

SECTION 01 51 00

TEMPORARY SEWER BYPASS PUMPING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Temporary bypass pumping for daily system shutdowns of sewer systems.
 - 2. Temporary bypass pumping for overnight or extended shutdowns of sewer systems.
- B. Related Requirements
 - 1. CFPUA Material Specification Manual (MSM).

1.2 REFERENCES

- A. Abbreviations and Acronyms
 - 1. ORC Operator in Responsible Charge (CFPUA)
 - 2. SSO Sanitary Sewer Overflow
- B. Definitions
 - 1. Daily System Shutdowns: System gravity flows shall be restored daily before the end of regular work hours.
 - 2. Firm Capacity: The pumping capacity of a temporary bypass pumping system with the largest pump out of service.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination
 - 1. Coordinate temporary bypass pumping system testing with Engineer and ORC. Provide a minimum of three business days' notice prior to system testing. Engineer or ORC representative must observe testing for it to be accepted.
 - 2. Coordinate system shutdowns with Engineer and ORC.
- B. Sequencing
 - 1. Operate temporary bypass pumping systems in accordance with the sequencing and phasing indicated on the Drawings.
- C. Scheduling
 - 1. The Project Schedule shall include the sequencing and coordination of maintaining wastewater flow during all phases of construction including but not limited to:
 - a. Sewer pump station upgrades and replacements
 - b. Drainage, cleaning, and replacement of sewer mains, manholes, and force mains
 - c. Trenchless rehabilitation of sewer and force mains
 - d. Inspection and testing of new or rehabilitated sewers
 - e. Connections to existing sewer mains and force mains

1.4 SUBMITTALS

- A. Provide in accordance with Section 01 33 00 – Submittals.
 - 1. Temporary Bypass Pumping Plans designated by type and location.
 - a. The Engineering Committee of the NC Board of Examiners for Engineers and Surveyors (NCBELS) ruled that providing design plans and calculations for temporary bypass pump systems is the practice of engineering and requires licensure with NCBELS per G.S. 89C-23 and -24, meaning the design work shall be done by Professional Engineers and companies licensed to practice engineering in North Carolina.
 - 2. System test results and operation logs.
 - 3. Obtain Engineer and ORC approval of submittals prior to mobilization of equipment included in the plans.

- B. Temporary Bypass Pumping Plan – For Daily System Shutdowns
 - 1. Outline provisions and precautions to be taken to convey and maintain existing wastewater flows during construction.
 - 2. Ensure proper protection of existing facilities, the project area, and surrounding properties from damage due to the discharge of flows.
 - 3. Provide adequate standby equipment available and ready for immediate operation and use in the event of an emergency or breakdown. One standby pump for each size pump utilized shall be located at the mainline flow bypassing locations, ready for use in the event of primary pump failure. In this event, promptly repair or replace the failed equipment.
 - 4. Include the following as a minimum:
 - a. Manufacturer's product data for bypass pumps including sizes, capacities, power requirements, and number of each size to be on site including primary, secondary, and spare pumps.
 - b. Manufacturer's product data for bypass piping including make, material, material properties, diameter, thickness, pressure rating, and number to be on site.
 - c. Calculations to demonstrate sufficient pump capacity for potential flows.
 - d. Method of noise control for pumps, motors, and generators.
 - e. Location and method of connection to the existing sewer on each side of the bypass if not provided in the Contract Documents.
 - f. Number, size, material, and method of installation of suction and discharge piping, valves (isolation and air release), fittings, and other components for connection to the existing sewer system.
 - g. Sewer isolation or plugging method and types of plugs or valves and fittings.
 - h. Emergency plan for adverse weather and flooding for various phases of the Work.
 - i. Incidental items required to ensure proper protection of the facilities.
 - j. Traffic Control Plan where roads are impacted.
 - k. Plan to divert pedestrian access where sidewalks are impacted.

