

SECTION 01010 SUMMARY OF WORK

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. General Scope of Work
- B. Work by Owner
- C. Contractor's Responsibilities.
- D. Work Sequence.
- E. Owner occupancy.
- F. Maintaining Sewage Flows
- G. Contract Documents

1.2 GENERAL SCOPE OF WORK

- A. The scope of work anticipated for the Sanitary Sewer Lining is generally described as:
 - 1. Pipe 1 – 187 feet of 12” vitrified clay, reinforce concrete and ductile iron pipe;
 - 2. Pipe 5 – 95 feet of 12” vitrified clay pipe;
 - 3. Pipe 7 – 109 feet of 14” cast iron pipe;
 - 4. Repairs to existing piping to accommodate liner;
 - 5. Bypass pumping as required;
 - 6. Closed circuit televising of sewer before and after project;
 - 7. Repair of existing facilities damaged or disturbed by project work;
- B. Contractors shall be responsible for coordination of subcontractors, suppliers, and overall construction schedule.

1.3 WORK BY OWNER

- A. Owner shall provide construction engineering and observation services for the project.
- B. Contractor shall be responsible for obtaining all permits required for construction of the improvements.

1.4 CONTRACTOR'S RESPONSIBILITIES

- A. Contractor shall provide all labor, material, equipment, supervision, management, and transportation necessary to complete the scope of work intended and required by these project documents.
- B. The site is constrained by existing underground utilities and overhead utility lines. Interested bidders are strongly encouraged to visit the site prior to submitting a bid.
- C. Contractor shall be responsible for providing any required temporary pumping facilities, piping, etc., necessary to complete the project without any process bypassing. Continuous treatment must be provided at the same level during construction as existed

- prior to construction.
- D. The Contractor shall take all precautions to protect against any adverse environmental effects (e.g., dust, noise, soil erosion) during construction.
 - E. Contractor shall be responsible for unloading and storage of all materials and equipment.
 - F. Contractor shall be responsible for supply of all labor and all ancillary materials to provide a complete installation of liner.

1.5 OWNER OCCUPANCY

- A. The Owner retains the right to occupy adjacent facilities throughout construction. The Contractor shall minimize disturbances to the Owner's operations.

1.6 MAINTAINING SEWAGE FLOWS

- A. Contractor shall be responsible for providing by-pass pumping as required to construct the improvements detailed in this contract.

1.7 CONTRACT DOCUMENTS

- A. The contract documents for this project shall consist of this volume plus a set of 24" x 36" blueline plans entitled "Village of Brewster, Ohio Sanitary Sewer Lining".

END OF SECTION

SECTION 01300 SUBMITTALS

PART1 - GENERAL

1.1 SECTION INCLUDES

- A. Submittal procedures.
- B. Construction progress schedules.
- C. Proposed products list.
- D. Shop drawings.
- E. Product data.
- F. Samples.
- G. Manufacturers' instructions.
- H. Manufacturers' certificates.
- I. Construction photographs.

1.2 SUBMITTAL PROCEDURES

- A. Transmit each submittal with cover letter to Engineer at:

ATS Engineering, Inc.
Village of Brewster, Ohio Sanitary Sewer Lining
7908 Cincinnati-Dayton Road
Suite P
West Chester, Ohio 45069

- B. Sequentially number the transmittal forms. Resubmittals to have original number with an alphabetic suffix.
- C. Identify Project, Contractor, Subcontractor or supplier; pertinent Drawing sheet and detail number(s), and specification section number, as appropriate.
- D. Apply Contractor's stamp, signed or initialed certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and Contract Documents.
- E. Schedule submittals to expedite the Project, and deliver to Engineer at business address. Coordinate submission of related items.
- F. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.
- G. Provide space for Contractor and Engineer review stamps. Engineer will require 4 ½" x 4 ½" for stamp
- H. Revise and resubmit submittals as required, identify all changes made since previous submittal.
- I. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

1.3 CONSTRUCTION PROGRESS SCHEDULES

- A. Prepare and submit initial and revised construction progress schedule in accordance with Section 01308.
- B. Revise and resubmit as required.
- C. Initial Application for Payment will not be accepted until construction progress schedule is approved.
- D. Applications for Payment will not be accepted unless accompanied by revised progress schedule.
- E. Construction progress schedules shall be prepared in accordance with Specification Section 01308.

1.4 SCEDHULE OF VALUES & SCHEDULE OF PAYMENTS

- A. Prepare and submit schedule of values and schedule of payments in accordance with Section 01308.
- B. Revise and resubmit as required.
- C. Initial Application for Payment will not be accepted until schedule of values and schedule of payments is approved.
- D. Schedules shall be prepared in accordance with Specification Section 01308

1.5 PROPOSED PRODUCTS LIST

- A. Within 15 days after date of Notice to Proceed, submit complete list of major products proposed for use other than those required sooner, with name of manufacturer, trade name, and model number of each product.
- B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.6 SHOP DRAWINGS

- A. Submit the number of copies which the Contractor requires, plus three copies which will be retained by the Engineer and Owner.

1.7 PRODUCT DATA

- A. Submit the number of copies which the Contractor requires, plus three copies which will be retained by the Engineer and Owner.
- B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this Project.
- C. After review, distribute in accordance with Article on Procedures above and provide copies for Record Documents described in Section 01700.

1.8 SAMPLES

- A. Submit samples to illustrate functional and aesthetic characteristics of the Product, with

- integral parts and attachment devices. Coordinate sample submittals for interfacing work.
- B. Submit samples of finishes from the full range of manufacturers' standard colors, or in custom colors selected, textures, and patterns for Owner's selection.
 - C. Include identification on each sample, with full Project information.
 - D. Submit the number or samples specified in individual specification Sections; one of which will be retained by Owner.
 - E. Reviewed samples which may be used in the Work are indicated in individual specification Sections.

1.9 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data.
- B. Identify conflicts between manufacturers' instructions and Contract Documents.

1.10 MANUFACTURER'S CERTIFICATES

- A. When specified in individual specification sections, submit manufacturers' certificate to Engineer for review, in quantities specified for Product Data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Engineer.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01308 SCHEDULES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Construction Progress Schedule.
- B. Schedule of Values.
- C. Schedule of Payments.

1.2 SUBMITTALS

- A. Submit schedules under provisions of Section 01300 and as modified herein.
- B. Construction Progress Schedule
 - 1. The contractor shall submit four (4) copies of the initial schedule to the Owner at the preconstruction conference.
 - 2. The schedule shall show each item to be procured for the work and for each such item, necessary dates for each step in the procurement process, including those for placement of orders, receipt and submittal of shop drawings, receipt of shop drawing approvals and delivery. Any delivery time problem or other problem anticipated shall be noted as remarks in the list.
 - 3. The component parts of the schedule shall be subdivided to the satisfaction of the Engineer and shall be broken down, at a minimum, to excavation, concrete, equipment, electrical, mechanical, instrumentation, etc., categories for each structure of the project.
 - 4. Within 30 days after the submission of the above mentioned list, the Contractor shall submit four (4) copies, in final form, of the critical path diagram and list to the Engineer.
 - 5. If the schedule as submitted by the Contractor is not sufficiently detailed, contains errors, or is unrealistic, it will be rejected in writing, and the Contractor shall submit a revised schedule within seven (7) days of the date of the notice of rejection.
 - 6. Contractor shall submit four (4) copies of the revised schedule to the Owner each month at or prior to the monthly progress meetings.
 - 7. A report summarizing the status of the project and the reason for deviation from the previous schedule shall accompany each monthly update of the schedule.
- C. Schedule of Values
 - 1. Submit four (4) copies of Schedule of Values to Owner for review at least 20 days prior to submitting first application for a progress payment. After review by the Engineer, revise and resubmit schedule as required until it is approved.
- D. Schedule of Payments

1. Submit four (4) copies of Schedule of Values to Owner for review at least 20 days prior to submitting first application for a progress payment. After review by the Engineer, revise and resubmit schedule as required until it is approved.
 2. Revisions to the Schedule of Payments may be required as the project progresses to reflect changing project conditions.
- E. Pending satisfaction of this requirement for schedules (Construction Progress Schedule, Schedule of Values and Schedule of Payments) no progress payment will be made, except in such amounts approved by the Engineer for materials received at the job site as provided in the General Conditions.

1.3 COORDINATION

- A. In the preparation of schedules the Contractor shall take into consideration shop drawing submittal and review time, the delivery times of equipment and materials, subcontractor's work, availability and abilities of workmen, weather conditions, any restrictions in operations at the job site, and all other items that may affect completion of the work within the time requirements of the Contract Documents.
- B. Contractor shall be responsible for coordination and scheduling of all construction activities including those of subcontractors and suppliers.

