SECTION 02767

FLOW CONTROL OF SEWER LINES

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section includes all materials, labor, and equipment required to provide bypass flow control for sanitary sewer lines construction, upgrade, or rehabilitation.

B. Also, furnish all power, maintenance, etc. to implement the bypass flow control and diversion pumping to divert the existing flow around the work area for the work's duration. If the duration of the work coincides with conditions that have a potential to cause higher flows than the minimum, the contractor shall be at risk for containing all flows.

C. The design, installation, and operation for the temporary bypass pumping system shall be solely the Contractor's responsibility. The Contractor is to plan and perform his construction work for the supporting diversion pumping operations to reduce risk, avert overflows, minimize exposure durations and address variable season and event sewer flow rates.

1.02 PERFORMANCE AND PENALTIES

A. The Contractor shall ensure:

1. All temporary sewer bypass pumping activities for the work are completed in full compliance with the local Stormwater Management Regulations, and no water quality or quantity compliance issues are encountered.

2. No illicit pollutant discharges to (or to a location that would create contaminated water runoff to) a storm sewer, a stormwater conveyance, or a water body within City of Brentwood shall occur.

3. All temporary sewer bypass pumping activities for the work are completed in full compliance with the Tennessee Department of Environment and Conservation and the U.S. EPA regulations, and no water quality or quantity compliance issues are encountered.

B. No discharge of sewage or debris shall be released to the environment. Should the Contractor's actions cause a sewage or debris overflow or bypass to the environment, site cleanup will be the Contractor's responsibility consistent with the *Brentwood CMOM Response Plan for Overflows* and regulators directions. All overflow or bypass environmental cleanup activities shall be immediately commenced and prosecuted continuously by the Contractor. Any associated fines or penalties enacted by the Tennessee Department of Environment and Conservation, the U.S. EPA, and/or any other regulatory groups or programs will be borne solely by the Contractor.

1.03 SUBMITTALS

A. At least 4 weeks prior to commencing work including plugging any line, bypass pumping, or similar actions, the Contractor shall submit to the WSD, a detailed *Bypass*

Sewage Pumping Plan (Plan), as further described in these specifications, for review and approval. Any Plan approval does not relieve the Contractor from any responsibility for the Plan's adequacy or proper execution. The Contractor is responsible for conducting his work in a manner which will not cause overflows or system backups that could damage private and/or public property.

B. Submit the following in accordance with Section 01 33 00.

1. *Bypass Sewage Pumping Plan*. Plan shall contain, at minimum, the following:

a. Staging areas for pumps

b. Sewer plugging method and plug types

c. Size and location for manholes or access points for suction and discharge hose or piping

d. Size for pipeline or conveyance system to be bypassed

e. Number, size, material, location, and method for installing suction piping

f. Number, size, material, location, and method for installing discharge piping

g. Provide bypass pump sizes, capacity, number of each size to be on site, and power requirements. Pump sizing shall clearly indicate compliance with requirements in this Section.

h. Calculations for static lift, friction losses, and flow velocity (pump curves showing pump operating range)

i. Standby power generator size and location (if electric pumps are employed)

j. Downstream discharge plan

k. Method to protect discharge manholes or structures from erosion and damage

l. Thrust and restraint block sizes and locations

m. Noise control method for each pump and/or generator

n. Any temporary pipe supports and anchoring required

o. Plans for access to bypass pumping locations indicated on the Drawings

p. Schedule for installing and maintaining bypass pumping lines

q. Plan indicating routing for bypass pumping line locations

r. Plan indicating monitoring location selections

s. All items related to testing, inspection, maintenance, and monitoring as described in this Section

t. All other incidental items necessary and/or required to ensure facilities are properly protected including protecting the access and bypass pumping locations from damage due to the discharge flows and compliance with the requirements and permit conditions specified in the Contract Documents

u. For sewer rehabilitation by lining methods, generic plans may be developed for typical situations and various sizes to be implemented.

PART 2 - PRODUCTS

2.01 BYPASS EQUIPMENT

A. All equipment used for bypass pumping shall be specifically designed for that intended purpose. All piping, pumps, etc. in contact with sanitary sewage shall be manufactured with materials designed for use in a sewage environment.

