SECTION 02511

Preconditioning and Cleaning Manholes and Sewers

PART 1 – GENERAL

1.01 SCOPE

A. Work described in this Section includes furnishing all labor, materials, equipment, tools, and incidentals required for complete cleaning of sewers including removal of silt, which is defined as any and all solid or semi-solid materials, including fine and granular material such as sand, grit, gravel, and rock; debris; grease; oil; sludge; slime or any other loose material or encrustation lodged in the manhole or sewer; invading roots; corroded concrete; corroded manhole rungs; intruding laterals and any other extraneous debris.

1. Sewers shall be considered preconditioned and cleaned if:

   a. Materials listed under 1.01A are removed and disposed of at an approved site.

   b. All roots, corroded concrete, corroded rungs, corroded ladders and intruding laterals are treated or reduced and cut flush with the interior surface of manholes and sewers, removed and disposed of.

   c. All surfaces shall be free of cleaning agents and their reactant products.

   d. The cleaning shall be in accordance with the requirements of the Grouted PVC Profile Sewer Pipe Liner System manufacturer.

2. Fulfillment of these requirements (e.g., depth of silt or cleanliness of surface) is to be determined by internal manhole and sewer inspection of each manhole and sewer length cleaned.

3. During cleaning work and all other associated Contractor operations, sewer services shall be maintained at all times. This requirement may be changed only with the written approval of the Engineer.

4. The sewers to be cleaned convey sanitary sewage or combined sewage. In many instances such sewers are subject to high flows, either continuously or in a periodically varying cycle, due to rainfall, infiltration, and/or pumping operations. The Contractor shall include in its bid provisions for dealing with such variations, and where necessary, schedule its Work to accommodate such variation in flows.

B. Related Work Specified Elsewhere:

1. Section 01200 – Measurement and Payment
2. Section 02546 – Grouted PVC Profile Sewer Pipe Liner System
3. Section 02750 – Wastewater Flow Control

1.02 SUBMITTALS

Submittals shall be in accordance with the requirements of the General Conditions of the Contract Documents. In addition, the following specific information shall be provided:

1. Descriptive details covering full details of equipment to be used including gas safety monitors, ventilation equipment, hydraulic pressure jetting/water blasting equipment, vacuum trucks and root cutters.

2. Descriptive details covering chemical root treatment equipment and chemicals to be used.

3. Proposed pipe cleaning method(s).

4. Bypass pumping plan (if required)

5. Pre-cleaning and post-cleaning video survey of pipe.

6. Work plan for pipe cleaning process including details of all materials and equipment to be used during the cleaning process.

7. Written documentation that all workers on site meet the experience requirements of 1.03 B of this specification. This documentation shall include a list of projects on which each individual worked and client name and telephone number for each reference.

1.03 QUALITY ASSURANCE

A. Reference Standards: The Contractor shall comply with the applicable provisions and recommendations of the latest editions of the following standards, except as otherwise shown on the Plans or specified in these Specifications.

1. OSHA 29 CFR 1910.146 (permit-required confined-space regulations)
2. Applicable Federal codes, including Federal Occupational Safety and Health Act of 1970 and the Construction Safety Act of 1969, as amended, and applicable state and local codes and standards.
3. To the extent applicable, the requirements of the Underwriter's Laboratories, Inc. and the National Electrical Code.

B. EXPERIENCED WORKERS

1. All crew chief(s) responsible for cleaning work shall have a minimum of 3 years previous experience in cleaning and related activities including:
   a. Use of gas safety monitors/detectors/testers
   b. Safe working in confined spaces
   c. Utilization of hydraulic pressure jetting/water blasting in sewers and confined spaces
   d. Utilization of root cutters and/or root treatment using chemicals
   e. Utilization of a wide range of cleaning nozzles in widely differing conditions

PART 2 – PRODUCTS

2.01 GENERAL

A. The Contractor shall certify that sufficient cleaning units can be provided, including standby units in the event of breakdown, in order to complete the work within the contract period. Further, the Contractor shall certify that standby or back-up equipment can be delivered to the site within 48 hours in the event of equipment breakdown.

B. The cleaning unit(s) shall be capable of operating routinely a minimum of 500-feet or more from the point of access to the sewer.

C. Each cleaning unit shall carry a mobile telephone to facilitate communication with the Engineer and to comply with relevant safety requirements defined in the safe working procedures approved by the Engineer for the execution of the work.