- C. Temporary Bypass Pumping Plan – For System Shutdowns Overnight or for Extended Periods
 - 1. Prepare and submit a project- and site-specific detailed temporary bypass pumping plan that provides detailed descriptions and layout drawings of the proposed temporary bypass pumping system(s). Outline provisions and

- precautions to be taken by the Contractor to convey and maintain existing wastewater flows during construction.
2. Ensure proper protection of existing facilities, the project area, and surrounding properties from damage due to the discharge of flows.
 3. Include the following as a minimum:
 - a. Size of pipeline or conveyance system to be bypassed.
 - b. Staging areas for pumps.
 - c. Manufacturer's product data for temporary bypass pump sizes, capacities, power requirements, and number of each size to be on site including primary, secondary, and spare pumps. Provide method of operation and control, and redundancy sufficient to prevent SSOs.
 - d. Provisions for standby power including generator size and location.
 - e. Provisions for stand-by lighting.
 - f. Method of noise control for pumps, motors, or generators.
 - g. Location and method of connection to the existing sewer on each side of the bypass if not provided in the Contract Documents.
 - h. Size and location of manholes or access points for suction and discharge hose or piping.
 - i. Plan indicating location of temporary bypass pumping pipe locations.
 - j. Number, size, material, location, and method of installation of suction and discharge piping, valves (isolation and air release), fittings, and connections to the existing sewer system.
 - k. For buried piping, typical sections showing suction and discharge pipe depth, embedment, select fill and special backfill.
 - l. Thrust and restraint block sizes and locations. Provide details necessary to demonstrate the integrity of restraint of suction and discharge piping including piping and fittings associated with primary and secondary pumping units.
 - m. Sewer isolation or plugging method and types of plugs or valves and fittings.
 - n. Discharge plan including method of protecting discharge manholes or structures from erosion and other damage.
 - o. Access plans to temporary bypass pumping locations indicated on the drawings.
 - p. Heavy equipment required for installation of pumps, piping, valves, fittings, and other materials.
 - q. Temporary pipe supports and anchoring.
 - r. Calculations of static lift, friction losses, and flow velocity (pump curves showing pump operating range shall be submitted).
 - s. Calculations for selection of temporary bypass pumping pipe size.
 - t. Schedule for installation, operation, maintenance, and removal of the temporary bypass pumping system(s).
 - u. Emergency plan for adverse weather and flooding for various phases of the Work.
 - v. Contractor's plan for providing continuous (24-hour) monitoring of the temporary bypass pumping operation as well as the monitoring persons' qualifications. Additionally, an auto-dialer alarm system shall be provided for loss of primary pump or high level at suction location.
 - w. Plan for refueling pump sets on demand.
 - x. Demonstration of compliance with the requirements and permit conditions specified in the Contract Documents.
 - y. Incidental items necessary to insure proper protection of the facilities.

1.5 QUALITY ASSURANCE

- A. Demonstrate, or employ the services of a subcontractor, who can demonstrate that they specialize in the design and operation of temporary sewer bypass pumping systems.
- B. Comply with North Carolina OSHA Standards, Underwriter Laboratories, and other authorities having jurisdiction. The temporary bypass pumping system shall meet the requirements of codes and regulatory agencies having jurisdiction.
- C. Materials and appurtenances shall be clearly, legibly, and appropriately marked for identification purposes. Marking shall include listing/approval stamp, label, or other marking indicating conformance with specified standards.
- D. Perform temporary bypass pumping system testing in accordance with Part 3.

PART 2 PRODUCTS

2.1 TEMPORARY SEWER BYPASS PUMPING SYSTEMS FOR SYSTEM SHUTDOWNS EXTENDING OVERNIGHT

- A. Pumps shall be fully automatic self-priming units that do not require the use of foot-valves or vacuum pumps in the priming system. Pumps may be electric, or diesel powered. Diesel powered pumps shall include critical grade silencing when used in residential settings or areas where excessive noise levels would create a disturbance. Critical grade silencing is not required on redundant bypass pumping.

Silencing Grade	Expected Attenuation (dBA)
Industrial	15 to 20
Residential	20 to 25
Critical	25 to 32
Super Critical	30 to 38
Hospital	35 to 42
Hospital Plus	35 to 50
Extreme	40 to 55
Super Extreme	45 to 60

- B. Provide level detection equipment, alarms, drives, controls, fittings, valves, air release valves, fuel tanks, auxiliary fuel tanks, and other components for a reliable stand-alone system. Provide sufficient components for a redundant system.
- C. Include 100 percent on-line pumping redundancy. Include a redundant bypass pump, intake and discharge conduit, and other equipment necessary to provide continuous wastewater flow and prevent the backing up of sewage in the event of primary system failure.

2.2 PERFORMANCE REQUIREMENTS

A. Design, install, operate, and maintain a temporary bypass pumping system to maintain continuous wastewater service to customers of CFPUA. The Contractor shall be responsible for bypass pumping of wastewater as required to prevent backing up of sewage (except as approved by CFPUA) and provide appropriate conditions for proper drainage, inspection, replacement, rehabilitation, testing or reconnections to existing sewers.