1.4 CONSTRUCTION PROGRESS SCHEDULE

- A. To assure completion of the work within the established time of completion, all activities of the Contractor will be scheduled and monitored by use of the critical path method, utilizing both activity diagram and list.
- B. The Contractor shall prepare and submit the initial and subsequent critical path diagrams and lists for the entire project.
- C. Critical path diagrams and lists shall be prepared by experts having demonstrated skill and substantial experience in critical path scheduling and shall show all activities in detail.
- D. Lists shall include for each activity its number, description, duration, early start, early finish, late start, late finish, and float time. Both the initial and subsequent submissions shall be time scaled.
- E. Schedule up dates and revisions
 1. The critical path diagram will be revised every month during the project to reflect departures and changes from the previous critical path diagram.
 2. If departures and changes during the previous period are of such minor nature that no useful purpose is served by revising the critical path diagram, the Owner may waive this requirement.
 3. A status report shall accompany each monthly update of the construction progress schedule which will provide detailed information as to the reason why the current schedule deviates from the previous.

- F. The Contractor shall consider equipment and material delivery times and coordinate deliveries to accommodate Contractors scheduling requirements.

1.5 SCHEDULE OF VALUES

- A. The Schedule of Values is an itemized list that establishes the value or costs of each part of the work.
- B. It shall be used as the basis for negotiations concerning additional work or credits which may arise during the construction.
- C. Quantities and unit prices may be included in the Schedule when approved by or required by the Owner.
- D. Schedule shall show breakdown of labor, materials, equipment and other costs used in preparation of the bid.
- E. Costs shall be in sufficient detail to indicate separate amounts for each portion of the work and section of the specifications.
- F. Contractor may include an item for bond, insurance, temporary facilities and job mobilization. This item will be included for payment at a rate of 25 percent per month for the first four months.
- G. Schedule of Values shall be prepared on 8-1/2" x 11" white paper.
- H. Use Table of Contents in the specifications as basis for Schedule format and identify each item with number and title in the Table of Contents. List sub-items of major products or systems as appropriate or when requested by the Engineer.
- I. When requested by the Engineer, support values with data that will substantiate their correctness.
- J. The sum of the individual values shown on the Schedule of Values must equal the total contract price.
- K. Each item shall include a directly proportional amount of the Contractor's overhead and profit.
- L. Schedule shall show the purchase and delivery costs for materials and equipment that the Contractor anticipates he shall request payment for prior to their installation.

1.6 SCHEDULE OF PAYMENTS

- A. The Schedule of Payments is list of the monthly applications for payment requests that the Contractor anticipates.
- B. It is understood that actual applications for payment may deviate from this schedule to reflect actual project conditions.
- C. Revised Schedule of Payment shall be required if deviations become substantial.

END OF SECTION

SECTION 01500
CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.1 FACILITIES

- A. Unless otherwise noted, Contractor shall provide all temporary electrical, lighting, heat, ventilation, telephone, water, sanitary, and first aid facilities required.
- B. The Contractor shall provide and maintain methods, equipment and temporary construction as necessary to provide controls over environmental conditions at the construction site and adjacent areas.
- C. The existing facilities may not be used unless agreement is obtained in writing from the Owner stating the conditions of use.

1.2 SECTION INCLUDES

- A. Temporary Utilities: Electricity, lighting, heat, ventilation, telephone service, water, and sanitary and first aid facilities.
- B. Temporary Controls: Barriers, enclosures and fencing, fire protection, protection of the Work, and water control.

1.3 TEMPORARY ELECTRICITY

- A. Temporary electrical service shall be installed and maintained by the Contractor until substantial completion of the project unless otherwise agreed by Owner.
- B. All cost for installation and operation, including the charge for power consumed, shall be the responsibility of the Contractor.
- C. Provide power outlets for construction operations, with branch wiring and distribution boxes. Provide flexible power cords as required.
- D. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.

1.4 TEMPORARY LIGHTING

- A. Provide and maintain adequate lighting for construction operations.
- B. Provide and maintain adequate lighting to interior work areas.

1.5 TEMPORARY VENTILATION

- A. Provide and pay for ventilation devices and power to ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

1.6 TEMPORARY SANITARY AND FIRST AID FACILITIES

- A. Provide all required sanitary and first aid facilities for use throughout the construction period including but not limited to:
 - 1. Potable water and sanitary drinking cups;
 - 2. Sanitary drinking fountains where feasible;
 - 3. Enclosed toilet facilities;
 - 4. Suitable general employee washing facilities;
 - 5. First-aid stations at or immediately adjacent to all major work areas and in the temporary field offices;
 - 6. Post telephone numbers of physicians, hospitals and ambulance services by each telephone at the project site;
 - 7. At least one person thoroughly trained in first aid procedures shall be present on the site whenever work is in progress. These persons must have a certificate indicating that they have completed a first-aid training course conducted by the American Red Cross or other approved agency.
- B. Contractor shall be responsible for the cost of maintaining all required sanitary and first aid facilities.
- C. Provide facilities and fixtures in compliance with applicable federal, state and local laws and regulations.
- D. Maintain strict supervision of use of facilities.
- E. Maintain, service and clean facilities and keep them supplied continuously with soap, towels, paper and all other required supplies.
- F. Enforce proper use of sanitary facilities, including preventing the committing of nuisances in buildings or on the site.
- G. Dispose of all wastes in conformance with applicable regulations.

1.7 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas and to protect adjacent properties from damage due to construction operations.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way.
- C. Provide protection for plant life designated to remain. Replace damaged plant life.
- D. Protect non-owned vehicular traffic, stored materials, site and structures from damage.

1.8 PROTECTION OF INSTALLED WORK AND PROPERTY

- A. Protect installed Work and provide special protection where specified in individual specification Sections.
- B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.
- A. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- A. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- B. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is

- necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- C. Prohibit traffic from landscaped areas.
 - D. Contractor shall assume full responsibility for the preservation of all public and private property or facility on or adjacent to the site. If any direct or indirect damage is done by or on account of any act, omission, neglect or misconduct in the execution of the work by the Contractor, it shall be restored by the Contractor, at his expense, to a condition equal to that existing before the damage was done.

1.9 SECURITY

- A. Contractor shall safely guard all work, materials, equipment and property from loss, theft, damage and vandalism. The Contractor's duty to safely guard property shall include the Owner's property and other private property from injury or loss in connection with the performance of the contract.
- B. Contractor may make no claim against the Owner for damage resulting from trespass.
- C. Party responsible for security shall make good all damage to property of Owner and others arising from failure to provide adequate security.
- D. If existing fencing or barriers are breached or removed for purposes of construction, the Contractor shall provide and maintain temporary security fencing equal to the existing in a manner satisfactory to the Owner.
- E. Security measures taken by the Contractor shall be at least equal to those usually provided by the Owner to protect his existing facilities during normal operation.
- F. Coordinate with Owner's security program.
- G. Maintain security program throughout construction until owner's acceptance and occupancy precludes need for Contractor's security program.

1.10 PARKING

- A. Provide all temporary construction roads, walks, and parking areas required during the construction and for use of emergency vehicles.
- B. Temporary roads and parking areas shall be designed and maintained by the Contractor so as to be fully usable in all weather
- C. When site space is not adequate, provide additional off-site parking.
- D. Prevent interference with traffic and the Owner's operations on existing roads.
- E. Contractor shall indemnify and save harmless the Owner from any expenses caused by Contractor's operations over these roads
- F. Roadways damaged by Contractor shall be restored to their original condition by the Contractor subject to approval of the Owner
- G. Temporary roads, walks and parking areas shall be removed by the Contractor prior to final acceptance and the ground returned to its original condition, unless otherwise required by the Contract Documents

1.11 ENVIRONMENTAL CONTROLS

- A. Noise Control

1. Contractor's vehicles and equipment shall be such as to minimize noise to the greatest degree practicable.
2. Noise shall conform to the latest OSHA standards.
3. In no case will noise levels be permitted which interfere with the work of the Owner or others.

B. Dust Control

1. Contractor shall be responsible for controlling objectionable dust caused by operation of vehicles and equipment.
2. Apply water and calcium chloride or use other methods subject to Engineer's review which will keep dust in the air to a minimum.

C. Pest and Rodent Control

1. Contractor shall provide rodent and pest control as necessary to prevent infestation of construction or storage area.
2. Employ methods and use materials which will not adversely affect conditions at the site or adjoining properties.

