to be acceptable prior to the start of the Work.
- (b) Pipes shall be inspected by the Owner for damage prior to installation.
- (c) If pipe is found to be superficially damaged by cracks, holes, de-laminations, foreign inclusions, blisters, or other defects that would, due to their nature, or extent, have a deleterious effect on the pipe performance as determined by the Owner, the Owner may reject the pipe or may allow the pipe to be repaired. Rejected pipe shall be replaced with a new section of pipe at no additional cost to the Owner.

Article 14-03-020 Preparation

Complete all pre-approved obstruction removal(s), pipe cleaning, and point repairs. Complete the Pre-Rehabilitation CCTV Inspection including submittal and approval by the Owner. All sewer service connections shall be identified and located prior to pipe bursting. All sanitary sewer flow control (bypass pumping) shall be approved by the Owner and be in-place and operation prior to pipe bursting.

Article 14-03-030 Installation

- (a) Rehabilitation of gravity sanitary sewer pipe by pipe bursting shall be full compensation for all subsurface investigations, materials, labor, equipment, cost of insertion and retrieval pits, machine pits, removing and replacing gravel base course, pavement, curb and sidewalk, and incidentals required to complete the pipe bursting process. Connection to the manhole(s) shall be incidental to the pipe bursting process.
- (b) Machine Pits and Pipe Insertion Pits
 - (1) The location and number of machine pits and pipe insertion pits shall be planned by the Contractor and submitted in writing for approval but the Owner at least ten (10) days prior to excavation.

- (2) Before any excavation is done for any purposes, the Contractor shall contact the appropriate One Call agency for determining field locations of existing utilities near the work area. Temporary construction easements and/or right-of-way areas, if required, will be arranged by the Contractor at no cost to the Owner.
- (3) Machine and insertion pits shall be excavated and backfilled in accordance with the appropriate specifications. Remove and replace existing asphalt in accordance with the Contract Documents.
- (4) All excavations shall be properly sheeted and shored in accordance with relevant specifications for trench safety systems. Any damage resulting from improperly shored excavations shall be corrected to the satisfaction of the Owner with no additional compensation due to the Contractor.
- (5) All open excavations shall be kept secure at all times but the use of barricades with appropriate lights and signs, construction tape, covering the steel plates, etc., or as directed by the Owner.
- (6) 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.
- (7) One or more (≥ 1) machine pits shall be excavated at the end(s) of the sewer pipe to be replaced or at appropriate points within the length of the existing pipe. Pits shall be centered over the existing pipe.
- (8) The number of pits for machine and pipe insertion shall be the minimum necessary to efficiently accomplish the work. The Contractor shall consider the use of excavations required for other purposes such as for sanitary sewer services reconnection and manhole replacement.
- (9) Where manholes are used as machine or new pipe insertion pits, the Contractor shall identify such manholes and replace them at no additional cost to the Owner if damaged. Any manhole modification or replacement required shall be considered incidental to the installation of the new pipe unless the manhole requires rehabilitation/replacement as indicated in the Contract Documents.

(c) Pipe Fusion

- (1) 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 comply with the manufacturer's recommendations. Fusing shall be accomplished by personnel certified as fusion technicians by a manufacturer of HDPE pipe and/or fusion equipment.

- (2) Fused pipe shall be laid along (parallel) to streets and/or alleys, not across streets or alleys, so as not to block traffic. The Contractor shall lay the pipe around corners or provide a ramp/bridge to allow traffic to safely cross the pipe with no damage to the pipe at street crossings. Private property, including landscaping, shall be protected.
- (3) 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.

(d) Pipe Installation

- (1) Contractor shall expose all interfering and crossing utilities by (vacuum) excavation prior to construction. The minimum clearance from other utilities shall be two feet (2') in any direction.
- (2) The minimum depth of cover over the installed pipe shall be three feet (3') from the top of the existing pipe, or ten times (10x) the amount of displacement from the diameter of the existing pipe, whichever is greater.
- (3) Contractor shall locate and expose all service connections prior to pipe installation to expedite reconnection. Upon commencement of the bursting process, pipe insertion shall be continuous and without interruption from one entry point to another, except as approved by the Owner.
- (4) For the pipe bursting process, the pipe-bursting tool shall be designed and manufactured to force its way through the existing pipe materials by fragmenting the pipe and compressing the old pipe section into the surrounding soils as it progresses. The bursting unit shall generate sufficient force to burst and compact the existing pipeline.
- (5) Equipment used to perform the work shall be located away from the buildings so as not to create noise or vibration impact. Provide a silent engine compartment with the winch to reduce machine noise as required to meet local requirements.

- (6) The Contractor shall install all pulleys, rollers, bumpers, alignment control devices, and other equipment required to protect existing manholes, and to protect the pipe from damage during installation. Lubrication may be used as recommended by the manufacturer. The Contractor shall take necessary measures to ensure that the new pipe is never stressed beyond its elastic limit.
- (7) The installed pipe shall be allowed the manufacturer's recommended amount of time, but not less than four (<4) hours, for cooling and relaxation due to tensile stressing prior to any reconnection of service line(s), sealing of the annulus, or backfilling of the insertion pit(s). Sufficient excess length of new pipe but not less than four inches (<4") shall be allowed to protrude into the manhole to provide for reoccurrence.
- (8) Following the relaxation period, the void between the new pipe and manhole wall shall be sealed. The approved sealant shall extend a minimum of eight inches (8") into the manhole wall in such a manner as to form a smooth, uniform, and watertight joint.

Article 14-03-040 End Seals

The finished liner shall be cut smooth and parallel with the manhole wall. The interface between the host pipe and the pipe liner shall be sealed 360 degrees.

Article 14-03-050 Reinstate Service Lateral Connection by Open Cut

- (a) The Contractor shall notify the occupants of the buildings with service connections when the service will be interrupted. The Contractor shall give the Owner of the service the opportunity to remove and replace the service line within private property at the Property Owner's expense. The Contractor shall maintain sewer service throughout the construction duration, without any spills or discharges to unapproved systems.
- (b) All live services shall be immediately reinstated after the pipe bursting (pipeline rehabilitation) is complete. Inactive service lines to a vacant lot, vacant building, or to an occupied residence with more than one (>1) service line serving the property, shall be defined as a "live" service, and shall be reinstated. It is the Contractor's responsibility to locate all live services prior to rehabilitation activities.
- (c) Service line reinstatement by open cut includes locating all interfering utilities, existing surface removal, excavation, dewatering, reinstatement of service lateral connection, backfilling, surface restoration, temporary flow bypassing, and sewer

dewatering. Reinstatement of service lateral connection by open cut includes the removal and replacement of the first five feet (5') of service lateral, cutting of the liner for the service opening, and installing a prefabricated fitting (Inserta-Tee© or equivalent) with the manufacturer's specifications so that a complete watertight seal is achieved. The new service line shall be connected to the existing service line with a flexible coupling and stainless-steel bands, as approved by the Owner. The service lateral connection at the pipeline shall be encased in lean (flowable) fill, a minimum of six inches (6") below and twelve inches (12") above and on the sides of the pipe. The lean (flowable) fill shall be inspected and approved by the Owner prior to completing the trench backfilling.

Article 14-03-060 Acceptance of Work

After completion of the pipe bursting, reconnection of sewer service laterals, and rehabilitation/replacement of manholes; the Contractor shall perform a CCTV inspection of the completed pipeline.

END OF CHAPTER 14