2.02 CCTV AND SONAR INSPECTION/SURVEY UNITS

All CCTV and sonar survey units shall comply with industry standards.

2.03 WINCHING EQUIPMENT

A. Winching equipment shall be sufficient for the purposes of attaining the degree of cleanliness specified in Section 1.01A

B. The Contractor shall provide conventional power winching equipment and all associated equipment, including winching buckets, balls, breakers, kites, scooters, scrapers, tires, tools and safety apparatus. Complete details of equipment proposed for use in cleaning shall be provided to the Engineer before work commences.

C. Dredging of sewers shall be undertaken by passing various sized buckets, balls, breakers, kites, scooters, scrapers, tires etc, through the sewers to physically remove accumulated silt, sludge and other debris. Where conditions dictate, power boring equipment and/or winching equipment shall be used to loosen the silt prior to its removal. All necessary equipment including cables, lines, and tools must be available at all times as required.

D. The equipment shall be capable of operating efficiently and effectively in the sizes of sewers and depth included in the project at distances of up to 500-feet between adjacent manholes.

E. The project sewers convey sanitary sewage flows. Certain Sections of sewer may be flowing entirely full or in a surcharged condition and the Contractor must be prepared at all times to use manual pushing rods, mechanical boring equipment or other methods to pass a leading line through the sewer prior to commencing dredging operations with winching.

F. Any item of CONTRACTOR plant or equipment associated with the Work, which may cause obstruction to the flow in the sewer, shall be removed from the sewer at the close of work each day. It shall be permissible to leave a line or winching cable through the sewer during breaks in the work.

G. Dredging operations in a particular section of sewer will generally proceed in a downstream direction, working between consecutive manholes using winch buckets of sizes stated below.

H. The size of winch bucket used in sewers up to 48" shall be 90% of the sewer bore up to a maximum of 24". It is anticipated that buckets of smaller sizes than those stated will need to be winched through Sections of sewer prior to the use of the maximum sizes. The maximum size bucket as stated may be varied at the discretion of the Engineer. However, no buckets larger than these maximum sizes specified shall be used without the approval of the Engineer.

I. The Contractor is advised that use of the maximum size buckets listed above may not be practical due to restricted access through manhole covers and other access points. The Contractor shall ensure that its working procedures will not be unduly affected by such restrictions and shall allow for inefficiencies due to all such restrictions in its unit rates.

J. The winches used to draw buckets, balls, breakers, scooters, scrapers, or tires shall be power driven. They shall incorporate a torque-limiting device to prevent the breaking of winching lines in case the line becomes jammed by obstructions.

K. Where the operational cleaning equipment is towed by winch and bond through the sewer, all winches shall be stable with either lockable or ratcheted drums. All bonds shall be steel or of an equally non-elastic material to ensure the smooth and steady progress of the equipment. All winches shall be inherently stable under loaded conditions.

2.04 PRESSURE JETTING EQUIPMENT

A. Pressure jetting equipment used shall be sufficient for the purposes of attaining the degree of cleanliness in sewers as specified in Section 1.01.

B. Jetting units in sewers must be capable of jetting a minimum distance of 500-feet either upstream or downstream from a manhole. Minimum nominal hose size shall be one-inch diameter.

C. The Contractor's unit prices specified in the bid form shall include jetting in sewers both upstream and downstream.

D. Successive passes using constantly moving pressure jetting techniques shall be applied to sewers until they are cleaned to the level specified. Nozzle hold-time (stationary time), for any particular location, shall not be more than 60 seconds in order to forestall damage to the pipe being cleaned. Nozzles shall have jet angles of between 30º to 45º. "High efficiency nozzles" (discharging "pencil jets") with jet angles higher than this figure shall not be allowed to be stationary at any time.

E. Silt shall be collected at manholes as specified herein. No silt shall be allowed to pass beyond the section of sewer being cleaned.

F. Pass rates (rewind speed) for the jetting head shall be at a consistent speed without jerking and excessive variations. Typical pass rates shall be 4 inches to 8 inches per second. The hose reel shall be power driven in the rewind direction.