D. Water Control

1. Contractor shall provide methods to control surface water and water from excavations and structures to prevent damage to the Work, the Site or adjoining properties.
2. Control fill, grading and ditching to direct water away from excavations, pits, tunnels, existing facilities and other construction areas.
3. Direct drainage to proper runoff courses so as to prevent erosion, damage or nuisance.
4. Provide, operate and maintain equipment and facilities of adequate size to control surface water.
5. Dispose of drainage water in a manner to prevent flooding, erosion, or other damage to any portion of the site or to adjoining areas and in conformance with all environmental requirements.

E. Pollution Control

1. Contractor shall provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations.
2. Provide equipment and personnel and perform emergency measures required to contain any spillages and to remove contaminated soils or liquids.
3. Excavate and dispose of any contaminated earth off site and replace with suitable compacted fill and topsoil.
4. Take special measures to prevent harmful substances from entering public waters.

5. Prevent disposal of wastes, effluents, chemicals or other such substances adjacent to streams or in sanitary or storm sewers.
6. All sewage, oil and refuse generated during the course of the Work shall not be discharged into the adjacent waterways.
7. Provide systems for control of atmospheric pollutants.
8. Prevent toxic concentrations of chemicals.
9. Prevent harmful dispersal of pollutants into the atmosphere.
10. All contractors' equipment used during construction shall conform to all current federal, state and local laws and regulations.

F. Erosion Control

1. Contractor shall plan and execute construction and earthwork by methods to control surface drainage from cuts and fills and from borrow and waste disposal areas to prevent erosion.
2. Hold areas of bare soil exposed at one time to a minimum.
3. Construct fills and waste areas by selective placement to eliminate surface silts or clays which will erode.
4. Periodically inspect earthwork to detect any evidence of the start of erosion and apply corrective measures as required to control erosion.

END OF SECTION

SECTION 01600
MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Products.
- B. Transportation and handling.
- C. Storage and protection.
- D. Product options.
- E. Substitutions.

1.2 PRODUCTS

- A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.
- B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- C. Provide interchangeable components of the same manufacturer, for similar components.

1.3 TRANSPORTATION AND HANDLING

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.4 STORAGE AND PROTECTION

- A. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight, climate controlled enclosures.
- B. For exterior storage of fabricated products, place on sloped supports, above ground.
- C. Provide off-site storage and protection when site does not permit on-site storage or protection.
- D. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.
- E. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- F. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

1.5 PRODUCT OPTIONS

- A. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named after bidding. No substitutions shall be considered prior to Bidding.

1.6 SUBSTITUTIONS

- A. Engineer will consider requests for substitutions only within 15 days after date of Owner-Contractor Agreement, established in Notice to Proceed.
- B. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.
- C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- D. A request constitutes a representation that the Contractor:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Will provide the same warranty for the substitution as for the specified product.
 - 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution Submittal Procedure:
 - 1. Submit three (3) copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
 - 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.
 - 3. The Engineer will notify Contractor, in writing, of decision to accept or reject request.

END OF SECTION

**SECTION 01700
CONTRACT CLOSEOUT**

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Closeout procedures.
- B. Warranties.

1.2 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Owner's inspection.
- B. Provide submittals to the Owner required by governing or other authorities.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.3 WARRANTIES

- A. Provide duplicate notarized copies.
- B. Submit prior to final Application for Payment.

END OF SECTION

SECTION 02110 SITE PREPARATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Protect existing streets and structures.
- B. Maintain streets, driveways, sidewalks, curbs, gutters, seeding, and sodding.
- C. Protect trees designated to remain (trunks, roots and branches).
- D. Restore topsoil in planted areas or agricultural land.
- E. Restore grass and other vegetation damaged during construction.
- F. Maintain the construction area during the progress of the work.
- G. Completely restore the construction area to its original condition at the completion of the work.

1.2 REGULATORY REQUIREMENTS

- A. Conform to applicable Local, State and Federal codes for disposal of debris, burning debris on site, use of herbicides, other disposal and erosion control.
- B. Coordinate clearing Work with utility companies.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify that existing plant life designated to remain, is tagged or identified.

3.2 PROTECTION

- A. Locate, identify, and protect utilities that remain, from damage.
- B. Protect trees, plant growth, and features designated to remain, as final landscaping.
- C. Protect bench marks from damage or displacement.
- D. Any trees, plant growth, or features designated to remain and damaged by the contractor shall be repaired to the satisfaction of the Owner at the Contractor's expense.
- E. Survey monuments damaged by Contractor shall be restored at the Contractor's expense.

3.3 CLEARING

- A. Clear areas required for access to site and execution of Work.
- B. Remove paving, curbs, and other improvements as necessary.
- C. Clear undergrowth and deadwood, without disturbing subsoil.

3.4 REMOVAL

- A. Remove debris, rock, and extracted plant life from site.

3.5 PAVEMENT, CURBS, WALKS AND DRIVES

- A. Use suitable equipment, tools and methods to saw and trim pavement, curbs, walks or drives to a neat joint at the removal limit if limit does not occur at an existing joint.
- B. Restore to their original condition all pavement, curbs, walks and drives that were damaged, disturbed or occupied by the Contractor in connection with any phase of the Work.

END OF SECTION

SECTION 02150 BYPASS PUMPING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Contractor shall furnish, construct, maintain and operate bulkheads, plugs, hoses, piping, and pumps to bypass sewage flow while maintenance or construction operations are in progress. The flow shall be diverted by pumping around the construction location to a downstream manhole. Bypass pumping shall prevent backup or overflow onto streets, yards and unpaved areas or into buildings, adjacent ditches, storm sewers, and waterways, without diverting sewage outside of the sewer system.
- B. Related Work Specified Elsewhere:
 - 1. Section 02651, Television Inspection.
 - 2. Section 02760, Cleaning of Sewers.
 - 3. Section 02770, Pipe Lining.

1.2 QUALITY ASSURANCE

- A. The bypass system shall meet the requirements of all codes and regulatory agencies having jurisdiction. The Contractor shall be responsible for damage due to sewer backup or overflow onto streets, yards and unpaved areas or into buildings, adjacent ditches, storm sewers, and waterways.
- B. Some sewer flow data is available for Contractor's review upon request.

1.3 SUBMITTALS

- A. Submittals shall conform to the requirements herein.
- B. The Contractor shall submit, prior to installation, a detailed plan and description outlining all details and provisions of the temporary bypass pumping system. The plan shall be specific and complete, including such items as schedules, locations, elevations, capacities of equipment, materials and all other incidental items necessary and/or required to insure proper operation of the bypass pumping system, including protection of the access and bypass pumping locations from damage due to the discharge flows, and compliance with the requirements and permit conditions specified in these Contract Documents. No bypass pumping shall begin until all provisions and requirements have been reviewed and approved.
- C. The bypass pumping plan shall include, but not be limited to, the following:
 - 1. Staging areas for pumps;
 - 2. Flow stoppage system, including pipe and channel plugging method and types of plugs;

3. Number, size, material, location and method of installation of pump suction piping;
4. Number, size, materials, method of installation and location of installation of discharge piping;
5. Number, size, materials, method of installation and location of installation of all valves;
6. Bypass pump sizes, capacity, number of each size to be on site and power requirements;
7. Calculations of static lift, friction losses, and flow velocity (pump curves showing pump operating range shall be submitted);
8. Size and location of standby power generator, if required;
9. Downstream discharge plan;
10. Any thrust and restraint block sizes and locations;
11. Any temporary pipe supports and anchoring required;
12. Calculations for selection of bypass pumping pipe size;
13. Schedule and for installation of and maintenance of bypass pumping lines;
14. Plan indicating location of bypass pumping line locations;
15. Method of noise reduction.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Design piping, joints, and accessories to withstand at least twice the maximum system pressure or 50 psi, whichever is greater.
- B. Pumps shall be self-priming type or submersible electric, in good working order, with a working pressure gauge. All power must be supplied by the Contractor. All pumps used must be constructed to allow dry running for extended periods of time to accommodate the cyclical nature of sewer flows.
- C. Contractor shall provide one stand-by pump equal to the capacity of the largest pump on site.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL AND MAINTENANCE

- A. Any time the bypass pumping system is operating, an experienced operator shall be on site to monitor the operation, adjust pump speed, valves, etc., make minor repairs to the system and report problems.
- B. During bypass pumping, do not allow sewage to be leaked, dumped, or spilled in or onto any area outside of the existing sewer system.
- C. In the event of accidental spill or overflow, immediately stop the discharge and take action to clean up, disinfect the spill and promptly notify the Owner.