B. All pumps used shall be fully automatic self-priming units which do not require foot valves or vacuum pumps in the priming system.

C. The pumps shall be electric, hydraulic, or diesel powered.

D. All pumps used shall be constructed to allow dry running for long periods of time in order to accommodate effluent flows' diurnal nature.

E. Above-ground pumps and/or power units shall be located inside a temporary portable berm to contain any fuel or sewage that may spill during the normal course of operation.

F. Hard discharge piping shall be butt-welded HDPE with a minimum pressure rating of 1.5 times the total dynamic pump head.

G. Under no circumstances will irrigation type piping or glued PVC pipe be allowed.

H. A discharge hose may be allowed on rehabilitation projects for short-term setups (less than or equal to 48 hours) on short sections with approval from the WSD. Hoses shall have no leaks, and all couplings shall be quick connecting with gaskets.

I. A multiple pump header system shall have check valves to facilitate pump removal, service, and/or replacement while the system remains operational.

J. All above ground pumps and/or power units shall be equipped with sound attenuation measures which reduce noise levels to 75-decibels maximum at a 30-foot distance from the equipment during all operation periods. If equipment is operated between 8:00 PM and 6:00 AM, this equipment shall also be provided with a sound attenuation 3-sided enclosure including a roof.

K. The discharge location (the point where the bypass main reenters the gravity sewer system) shall be constructed with adequate sealant materials to minimize sewer gas and odor release to the maximum extent possible.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. Provide bypass sewage pumping, as required, around the section in which work is to be performed. Bypass pumping shall be the Contractor's full responsibility. The bypass system shall be of sufficient capacity to handle a minimum of 2.0 times the dry weather daily peak flow of the pipeline section being bypassed. Performance of extended pumping durations in or immediately following precipitation events and/or with precipitation events in the forecast will require greater pumping system capacities to accommodate the potential higher flows.

B. At least 4 weeks prior to the desired start date of construction requiring bypass pumping, submit a detailed description of the method proposed for bypass pumping to the WSD for review and approval. The description shall include capacity calculations, operational conditions, conditions of performance relative to precipitation and antecedent conditions, all materials and equipment to be used, personnel, spare equipment, and sketches showing proposed pump-around setups. No work shall commence until the WSD approves.

C. Bypass pumping equipment shall include pumps, conduits, engines, and related equipment necessary to divert sewage flow around the section in which work is to be performed. Backup pumps shall be online and isolated from the primary system by valves. Include 100% mechanical redundancy installed online with a float or ultrasonic type system to switch to the standby system automatically if the primary system fails.

D. Piping redundancy may be required for relatively long bypass piping lengths or large diameter bypass pipes as deemed necessary by the WSD.

E. Suction and discharge points shall only be located at manholes.

F. If at any time the Contractor is unable to properly bypass pump the sewage, construction will be stopped until the Contractor can continue work in an acceptable manner. Additional contract time for delays caused by improper equipment, labor, or breakdowns will not be considered.

G. Service shall be maintained at all times. Surcharges due to plugging the sewer line for bypass pumping shall be maintained to prevent service backups and overflows anywhere in the system.

H. For rehabilitation projects and only with the WSD's approval, a hose may be used for 48 hours or less. If the anticipated bypass time exceeds 48 hours, use hard piping only. If using a hose when the bypass time reaches 48 hours, the Contractor may either install hard piping to accomplish the bypass or restore flow until an approved bypass method can be employed. No modifications to the bypass system shall be made without WSD's approval.

I. The bypass or diversion pumping system shall be able to pump all of the sewage in the existing line regardless of the performance period's weather and seasonal conditions. All pumping equipment to be used shall be submitted to the WSD for review and approval.

J. Bypass pumping systems are required to be operated and continuously monitored 24-hours per day for flow diversion.

K. The bypass pumping must be initiated at one manhole upstream and continue to one manhole downstream of the line being rehabilitated in order to use flow-through plugs at the insertion and end points. The liner bag may not be used as part of the bypass pumping system or as a plug in the line.