G. The Engineer shall be notified of the jetting equipment proposed by the Contractor in the bid documents. The jetting equipment will be operated utilizing the pressures specified unless otherwise noted elsewhere in the document. The proposed equipment shall be categorized from the following table:

CATEGORY	MACHINE TYPE	CAPACITY (GALL/MINUTE) min max	PRESSURE (psi) min max
Sewers			
1	High pressure/low volume – non HGV/HGV jetter/combination	30 – 50	1,500 – 2,000
2	Low pressure/high volume – HGV	30 – 75	1,500 – 3,000
3	Low pressure/high volume – combination	75 – 175	2,000 – 2,500
4	Low pressure/high volume – super combination	75 – 200	2,000 – 2,500
Other	Low pressure/high volume – separate jumbo jetter/suction units		

Notes for 2.04 G.

1. The categories listed are typical only of the equipment for use in the present contract. Exceptions to the duty and equipment shown above will be allowed subject to appropriate notification and approval. The Contractor is required to complete the table with details of any other equipment proposed.

2. Discretion shall be used concerning the maximum pressure used for cleaning sewers. In general for asbestos cement, clay and concrete pipes cleaning pressures shall be limited to 5000 psi (340 bar). For brick sewers cleaning pressures shall be limited to 3500 psi (240 bar) For pitch fiber and plastic pipes cleaning pressures will be limited to 1500 psi (102 bar) and 2500 psi (170 bar) respectively.

3. Cleaning pressures in concrete manholes shall be limited to 5000 psi (340 bar). Cleaning pressures in new brickwork manholes shall be limited to 5000 psi (340 bar) and in old brickwork manholes to 3500 psi (240 bar).

4. Higher pre-conditioning pressures in sewers and manholes prior to rehabilitation may be allowed at the sole discretion of the Engineer. The Engineer's agreement to use higher pressures shall not relieve the Contractor of its responsibilities for any resultant damage in accordance with the requirements of paragraph 3.16 above.

I. Where a jetter is fitted with an airflow suction unit for removal of silt and other material from the sewer, it shall be capable of removing materials such as sludge, silt and bricks from depths up to 32-feet with minimum suction of 2500-cfm. A tank with a minimum capacity of 175-cf shall be provided and be capable of decanting collected liquids and conveying them back to the sewer. The suction hose of such a system shall have a minimum internal diameter of 6-inches.

J. Jetting equipment shall be calibrated on an annual basis by an approved body and calibration certificates made available for inspection by the Engineer as requested. Such equipment shall be maintained on a regular basis in accordance with the manufacturer's Specification. The Contractor shall make available copies of its maintenance certificates and/or schedules to the Engineer as requested.

K. An automatic pressure relief valve shall be incorporated on the pump discharge chamber to prevent the pressure exceeding the safe maximum for the system as a whole. This may take the form of a pressure relief valve of the bursting disc type in holder or an automatic pressure regulating valve (unloading valve).

NOTE: The maximum working pressure is the lowest value of the maximum working pressure ratings of all individual components of the system.

2.05 AIR DRIVEN, ELECTRO-MECHANICAL AND/OR MECHANICAL CLEANING TOOLS

Where necessary, and additional to winching and pressure cleaning equipment, appropriate air driven, electrically driven and/or mechanical tools may be used to needle, hammer, scrape or grind off corroded concrete, scarify and remove compacted silt, chip-off spilt grout, detach encrustation, trim and cut laterals and roots, etc. The Contractor shall provide prior notification to the Engineer prior to the use of such equipment and techniques.

2.06 VENTILATION OF CONFINED SPACES

The Contractor shall provide, operate, maintain and subsequently remove on completion, adequate ventilation apparatus in the form of blowers and/or fans. The ventilation apparatus shall introduce a fresh air supply to support a safe environment for work in sewers, manholes and all other confined spaces, which shall be kept free from dangerous, toxic and/or explosive gases, whether generated from sewage, soil strata or other source.

PART 3 – EXECUTION

3.01 GENERAL

A. Cleaning shall be carried out from the downstream access manhole or chamber to the upstream access manhole or chamber and shall entirely comply with the performance requirements defined in the relevant sub-clauses of clause 1.01 of this specification.

B. All concrete and masonry surfaces to be rehabilitated or repaired shall be meticulously cleaned by water blasting utilizing a 210°F steam unit and appropriate nozzles to provide a contamination-free and sound surface. Other methods, such as wet or dry sand blasting, acid wash, concrete cleansers, degreasers or mechanical means, may be required to completely clean the manhole surface prior to rehabilitation or repair.