- D. Prevent back-up of sewage in sewer laterals within the areas of pipe being rehabilitated.
- E. In the event of rain, the Contractor shall coordinate the operation of bypassing with the Owner.
- F. The Contractor shall design his bypass pumping operation to handle all flows when bypass pumping. The Contractor is responsible for timing lining operations for dry weather conditions. Wet weather flows may significantly exceed peak dry weather flows.
- G. Spare parts for each type of pump and piping shall be kept on site as required.
- H. The bypass pumping operation shall be demonstrated to the satisfaction of the Engineer and Owner prior to starting rehabilitation work.

3.2 INSTALLATION AND REMOVAL

- A. Contractor shall locate his bypass pipelines to minimize any disturbance to existing utilities and shall obtain approval of the pipeline locations from the Owner.
- B. During all bypass pumping operation, the Contractor shall protect existing structures and equipment from damage inflicted by any equipment. The Contractor shall be responsible for all physical damage to the existing structures and equipment caused by human or mechanical failure. The Contractor is responsible for replacing any part of the manhole damaged during the bypass operation.
- C. When working inside existing structures, the Contractor shall exercise caution and comply with OSHA requirements when working in the presence of gases, combustible or oxygen-deficient atmospheres, and confined spaces.
- D. The Contractor is responsible for excavation and dismantling the manhole to allow the proper area for the bypass operation. Upon completion of the work, the Contractor shall restore the manhole to its original condition, and backfill the excavation according to the requirements of the agency having jurisdiction.
- E. Bypass pumping and piping equipment shall be located on property and easements owned by the Owner. If additional property is required for operation and access to the Contractor's bypass pumping operation, the Contractor shall obtain written permission and agreements from the property owner and submit copies of the agreement to the Owner.
- F. The pipeline must be located off streets and sidewalks and on shoulders of the roads. When the bypass pipeline crosses streets and driveways, the Contractor must place the bypass pipelines in trenches and cover with temporary pavement. Upon completion of the bypass pumping operations, and after the receipt of written permission from the Owner, the Contractor shall remove all the piping, restore all property to pre-construction condition and restore all pavement.
- G. When bypass pumping operations are complete, piping shall be drained into the sewer prior to disassembly.
- H. Noise reduction shall be required if bypass pumping is located within 300 feet of an occupied structure. The method of noise reduction shall be approved by the Engineer. Noise reduction shall result in a sound level of no more than 70 dBA at a distance of 30 feet from the pumps.

END OF SECTION

SECTION 02651
TELEVISION INSPECTION

PART 1 – GENERAL

1.1 WORK INCLUDED

- A. Contractor shall provide all labor, materials, tools, equipment and incidentals as shown, specified, and required to perform Post- Installation television (TV) inspection of the influent sewer, as specified herein.

1.2 DEFINITIONS

- A. Survey TV Inspection: Video inspection of sewer lines to determine existing conditions of the pipe. Survey TV Inspection has already been performed by the Owner.
- B. Pre-Installation TV Inspection: Video inspection of sewer lines specified for rehabilitation to confirm cleaning and constructability of line rehabilitation.
- C. Post-Installation TV Inspection: Video inspection to determine that rehabilitation of an existing sewer or construction of new sanitary sewers has been completed according to Specifications.

1.3 SUBMITTALS

- A. Submit the TV equipment manufacturer's operating manual and guidelines to the Owner and Engineer for review. Strictly follow such instructions unless modified by the Owner or Engineer.
- B. Submit three (3) copies of CD-ROMs, DVDs and TV Inspection logs, in a bound report, to the Owner or Engineer for review.
 - 1. Provide CD-ROMs or DVDs of a quality sufficient for the Owner or Engineer to evaluate the condition of the sewer, locate the sewer service connections, and verify cleaning. If the Owner or Engineer determines that the quality is not sufficient, Contractor shall re-televiser the sewer segment and provide a new CD-ROM or DVD and report at no additional cost to the Owner. Camera distortions, inadequate lighting, dirty lens, or blurred/hazy picture will be cause for rejection of a tape and rejection of the associated line segment. Payment for televised inspection will not be made until Owner or Engineer approves the quality of the CD-ROM, DVD and reports.
 - 2. CD-ROM or DVD submitted become the property of the Owner.
 - 3. Contractor shall maintain a master copy of all CD-ROMs, DVDs and TV Inspection Reports submitted, until final acceptance of contract.
 - 4. The Post-Installation CD-ROMs or DVDs shall not be edited.

PART 2 – PRODUCTS

2.1 TELEVISION EQUIPMENT

- A. Closed Circuit TV Equipment: Select and use closed-circuit television equipment that will produce a color CD-ROM or DVD.
- B. Pipe Inspection Camera: Produce a CD-ROM or DVD using a pan-and-tilt, radial viewing, pipe inspection camera or a hand-held video camera that pans ± 275 degrees and rotates 360 degrees. Use an accurate footage counter to measure the exact distance of the camera from the centerline of the starting point. Use a camera with camera height adjustment so that the camera lens is always centered at one-half the inside diameter, or higher, in the pipe being televised. Provide a lighting system that allows the features and condition of the pipe to be clearly seen. A reflector in front of the camera may be required to enhance lighting in humidity conditions. The camera shall be operative in 100 percent humidity conditions. The camera, television monitor and other components of the video system shall be capable of producing a minimum 500-line resolution colored video picture. Picture quality and definition shall be to the satisfaction of the Engineer. If unsatisfactory, equipment shall be removed and no payment made for an unsatisfactory inspection.
- C. Television Inspection Logs: Prepare printed location records to clearly identify the location of each source of infiltration or defect discovered using a standard stationing system. Other data of significance includes:
 - 1. Estimation of extraneous flows observed from holes, joints, cracks, and from the annular space between rehabilitated sliplined pipe.
 - 2. Unusual conditions.
 - 3. Roots.
 - 4. Cracked or collapsed sections.
 - 5. Sags or low spots in the pipe.
 - 6. Presence of scale and corrosion.
 - 7. Structural deficiencies.
 - 8. Signs of previous leakage.
 - 9. Sewer line sections that the camera failed to pass through and reasons for the failure.
 - 10. Other discernible features.
- D. Data shall be recorded and a copy of the television inspection logs shall be supplied to the Owner or Engineer in the form of a bound report. A table listing acronyms and their meaning shall be included in the report. Contractor shall also supply the Owner a copy of the television inspection logs on an electronic file that is Microsoft Excel compatible.
- E. Photographs: Take instant developing 35 mm, or other standard size photographs off the TV monitor of problem areas as directed to document defects, and unusual, questionable, or severe conditions found during the course of the Work.
- F. Digital Video Disc: Provide digital video of the information in DVD format.

1. Two labels are required. One label shall be placed on the front of the CD-Rom or DVD and one place on the CD-ROM or DVD case. Permanently label each CD-ROM or DVD with the following information:
 - a. Spine of tape or CD-ROM or DVD case:
 - 1) File Number.
 - 2) Contractor's Name.
 - 3) Inspection Type: Pre or Post-Installation.
 - 4) Tape Number.
 - 5) Date Televised.
 - 6) Date Submitted.
 - b. Face of tape or front of CD-ROM or DVD:
 - 1) File Name/Description.
 - 2) Pipe Diameter.
 - 3) Pipe Length.

PART 3 – EXECUTION

3.1 TELEVISION

- A. Immediately after cleaning, televise the sewer line to document its condition and to locate existing points of infiltration or other defects. Notify the Owner and Engineer 24 hours in advance of any TV inspection so that the Owner and Engineer may observe inspection operations. If conditions are shown that preclude the proper liner installation, even with cleaning, the Contractor shall notify the Owner and Engineer immediately.
- B. Perform TV inspection of the sewer as follows:
 1. Perform Survey TV Inspection immediately after cleaning.
 - a. Move the camera through the line in either direction at a uniform rate, stopping when necessary to ensure proper documentation of the sewer's condition.
 - b. Use manual winches, power winches, TV cable and powered rewinds or other devices that do not obstruct the camera view or interfere with proper documentation of the sewer conditions to move the camera through the sewer line.
 - c. Quantify visible leakage of extraneous flow into the sewer or other sags or defects in the sewer and record on electronic log and audio/video recording. The video recording may be paused during observation. Record results of the flow observed on CD-ROM, DVD and inspection logs..