L. The temporary diversion pumping system shall be placed in operation prior to the commencement of work in the areas being bypassed. Minimum times of operation prior to the commencement of work are 1 hour for small diameter CIPP lining and 4 hours for any other major system work such as trunk sewer diversion, large diameter sewer lining, or pumping station work.

M. Provide the necessary stop/start controls and a visual alarm indicating a pump malfunction for each pump.

3.02 PERFORMANCE REQUIREMENTS

A. It is essential for the operation of the existing system being bypassed that no interruptions in the flow occur throughout the project's duration. Provide, maintain, and operate all temporary facilities such as dams, plugs, pumping equipment (primary and backup units as required), conduits, all necessary power, and all other labor and equipment necessary to intercept the incoming flow before it reaches the point where it would interfere with the work, carry it past the work area, and return it to the existing system downstream of the work.

B. The temporary pumping system's design, installation, and operation shall be the Contractor's responsibility. The bypass system shall meet all codes and requirements for regulatory agencies having jurisdiction.

C. The temporary pumping system's design, installation, and operation shall address system flow variations for diurnal peaks and low flows during the pumping period.

D. Provide all necessary means to safely convey the sewage past the work area. The Contractor will not be permitted to stop or impede the sewer main flows under any circumstances.

E. No flow diversion around the work area shall be performed in a manner that will cause damage to or the surcharging of Brentwood system. The diversion shall protect public and private property from damage and flooding.

F. Protect water resources, wetlands, and other natural resources.

3.03 FIELD QUALITY CONTROL AND MAINTENANCE

A. Testing: Prior to actual operation, test the bypass pumping discharge hard piping system for leaks and pressure using clean water. Bypass hard piping shall be hydrostatically tested following each setup and prior to flow diversion or bypass to a minimum pressure 1.5 times the pump(s) total dynamic head. The WSD shall be given a 24-hour notice prior to testing.

B. Inspection: Inspect the bypass pumping system on a continuous basis to ensure the system is working properly. A daily checklist for physically inspecting the piping shall be required. The checklist shall contain all bypass pumping system components and shall be specifically developed to address aspects for the individual project.

C. Maintenance Service: Ensure that the temporary bypass pumping system is properly maintained and that a responsible operator shall be readily available at all times when pumps are operating.

D. Monitoring

1. During bypass pumping, continuously monitor all bypass pumping system components.

2. A telemetry system or designated personnel to maintain 24-hour onsite monitoring shall be required to alert the Contractor to system malfunctions or high liquid levels in manholes.

3. If bypass pumping activities are conducted near State waters or in other situations where the potential exists for a sewage release to potentially enter State waters by other than direct means, an in-line stream monitoring system shall be used to measure real-time conductivity and dissolved oxygen (DO) concentrations in 30-minute intervals at a minimum. The system shall be mounted in the receiving stream in the immediate downstream area(s) adjacent to the location(s) of the bypass piping system discharge to the gravity conveyance system. The system shall have web-portal capabilities with alarm functions for conductivity and DO. The alarm function shall be equipped with battery power and solar charging provisions and shall be able to send e-mail and text messaging alarms to at least five devices.

E. Additional Materials

1. Spare parts for pumps and piping shall be kept on site as required.

2. Repair kits for piping shall be kept on site as required.

F. Installation and Removal

1. Remove manhole sections or make connections to the existing conveyance system. Construct temporary bypass pumping structures only at the access location(s) indicated on the Drawings and as may be required with WSD's approval to provide adequate suction conduit.

2. Plugging or blocking flows shall incorporate a primary or secondary plugging device. When plugging or blocking is no longer needed for work performance and acceptance, it is to be removed in a manner that permits the sewage flow to slowly return to normal without surge flows to prevent surcharging or causing other major disturbances downstream.

3. When working inside manholes, sewers, or force mains, exercise caution and comply with all applicable OSHA requirements.

4. When the bypass pipeline crosses local streets and private driveways, place the bypass pipelines in trenches and cover with temporary pavement or other protected means of pipe crossing. Obtain any property owner approvals for placing the temporary pipeline.

3.04 CLEANUP

A. Upon acceptance of the installation work and testing, restore the project area affected by the operations to a condition at least equal to that existing prior to the work.

END OF SECTION