C. All surfaces on which cleaning methods outlined in Paragraph 2.04 above have been used shall be thoroughly rinsed, scrubbed, and neutralized to remove cleaning agents and their reactant products before rehabilitation commences. Concrete surfaces shall be accepted for the purpose of rehabilitation when they are sound, surface dry, porous and free from dust, dirt, oil, grease, fat efflorescence, concrete hardening or sealing chemicals, previous coatings, rust, form-release agents, laitance, other penetrating contaminants, fins, surface projections, thin crusts, bridging voids, and loosely adhering concrete and dirt particles.

D. All manhole “runner” and “gusher” infiltration leaks shall be sealed in areas where linings are to be installed. The Contractor will not be allowed to commence rehabilitation work until these leaks have been sealed to the satisfaction of the Engineer.

3.02 WORKING AREA

A. The working area in which machinery and equipment operates is to be kept to a minimum. Equipment not in use shall be removed from the work site so as to minimize disruption to traffic and the general public.

B. The working area is to be free from silt and debris when the Contractor leaves the site at the end of each visit.

C. Open manholes, machinery and standing equipment shall be protected at all times.

D. The locations of sewers included in the Work are indicated in the Drawings.

E. All work activities for cleaning sewers and manholes shall comply with the requirements of SC- 11.6.

F. All unattended open manholes and working areas shall be provided with temporary fencing and/or barriers meeting applicable Federal, State, and City of Atlanta standards and subject to the approval of the Engineer.

3.03 OPERATIONAL REQUIREMENTS

A. Each cleaning unit and each CCTV/sonar unit shall carry sufficient numbers of guides and rollers such that, when cleaning and inspecting or surveying, all bonds (e.g. metal winch cable) are supported away from sewer and manhole structures.

B. Each cleaning unit shall carry a range of flow control equipment, as opposed to bypass pumping equipment, for use in controlling the flow during the work. A minimum of one item of each size of equipment ranging from 4-inch to 24-inch diameter inclusive shall be carried.

C. The system of silt and debris removal shall be capable of operating in such a way as to minimize the obstruction to sewer flows and cleaning operations.

D. Basements, homes and all other vulnerable property shall be prevented from being flooded where hydraulic cleaning methods are used to clean manholes and sewers.

E. The Contractor shall make its own arrangements for the security of “off road” overnight parking of its vehicles and cleaning equipment and shall comply with all relevant statutory traffic regulations and local laws.

3.04 HANDLING AND DISPOSAL OF REMOVED MATERIAL

A. The Contractor shall remove all silt, debris, detritus, etc. resulting from all manhole and sewer cleaning activities at least once each working day. Such material shall be caught

and collected in a suitable trap, weir, or dam within the manhole or chamber being cleaned and/or at the downstream manhole of the sewer segment being cleaned. The Contractor shall ensure that the capture method or methods used effectively prevent silt migration downstream. Descriptions of such methods, including details of the equipment used, shall be provided to the Engineer on request.

B. All material removed from sewers and manholes shall be deposited in suitable closed watertight containers such that the total amount removed can be easily measured if required. The Contractor is to give the Engineer such assistance as may be necessary in carrying out this measurement work.

C. The type and capacity of containers to be employed for the holding and transport of the removed materials shall be determined by the Contractor. The Contractor shall not accumulate or store debris, silt, and/or liquid waste or sludge on site. Under no circumstances shall sewage, silt or solids be dumped onto the ground surface, ditches, catch basins or storm drains.

D. The Contractor's work procedures shall be such that sewer cleaning work is not delayed by a lack of an empty container in which to deposit the materials removed from the sewer.

E. The Contractor is advised that it may not always be possible for the container to be positioned immediately adjacent to the manhole from which materials are being removed and that "double handling" of the materials may be necessary. The Contractor shall provide for such "double handling" to be carried out safely and efficiently at no additional cost to the City.

F. The Contractor must make its own arrangements for the proper disposal of materials removed from the sewer. The disposal site must be licensed to accept such materials and must be approved by the Engineer prior to commencement of the work. The Contractor shall be responsible for obtaining all necessary disposal permits and for complying with all state and City regulations for handling silt laden sewage.

G. All costs associated with disposal permitting and silt handling must be included in the Contractor's rates for work.

H. The containers for the disposal of materials removed from sewers and manholes shall be routed through an approved weigh station and a copy of each weight ticket submitted to the Engineer. Such tickets shall be used to determine the quantities of materials removed.

3.05 WATER SUPPLY

A. Prior to the commencement of work, the Contractor shall locate all hydrants from which water may be obtained.

B. The Contractor is responsible for making its own arrangements for obtaining water for the work, and paying for the water used and shall comply with all local conditions regarding the use of construction and flushing water. Such arrangements shall be approved by the Engineer prior to commencement of work.