2. Perform Pre-Installation TV Inspection immediately after line cleaning and before line rehabilitation work. Pre-Installation TV Inspection is not required for sewer lines designated as remove and replace. Verify that the line is clean and ready to accept the line rehabilitation material. Maintain copies of CD-ROMs or DVDs and logs for reference by the Owner or Engineer for the duration of the Project.
3. Perform Post-Installation TV Inspection to confirm completion of rehabilitation work or proper installation of new sewers. Verify that the rehabilitation work or new sewer construction conforms to the requirements of the Specifications. Provide a color videotape showing the completed Work. Prepare and submit a log providing location of any discrepancies.
4. Camera shall pan beginning and ending manholes to demonstrate that all debris has been removed. Camera operator shall slowly pan clamped joints, and when pipe material transitions from one material to another. A log shall be completed for every segment that is submitted to the Owner.
5. Whenever non-remote powered and controlled winches are used to pull the television camera through the line, telephones, radios, or other suitable means of communication shall be set up between the operators positioned at the two manholes of the sewer lines being inspected to ensure that good communications exist between members of the crew.
6. The accuracy of the measurements for location of defects and service connections cannot be stressed too strongly. Marking on cable, or the like, which would require interpolation for depth of manhole, will not be allowed. Measurement meters shall be accurate to two-tenths of a foot over the entire length of the sewer line section being inspected. Prior to recording the location of defects and service connections, slack in the cable of the television inspection camera shall be taken up to assure metering device is designating proper footage. Accuracy of the measurement meters shall be checked daily by use of a walking meter, roll-a-tape, or other suitable device.

3.2 FLOW CONTROL

- A. There shall be no flow in the line while performing Pre-Installation TV Inspection.
- B. No flow will be allowed in the line while performing Post-Installation TV Inspection.

3.3 PASSAGE OF TV CAMERA

- A. Do not pull or propel the television camera through the line at a speed greater than 30 feet per minute for Pre- and Post-Rehabilitation TV Inspection.
- B. For Post-Installation TV Inspection, exercise the full capabilities of the camera equipment to document the completion of the rehabilitation work or proper installation of the new sewers. and the conformance of the Work to the Specifications. Provide a full 360-degree view of pipe and joints.

3.4 FIELD QUALITY CONTROL

- A. Contractor shall not allow, under any circumstances, sewage or solids removed in the cleaning process to be released onto streets or into ditches, catch basins, storm drains, or storm sewer manholes, or cleanouts.
- B. Acceptance of sewer cleaning work is contingent upon the successful completion of the TV inspection. If the TV inspection shows debris, solids, sand, grease, or grit remaining in the line, the cleaning will be considered unsatisfactory. Repeat cleaning, inspection, and televising of the sewer line until cleaning is satisfactory.

3.5 ACCEPTANCE OF WORK

- A. Rehabilitation or completion of new sewer installation work shall only be accepted if no defects are found in the line upon TV inspection as determined by the Owner.
- B. Contractor shall repair all defects to the piping in a manner acceptable to the Owner at no additional cost to the Owner.

END OF SECTION

SECTION 02760 CLEANING OF SEWERS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Contractor shall provide all labor, materials, tools, equipment and incidentals as shown, specified, and required to clean the pipelines.
- B. The cleaning work required includes, but is not limited to, the following:
 - a. field locating all manholes along the sewer reaches to be cleaned;
 - b. cleaning of existing sanitary sewers, as hereinafter specified, to permit proper television inspection, installation of liner, and other rehabilitation techniques;
 - c. disposal of waste and sediment as specified herein;
 - d. removal of roots as specified herein;
 - e. cleaning up as the Work progresses and after the completion of all Work activities; and
 - f. all other work required for the complete and satisfactory cleaning of the pipeline.
- C. Related Sections:
 - 1. Section 02150, Bypass Pumping.
 - 2. Section 02651, Television Inspection.
 - 3. Section 02770, Pipe Lining.

1.2 REQUIREMENTS

- A. The Contractor shall take precautions recommended by the manufacturer and all other precautions necessary in handling of root treatment chemicals. Chemical root treatment material to be used in strict compliance with all applicable federal, state and local requirements relative to type of material and usage thereof.
- B. Take precautions to protect sewer mains and manholes from damage that might be inflicted by the improper selection of the cleaning process or improper use of the equipment. When using hydraulically propelled devices, take precautions to ensure that the water pressure created does not cause damage or flooding to public or private property. Do not surcharge the sewer beyond the elevation that could cause overflow of sewage into area waterways, homes, or buildings, or onto the ground.
- C. While video of the sewers are available, the images are approximately two years old. The Contractor is responsible for determining current conditions for estimating amount of cleaning that may be required.

1.3 SUBMITTALS

- A. Submit the following to Engineer for review:
 - 1. Plan for disposal of debris and sediment removed from the sewer lines.
 - 2. Specifications for the sewer cleaning equipment to be used on the project.
 - 3. Specifications for the equipment to be used to remove sediment and debris at the downstream manhole of each reach to be cleaned.

PART 2 - PRODUCTS

2.1 CLEANING EQUIPMENT

- A. All sewers shall be cleaned with truck-mounted, high velocity, hydro-cleaning equipment. The Contractor shall remove all unsound materials, debris, and grease by cleansing the interior surface using a minimum of 2,000 psi water spray pressure wash.
- B. Provide equipment capable of removing all sand, dirt, rocks and other debris from the sewer reach to allow unobstructed remote television internal inspection of all internal surfaces, and other rehabilitation techniques.
- C. All cleaning equipment, including machines, devices, and tools required for the entire cleaning operation shall be owned or leased and operated by the Contractor. The Contractor shall certify that backup cleaning equipment is available and can be delivered to the Site within 24 hours.
- D. Any blockages of lateral building connections resulting from the cleaning or other items of Work shall be removed by cleaning of the building connection by the Contractor, at his own expense. Any damage caused by flood of lateral building connections shall be corrected by the Contractor, at his own expense.
- E. Contractor shall provide all equipment capable of mechanically removing roots. Devices shall include a root saw, spring blade root cutter chuck or approved equal.
- F. Hand-held pressure washers with a minimum of 1,000 psi of pressure may be used.

PART 3 - EXECUTION

3.1 CLEANING

- A. After determining the preliminary requirements and the feasibility of effective video inspection, the Contractor shall thoroughly clean all pipeline reaches in order to permit an unrestricted inspection by closed circuit television. Particular emphasis shall be afforded the removal of accumulated grease, roots, sand, rocks, sludge and other debris so that the video inspection will show clearly all portions of the pipe being inspected. Acceptance of pipeline cleaning shall be made upon the successful completion of the television inspection and shall be defined as removing sufficient material to ensure an effective rehabilitation of the pipeline, to the satisfaction of the Engineer. If television inspection shows the cleaning to be unsatisfactory, the

- Contractor shall reclean and reinspect the pipeline at no additional cost to the Owner.
- B. Contractor is responsible for obtaining necessary permits for obtaining water from the Village of Brewster. Contractor is responsible for following all rules and requirements of the Water Department. Backflow preventers shall be used to prevent contamination of the potable water system. The Contractor is responsible for any damage resulting from improper operation of hydrants. Do not use or obstruct a fire hydrant when there is a fire in the area. Remove water meters, fittings and piping from fire hydrants at the end of each working day.
 - C. Do not waste water from the public water supply because of improper connections or from hydrants left opened. If the Engineer or Owner determines that the Contractor is wasting water, the Owner may elect to charge the Contractor for water used on the project.
 - D. The Contractor shall remove all bricks, rocks, debris, sludge, dirt, sand, grease, roots and other materials from the sewers to be cleaned, and collect and remove the resulting debris from the downstream manholes of the sewer section being cleaned. Passing waste material between manholes will not be permitted. When necessary, temporarily install a dam trap or weir and in the downstream manhole in such manner that debris and solids shall be trapped and retained for subsequent removal.
 - E. Remove waste and debris cleaned from the sewers at the downstream manhole by pumps or other means. The discharge and drainage stream shall be returned to the sewer and discharged downstream for disposal. Under no circumstances shall sewage or solids be dumped onto the ground surface, street, or into ditches, catch basins or storm drains. All solids and semi-solids shall be placed in a covered watertight container so that no spillage or leakage will occur and covered to minimize odors, and shall be disposed of by the Contractor. The Contractor is responsible for all operations and costs associated with removal, transportation, tipping and disposal of debris collected during the cleaning operations.
 - F. Where access to manholes in easements and rights-of-way is required, the Contractor will obtain permission for access for his equipment.
 - G. The Contractor shall conform to the following requirements:
 - 1. Cleaning of upstream reaches of sewers shall be completed before the downstream reaches are cleaned;
 - 2. Hydro-cleaning equipment shall be inserted in the downstream manhole of the reach, and the cleaning work shall proceed upstream; and
 - 3. Winching equipment used shall not damage the existing pipelines.

END OF SECTION

SECTION 02770 PIPE LINING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Contractor shall provide all materials, equipment, labor and supervision for the installation and testing of pipe lining. The pipe lining will be installed in pipes made of various materials.
- B. Related Sections:
 - 1. Section 02150, Bypass Pumping.
 - 2. Section 02651, Television Inspection.
 - 3. Section 02760, Cleaning of Sewers.
 - 4. Section 03602, Sliplining Grout - Structural

1.2 QUALITY ASSURANCE

- A. Reference Standards: Comply with applicable provisions and recommendations of the following:
 - 1. ASTM D2321, Practice for Underground Installation of Flexible Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.
 - 2. ASTM 3035, Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on a Controlled Outside Diameter.
 - 3. ASTM D 3350, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
 - 4. ASTM F 585, Practice for Insertion of Flexible Polyethylene Pipe into Existing Sewers.
 - 5. ASTM F 714, Specification for Polyethylene (PE) plastic pipe (SDR-PR) Based on Outside Diameter.
 - 6. ASTM F 1417, Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low Pressure Air
 - 7. PPI Handbook of Polyethylene Pipe.
 - 8. AASHTO Standard Specification for Highway Bridges.
 - 9. ASTM D543 - Test Method for Resistance of Plastics to Chemical Reagents.
 - 10. Standards of American Water Works Association, AWWA.
 - 11. Standards of American National Standards Institute, ANSI.
 - 12. ASTM D2990 - Long-term Flexural and Tensile Modulus of Elasticity.
 - 13. ASTM D1784 - Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
 - 14. ASTM D2152 - Test Method for Degree of Fusion of Extruded Poly(Vinyl Chloride) (PVC) Pipe and Molded Fittings by Acetone Immersion
 - 15. ASTM D2241 - Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR)

- B. Contractor shall be licensed and/or certified by the manufacturer of the sliplining system and shall meet other experience requirements as listed. Only commercially proven products and installers with substantial track records will be approved. Products and installers seeking approval must document an ability to meet the following criteria to be deemed commercially proven:
1. For a product to be considered commercially proven, a minimum of 1,000,000 linear feet or 4,000 manhole-to-manhole line sections of successful wastewater collection system installations in the U.S. must be documented to the satisfaction of the Owner to assure commercial viability. Of that, 50,000 LF must be 26-inches and larger.
 2. For an Installer to be considered as commercially proven, the installer must satisfy all insurance, financial, and bonding requirements of the Owner, and must have had at least 5 (five) years active experience in the commercial installation of the product. Acceptable documentation of these minimum installations must be submitted to the Owner.
 3. Sewer rehabilitation products submitted for approval must provide third party test results supporting the long term performance and structural strength of the product and such data shall be satisfactory to the Owner. No product will be approved without independent third party testing verification.
 4. The Contractor's Superintendent who will perform the work under this Section must have at least 3 years of experience and have successfully installed at least 300,000 linear feet of the proposed product, of which at least 5,000 linear feet must be 36-inch or greater.
- C. The Contractor shall be capable of providing all crews and equipment as needed to complete the work when directed without undue delay.
- D. Though the process may be licensed, no change of material, design values, or procedures may be made during the course of the Work without the prior written approval of the Engineer.
- E. The Contractor shall use sliplining materials provided by a single manufacturer. The supplier shall be responsible for conforming to all test requirements specified herein as applicable. In addition, all liners to be installed under this Contract may be inspected at the plant for compliance with these specifications by an independent testing laboratory provided by the Owner, at its own expense. The Contractor shall require the manufacturer's cooperation in these inspections. The cost of plant inspection will be the responsibility of the Owner.
- F. At the time of manufacture, each lot of liner shall be inspected for defects and tested in accordance with applicable ASTM standards. At the time of delivery, the liner shall be homogeneous throughout, uniform in color, free of cracks, holes, foreign materials, blisters, or deleterious faults.
- G. Care shall be taken in shipping, handling and storage to avoid damaging the liner. Extra care shall be taken during cold weather construction. Any liner damaged in shipment shall be replaced as directed by the Engineer.
- H. While stored, the sliplining materials shall be adequately supported and protected. The sliplining materials shall be stored in a manner as recommended by the manufacturer and as approved by the Engineer.

- I. For testing purposes, a production lot shall consist of all 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.
- J. All sliplining work shall be fully guaranteed by the Contractor and manufacturer for a period of one year from the date of acceptance. During this period, all serious defects discovered by the Owner shall be removed and replaced in a satisfactory manner at no cost to the Owner. The Owner may conduct an independent television inspection, at its own expense, of the lining work at any time prior to the completion of the guarantee period.
- K. The Engineer may at any time direct the manufacturer and the Contractor to obtain compound samples and prepare test specimens in accordance with the applicable ASTM standards. The Contractor shall provide certified test results of the short-term properties, including wall thickness, flexural strength and flexural modulus of the cured lining material from a flat plate sample, conforming to Article 3.6.A of this Section. Samples shall be prepared and tested by an independent laboratory approved by the Engineer. The cured liner samples shall be tested for flexural strength and flexural modulus properties in accordance with ASTM F1216, ASTM D790, ASTM M638 and ASTM D2990. The samples shall meet or exceed the physical properties stated in this specification. Conformance certification shall be submitted to the Engineer for approval as part of the acceptance requirements.
- L. The newly installed liner shall be designed for a minimum 50-year service life under continuous loading conditions. Design of the liner shall be based on the condition of the existing pipe as classified by the Engineer. The liner design is the responsibility of the Contractor. The liner shall be designed by a registered professional engineer in the State of Ohio and shall have sufficient wall thickness to withstand the anticipated external pressures and loads which will be imposed after installation. The design of the liner shall include considerations for ring bending, deflection, combined loading, buckling, and ovality. Calculations which determine wall thickness requirements of the liner shall be submitted to the Engineer for information only, to assure that the requirements of the specifications have been complied with. Designs shall be based on the use of standard flexible pipe equations, as defined in ASTM and shall account for the effects of ovality. A safety factor of at least two shall be utilized. The short-term modulus of elasticity shall be reduced by 50 percent in the calculations. Where ovalities exceed 10 percent, alternate design methodologies shall be used and shall show design meets structural requirements.

1.3 DESCRIPTION

- A. The process shall consist of inserting a plastic pipe into an existing sewer, holding the pipe in place and grouting the annular space between the host pipe and the liner.
- B. The liner pipe shall be designed for and a structurally sound pipe with a uniformly smooth interior providing hydraulic flow equal to or greater than the existing sewer in original condition.

1.4 SUBMITTALS

- A. Submittals shall conform to the requirements of Section 01300, Submittals.

- B. Product Data: Provide data indicating pipe and pipe accessories.
- C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. High Density Polyethylene (HDPE) Pipe

- 1. Be manufactured of high-density polyethylene resin in accordance with ASTM D3350-06 with a cell classification of 345464C.
- 2. Have a material designation of PE 3408 by the Plastic Pipe Institute.
- 3. Meet stiffness range as shown in ASTM F714, Appendix X1, Table X1.1
- 4. Have physical properties in accordance with polyethylene material standard ASTM D3350-06 with cell classification 345464C as follows:
 - a. Density: 0.955 gms/cubic centimeters per ASTM D1505.
 - b. Flexural Modulus: Minimum 135,000 psi per ASTM D790.
 - c. Tensile Strength: Minimum 3,200 psi per ASTM D638.
 - d. PENT > 100 hours at 80 degrees C, 2.4 Mpa per ASTM F1473.
 - e. HDB@ 23 degrees C: 1,600 psi per ASTM D2837.
 - f. UV Stabilizer: Minimum 2% carbon black per ASTM D 1603.
- 5. Liner pipe for host pipe 24-inch ID and larger shall be DR 32.5
- 6. Liner pipe for host pipe 20-inch and smaller shall be DR 17
- 7. Liner pipe shall be smooth and non-porous with a Manning friction coefficient "n" of 0.009 or a Hazen Williams friction coefficient "C" of 150.