C. All details of the point of water connection, backflow protection, conveyance methods, draw-off rates, times and all local conditions regarding the use of water shall be approved by the Engineer prior to commencement of work. All equipment, labor, and material required for obtaining water for the work shall be provided by the Contractor.

D. The Contractor shall provide constant attendance when water is being drawn off any hydrant.

E. The Contractor must ensure that a 12-inch minimum air gap is maintained at the supply point on desilting/cleaning/jetting equipment or any other receiving apparatus.

F. The use of any standpipe or hydrant, which has not been approved by the Engineer, is expressly forbidden.

3.06 DAMAGE TO MANHOLES OR SEWERS CAUSED BY CONTRACTOR

The Contractor shall use special care in its work methods and take all necessary precautions against improper use of the cleaning equipment to avoid damaging the sewer and/or manholes being cleaned. If the Contractor's work has caused damage to the manhole or sewer, the Contractor shall repair the damage to the complete satisfaction of the Engineer at no additional cost to the City.

3.07 RESPONSIBILITY FOR OVERFLOWS OR SPILLS

A. It shall be the responsibility of the Contractor to schedule and perform its Work in a manner that does not cause or contribute to incidence of overflows or spills of sewage from the sewer system.

B. In the event that the Contractor Work activities contribute to overflows or spills, the Contractor shall immediately take appropriate action to contain and stop the overflow, clean up the spillage, disinfect the area affected by the spill, and notify the Engineer in a timely manner, all in accordance with the City's Emergency Response Plan.

C. Contractor will indemnify and hold harmless the City for any fines or third-party claims for personal or property damage arising out of a spill or overflow that is fully or partially the responsibility of the Contractor, including the legal, engineering and administrative expenses of the City in defending such fines and claims

3.08 QUALITY CONTROL/CLEANING REPORT

A. A quality control video inspection of cleaned sewers shall be carried out as directed, immediately following completion of cleaning work. If a sewer or pipe line has not been preconditioned or cleaned as specified (by visual inspection, video review or field analysis) in the sole opinion of the Engineer, the sewer shall be re-cleaned in accordance with the Specification at no additional cost to the City.

B. The Contractor shall supply one copy of inspection video for each reach of sewer completed.

C. When required by the Engineer, the Contractor shall supply one copy of the full internal sewer condition assessment report.

3.09 DAILY LOG

A. The Contractor shall provide a report of work completed each day. The report shall be submitted to the Engineer no later than one workday following completion of the work. The report shall contain a separate sheet for each manhole and sewer reach preconditioned. The report shall utilize the form provided at the end of this Specification.

B. The Contractor shall immediately notify the Engineer of any material such as bricks, concrete or broken clay pipe appearing in the materials removed from the sewers and/or manholes during cleaning activities.

(EXAMPLE) CONFINED ENTRY LOG
MANHOLE/ SEWER SAFETY CHECK (TO BE COMPLETED DAILY)

Date:_____ Supervisor: _____ Vehicle No._____

Time	Manhole No.	Manhole Location
1.		
2.		
3.		
4.		
5.		

Workers on site: _____
(Underline those with safety training certification)

Safety Apparatus on Site: (tick)

Multi Gas Monitor ☐ Lifting Harness ☐ Lifeline ☐
Helmet/ Safety Boots ☐ First Aid Kit ☐ Torch Light ☐
Aluminum Ladder (AL) ☐ Air Blower ☐ Breathing Apparatus ☐
Headphone ☐ Cell Phone ☐

Safety Check: (tick)

Manhole Vented by Blower? ☐ Manhole Tested for Gases? ☐
Oxygen Sufficiency OK? ☐ Protective Clothing Worn? ☐
Top Men Carrying BA? ☐ Ladder Used ☐
Traffic Signs and Cones OK? ☐ Blinkers and Beacons OK? ☐ Site Plans? ☐

Gas Monitoring Readings

Time	**Hydrogen Sulfide Level**		**Oxygen Level %**	**Carbon Monoxide Level**		**Methane Level**	
	Detected (PPM)	Not Detected		Detected (PPM)	Not Detected	Detected (PPM)	Not Detected

Manhole/Sewer Safe to Enter? ☐ Yes ☐ No Incidents, if any:_____
(Append Lengthy Description)

Signature of Safety Officer/ Supervisor:_____ Date:_____