B. Fusible Polyvinyl Chloride (FPVC) Pipe

- 1. Fusible polyvinylchloride pipe shall conform to ASTM D3034 or ASTM F679.
- 2. Fusible polyvinylchloride pipe may instead conform to AWWA C900 or AWWA C905, and/or ASTM D2241 or ASTM D1785 for IPS standard dimensionality, if applicable. Testing shall be in accordance with AWWA standards for any of these pipe types.
- 3. Rework material shall be allowed per ASTM D3034, ASTM F679, AWWA C900 or AWWA C905 standards.
- 4. Fusible polyvinylchloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.
- 5. Fusible polyvinylchloride pipe shall be manufactured in a standard 20', 30' or 40' nominal length.
- 6. Fusible polyvinylchloride pipe shall be green in color for wastewater use.

7. Pipe generally shall be marked per AWWA C900 or AWWA C905, and shall include as a minimum:
 - a. Nominal pipe size
 - b. PVC
 - c. Dimension Ratio, Standard Dimension Ratio or Schedule (omit for ASTM D3034 or ASTM F679 pipe)
 - d. Extrusion production-record code
 - e. Trademark or trade name
 - f. Cell Classification 12454 and/or PVC material code 1120 may also be included.
8. Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other visible deleterious faults.
9. Liner pipe for host pipe 24-inch ID and larger shall be DR 32.5
10. Liner pipe for host pipe 20-inch and smaller shall be DR 17
11. Liner pipe shall be smooth and non-porous with a Manning friction coefficient “n” of 0.009 or a Hazen Williams friction coefficient “C” of 150.

2.2 **JOINTING**

A. Fusion Joints

1. Fusible joints shall be assembled in the field with butt-fused joints.
2. Contractor shall follow the pipe supplier’s guidelines for this procedure.
3. Pipe shall be handled in a safe and non-destructive manner before, during, and after the fusion process and in accordance with this specification and pipe supplier’s guidelines.
4. Pipe shall be fused by qualified fusion technicians, as documented by the pipe supplier.
5. Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) affixed to the fusion machine.
6. Only appropriately sized and outfitted fusion machines that have been approved by the pipe supplier shall be used for the fusion process.
7. Fusion machines shall incorporate the following properties, including the following elements:
 - a. HEAT PLATE - Heat plates shall be in good condition with no deep gouges or scratches. Plates shall be clean and free of any debris or contamination. Heater controls shall function properly, cord and plug shall be in good condition. The appropriately sized heat plate shall be capable of maintaining a uniform and consistent heat profile and temperature for the size of pipe being fused, per the pipe supplier’s guidelines.
 - b. CARRIAGE – Carriage shall travel smoothly with no binding at less than 50 psi. Jaws shall be in good condition with proper inserts for the pipe size being fused. Insert pins shall be installed with no interference to

- carriage travel.
 - c. GENERAL MACHINE - Overview of machine body shall yield no obvious defects, missing parts, or potential safety issues during fusion.
 - d. DATA LOGGING DEVICE - The current version of the pipe supplier's recommended and compatible software shall be used. Datalogging device operations and maintenance manual shall be with the unit at all times. If fusing for extended periods of time, an independent 110V power source shall be available to extend battery life.
8. Other equipment specifically required for the fusion process shall include the following:
- a. Pipe rollers shall be used for support of pipe to either side of the machine.
 - b. A weather protection canopy that allows full machine motion of the heat plate, fusion assembly and carriage shall be provided for fusion in inclement and /or windy weather.
 - c. Fusion machine operations and maintenance manual shall be kept with the fusion machine at all times.
 - d. Facing blades specifically designed for cutting fusible polyvinylchloride pipe shall be used.
9. Joint Recording
- a. Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine.
 - b. The fusion data logging and joint report shall be generated by software developed specifically for the butt-fusion of thermoplastic pipe.
 - c. The software shall register and/or record the parameters required by the pipe supplier and these specifications.
 - d. Data not logged by the data logger shall be logged manually and be included in the Fusion Technician's joint report.

B. Buttress Lock Joints

- 1. "Buttress-Loc" pipe allows short lengths of pipe to be assemble inside a manhole effectively converting short lengths of plastic pipe into continuous pipelines.
- 2. Each length is screwed together with a chain wrench that when fully tightened, automatically self seals.
- 3. Completed joint shall exhibit very high pull out strength without changing the OD or the ID of the liner pipe.
- 4. Liner pipe shall be advanced into the host pipe as the joints are completed.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Review survey television inspection tapes of the sewer line to plan rehabilitation work. Contractor shall be responsible for determining the location of all active sanitary services prior to lining.
- B. The work of pipeline cleaning shall conform to the requirements of Section 02760, Cleaning of Sewers.
- C. Contractor shall provide for continuous sewage flow around the section of sewer that is to be lined in accordance with Section 02150, Bypass Pumping.
- D. Inspect and confirm the inside diameter, alignment and condition of the pipeline. Contractor shall confirm the data and information collected from this inspection to verify the size of the liner and refine the installation techniques. If unknown physical conditions in the work area are uncovered during the investigation that materially differ from those ordinarily encountered, the Contractor shall notify the Engineer.
- E. Inform the Engineer of work schedules for sliplining installation.
- F. Conduct operations in accordance with applicable OSHA standards, including those safety requirements involving work on an elevated platform and entry into a confined space. Make suitable precautions to eliminate hazards to personnel near construction activities when pressurized air is being used.

3.2 PRE-INSTALLATION CLEANING AND TV INSPECTION

- A. Contractor shall clean the pipeline in accordance with Section 02760, Cleaning of Sewers, prior to lining the existing pipe.
- B. Contractor shall conduct TV Inspection, prior to lining in accordance with Section 02651, Television Inspection.

3.3 OBSTRUCTION REMOVAL, POINT REPAIR AND SAG ELIMINATION

- A. Necessary point repairs to facilitate lining shall be the responsibility of the Owner. Contractor shall notify the Owner immediately after the pre-installation cleaning and TV inspection where point repairs are necessary to facilitate installation of the liner.
- B. Notify the Engineer if the pre-installation video inspection reveals an obstruction in the line segment (such as heavy solids, dropped joints, protruding service connections or collapsed pipe) that cannot be removed by conventional sewer cleaning equipment and if the obstruction will prevent completion of the inversion.

3.4 BYPASS PUMPING

- A. Bypass pumping systems shall be in accordance with Section 02150, Bypass Pumping.

3.5 INSTALLATION PROCEDURES

- A. General
 - 1. Liner shall be installed by pulling or pushing.
 - 2. Precautions shall be taken to protect the liner from scratches or gouges.

3. Liner shall be protected from rough edges of the host pipe.
4. Liner shall be equipped with suitable spacers to allow installation and ensure proper placement of the liner pipe in the host pipe.
5. Liner shall be allowed to relax and come to thermal equilibrium before sealing the annular space between the liner and the host pipe.
6. Liner shall extend into manhole.

B. Excavation And Access Pits

1. Access pit length shall be determined by the material and jointing method selected by the Contractor.
2. The minimum bending radius for the pipe as recommended by the supplier shall be maintained.
3. Sheet piling, shoring and bracing requirements shall be in accordance with these specifications and applicable jurisdictional standards.
4. Confined space requirements shall be in accordance with OSHA regulations.
5. Access pit excavations shall be performed at all points where the slipline pipe will be inserted into the existing pipeline.
6. When possible, access pit excavations shall coincide with host pipe lateral connection points or other appurtenance installations.

C. Pulling Equipment

1. The pulling mechanism shall be properly connected to the end of the pipe via a pulling head or arrangement approved by the pipe supplier.
2. The maximum pulling tension on the pipe shall not exceed the pipe supplier's safe pulling force as submitted for this project.

D. Pushing Equipment

1. An end protector plate shall be attached for hydraulically pushing or winching completed sections further into the sewer from manhole to manhole.
2. Routine shall be carried out until the entire pipe insertion is finished.

E. Pipe Care

1. The pipe shall be handled with care to minimize the possibility of it being cut, kinked, gouged, or otherwise damaged. The use of cables or hooks will not be permitted.
2. Sections of the pipe damaged, cut, or gouged shall be repaired by cutting out the section of damaged pipe and rejoining.

3.6 **FIELD QUALITY CONTROL**

- A. Field acceptance of the liner shall be based on the Engineer's evaluation of the installation including TV video and a review of certified test data for the installed pipe samples.

1. Groundwater infiltration of the liner shall be zero.
 2. There shall be no evidence of splits, cracks, breaks, lifts, kinks, delaminations or crazing in the liner.
 3. If any defective liner is discovered after it has been installed, it shall be removed and replaced with either a sound liner or a new pipe at no additional cost to the Owner.
- B. Repair failed lining or lining deemed unacceptable as a result of post-installation television inspection or test reports for structural values, thickness, or other defects. Obtain approval of the Engineer for method of repair, which may require field or workshop demonstration.

3.7 SEALING AT MANHOLES

- A. Form a tight seal between the sliplining and the manhole wall at the pipe penetration.
- B. Liner pipe shall be allowed to relax and come to thermal equilibrium for 24 hours prior to sealing.
- C. Do not leave any annular gaps.
- D. Seal the annular space to permanently block the flow of water into the manhole between the liner and the host pipe.
- E. Finish off the seal with an approved non-shrink grout or cementitious liner material placed around the pipe opening from inside the manhole in a band at least 4-inches wide.

3.8 POST-TELEVISION OF COMPLETED WORK

- A. Provide a video tape showing completed work in accordance with Section 02651, Television Inspection.
- B. All defects discovered during the television inspection shall be corrected by the Contractor before the Work under the Contract will be considered for substantial completion. After the defects are corrected, the sewer shall be video taped again.
- C. The post-rehabilitation television inspection tape shall be submitted to the Engineer in sufficient time to allow the Engineer to review the video tape prior to substantial completion.

3.9 FINAL CLEANUP

- A. Upon completion of rehabilitation work and testing, Contractor shall clean and restore the entire project area affected by the Work.
- B. All excess material and debris not incorporated into the permanent installation shall be disposed of in accordance with local regulations.
- C. Sidewalks, driveways and street surfaces shall be cleaned and returned to a condition similar to that before the work started.

END OF SECTION

02770-9

SECTION 03602
SLIPLINING GROUT - STRUCTURAL

PART 1 – GENERAL

1.1 DESCRIPTION

Contractor shall provide all materials, labor and equipment necessary to completely fill the annular space between the slipliner pipe and the host pipe with high-strength (> 3000 psi) cementitious grout.

1.2 QUALITY ASSURANCE

- A. ASTM C138 Test Method for Unit Weight, Yield and Air Content (Gravimetric) of Concrete
- B. ASTM C939 Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method)
- C. ASTM C942 Standard Test Method for Compressive Strength of Grout for Preplaced-Aggregate Concrete in the Laboratory
- D. ASTM C1090 Standard Test Method for Measuring Changes in Height of Cylindrical Specimens from Hydraulic-Cement Grout

1.3 DESCRIPTION

- A. Contractor shall seal the annular space between the liner and host pipes with cementitious structural grout as shown and specified.

1.4 SUBMITTALS

- A. Submittals shall conform to the requirements of Section 01300, Submittals.
- B. CONTRACTOR shall provide six (6) bound copies of the following information to the ENGINEER for review and approval prior to construction:
 - 1. Qualifications and experience of grout mix applicator and Project Superintendent and support personnel.
 - 2. Grout mix design and trial mix tests, with set time, compressive strength, viscosity, and density test results.
 - 3. Initial set time of the grout.
 - 4. The 24 hour and 28 day minimum grout compressive strengths.
 - 5. The grout working time before a 15% change in density or viscosity occurs.
 - 6. The proposed grouting methods and procedures.
 - 7. Method for waste grout recovery.
 - 8. Estimated grout volume for each pipe.
 - 9. The maximum injection pressures proposed as well as maximum allowable grout injection pressures as provided by the pipe manufacturer (as applicable).
 - 10. Proposed grout stage volumes (if grouting is to be performed in stages)

11. Bulkhead designs and locations including vent and injection port location and proposed materials to be used in bulkhead construction. In addition the lengths of each port shall be shown.
12. Method of flow control during grouting
13. Detailed plans depicting the method of blocking the liner pipe down to the invert for a period of time long enough to allow the grout to set when buoyant uplift is a factor.
14. Written confirmation that the CONTRACTOR has coordinated grouting procedures with the grout installer and the liner pipe manufacturer.
15. For each different type of grout or variations in procedure of installation, a complete package shall be submitted. The submittal shall include each of the above items and the locations of conditions to which it applies.

PART 2 - PRODUCTS

- A. Provide cementitious grout consisting of a mixture of cement, water, fly ash or lime and admixtures specifically designed to meet the requirements of this Section.
- B. Use only potable water obtained from a municipal water distribution system and transported, when required, in a clean, dedicated container designed specifically for such.
- C. Admixtures shall be selected by the slip-lining grout manufacturer to meet performance requirements, improve pumpability, control set time and reduce segregation. Admixtures shall not be biodegradable.
- D. The grout shall have a minimum compressive strength of 3000 psi in 28 days when tested in accordance with ASTM C942.
- E. The grouting system shall have sufficient gauges, monitoring devices, and tests to determine the effectiveness of the grouting operation and to ensure compliance with the liner pipe specifications and design parameters.
- F. CONTRACTOR shall develop one or more mix designs to completely fill the annular space based upon, but not restricted to, the following requirements:
 1. Size of annular void
 2. Void (size) of the surrounding soil
 3. Absence or presence of water
 4. Sufficient strength and durability achieve the design requirements presented in the sliplining Specification.
 5. Provide adequate retardation for placement
 6. Provide less than 1 percent shrinkage by volume
 7. Heat of hydration compatible with pipe material in accordance with pipe manufacturer's recommendations
- G. Mixing
 1. The materials shall be mixed in equipment of sufficient size and capacity to

provide the desired amount of grout material for each stage of the grouting operation.

2. System shall mix the grout to a homogeneous consistency and deliver grout to the injection point under a normal range of operating conditions.
3. Equipment shall be capable of mixing the grout at densities required for the approved procedures and shall also be capable of changing mixing parameters as dictated by field conditions at any time during the grouting operation.

H. Pressure Gauges

1. Pressure gauges shall be suitable for use in the grouting environment and have a working range between 1.5 to 2.0 times the design grout pressures, and have accuracy within 0.5% of full range.
2. Provide, at a minimum, one pressure gauge at the point of injection and one pressure gauge at the grout pump.

PART 3 - EXECUTION

3.1 GROUT INJECTION

- A. Notify the ENGINEER at least 24 hours in advance of grouting operations.
- B. Once the slipliner pipe has been installed, construct bulkheads at each end in sequence from upstream to downstream. Following construction of the bulkheads, the CONTRACTOR shall fill the annular space between the slipliner pipe and the host pipe along its entire length with cementitious grout by injecting grout from one end of the pipe segment, allowing it to flow toward the other end.
- C. Equip slipliner pipes with temporary weirs as necessary to fill the pipes with water to prevent flotation during grouting operations.
- D. Remove or control standing or running water in annular spaces to maintain the correct water ratio of the grout mixture.
- E. Limit pressure on the annular space to prevent damage to the liner. The gauged grout pressure at the pipe shall not exceed that of the pipe manufacturer's recommendation or 5 psi, whichever is smaller. Regardless of the pressure, the CONTRACTOR shall be solely responsible for any damage or distortion to slipliner pipe due to grouting.
- F. The drilling of additional injection holes from the surface or through the liner pipe to facilitate grouting is prohibited.
- G. Injection of grout shall continue until all of the following conditions have been achieved unless otherwise approved by the ENGINEER:
 1. The estimated volume of grout has been injected
 2. The exhausted grout recovered at each vent is not less than 85% of the density of the freshly injected grout
 3. The exhausted grout at each vent is not less than 85% of the original viscosity of the freshly injected grout, and

4. The grout installer, and/or Field Engineer recommends ceasing grouting operations
- H. No hardened grout is permitted in the liner pipe invert after completion of grouting operations.

3.2 **TESTING**

- A. Provide all personnel and equipment necessary to measure density in accordance with ASTM C138 or by another method as approved by the ENGINEER not less than two times per hour in the field during grouting operations.
- B. Provide all personnel and equipment necessary to measure viscosity in accordance with ASTM C939 not less than two times per hour in the field during grouting placement. The apparent viscosity shall not exceed 35 seconds unless otherwise approved by the ENGINEER.
- C. Compressive Strength
 1. Collect, transport, cure, test and report samples in accordance with ASTM C942.
 2. Contrary to ASTM C942, collect and test specimens based on the more restrictive of the following criteria:
 - a. One (1) specimen (consisting of one, 3-gang mold) for each grouting event for each pipe collected at approximately the mid-point of the grouting operation.
 - b. One (1) specimen (consisting of one, 3-gang mold) for each 500 cubic feet of grout placed for each pipe.
 3. Test all specimens for compressive strength at 28 days. Additional specimens and tests may be performed at the CONTRACTOR'S discretion.
 4. CONTRACTOR shall engage the services of an independent, ASTM/AASHTO accredited testing laboratory to collect and test specimens associated with the strength requirements of this Section.

END OF SECTION