B. Temporary Bypass Pumping System Capacities

Location	Firm Capacity (GPM)

C. Operation

1. Operators

- a. Provide on-site manual oversight by a responsible operator of temporary bypass pumping operations 24 hours per day, 7 days per week when the temporary bypass pumping systems are in operation.
- b. The 24-hour monitoring operator shall be properly trained, experienced, and mechanically qualified so that they can quickly and effectively address potential emergency and non-emergency situations associated with the pumps and temporary bypass pumping system.

2. Controls

- a. Pumps shall operate on redundant control systems and be equipped with an auto-dialer, cellular, or SCADA monitoring and control. Controls shall be set so that the systems do not surcharge and create an SSO in upstream manholes or a backup of wastewater into residential or commercial facilities.

3. Operation Sequences

- a. Comply with operating sequences provided by Engineer and ORC.

PART 3 EXECUTION

3.1 EXAMINATION

A. Inspect Work area and verify that existing conditions match the conditions depicted on the Drawings. Notify Engineer immediately of any discrepancies.

B. System Testing

1. Perform leakage and pressure tests of the temporary bypass pumping discharge piping using clean water prior to operation. Pressure and leakage tests shall be conducted at 1.5 times the maximum working pressure, based on the approved Temporary Bypass Pumping Plan, for a period of two hours. No leakage is permitted during this test. Provide a leakage and pressure test report that documents start time and pressure, pressure at 15-minute intervals, stop time, end

of test pressure, and amount of leakage. Report shall be signed by the Contractor's on-site superintendent and project manager, and the Engineer or CFPUA representative.

2. Demonstrate that the temporary bypass pumping system is in good working order and is sufficiently sized to successfully convey wastewater flows by operating the system in automatic mode for a period of 24 hours prior to beginning Work.
3. Demonstrate alarms function as designed.
4. Demonstrate back-up pumps and systems operate as designed.

3.2 PREPARATION

- A. Temporary bypass pumping operations shall not proceed until submittals have been approved.
- B. Do not interrupt sewer service without prior approval of CFPUA.
- C. Precautions
 1. Locate existing utilities in proximity to the temporary bypass pumping system. Install temporary bypass pumping system components to minimize disturbance to existing utilities and in accordance with the Temporary Bypass Pumping System Plan. Costs associated with relocating existing utilities and obtaining approvals shall be borne by the Contractor.
 2. During temporary bypass pumping system operation, protect the existing sanitary sewer facilities from damage inflicted by any equipment. The Contractor shall be responsible for physical damage to the existing sanitary sewer facilities caused by human or mechanical failure.
- D. Protect existing facilities in accordance with Section 01 50 00 – Temporary Facilities and Controls.

3.3 INSTALLATION

- A. General
 1. Prevent damage to existing structures. Discharge piping to gravity sewer systems shall be designed in such a manner as to prevent discharge from contacting manhole walls or benching. Full discharge shall go into the downstream pipe in a manner to minimize turbulence. It may be necessary to remove manhole cones to provide sufficient space for the bypass piping. Contractor is responsible for any damage to manholes. Repair damaged manholes to preconstruction condition.
 2. Make connections to the existing sewer and construct temporary bypass pumping structures only at the access locations indicated on the Drawings.
 3. The new sewer may be used by the Contractor to convey the sanitary flows after the new sewer has passed inspection and testing. CFPUA shall approve any temporary connections to the new sewer.
 4. Plugging or blocking of sewage flows shall incorporate a primary and secondary plugging device. When plugging or blocking is no longer needed for performance and acceptance of work, it is to be removed in a manner that permits the sewage flow to slowly return to normal without surge and that prevents surcharging or causing other major disturbances downstream.

5. When working inside a manhole or force main in the presence of sewer gases, combustible or oxygen-deficient atmospheres, and confined spaces, the Contractor shall exercise caution and comply with OSHA requirements.
 6. Installation of bypass pipelines is prohibited in wetland areas unless specifically indicated or allowed in the Contract Documents. The pipeline must be located off streets (except where streets are shut down and detours or lane shifts are provided) and sidewalks and on shoulders of the roads or within easements. When the bypass pipeline crosses local streets and private driveways, install temporary road ramps.
- B. Steel Pipe shall be installed in accordance with manufacturer recommendations. Locking pins shall be placed in couplings.
- C. HDPE pipe shall be installed in accordance with AWWA M55 “PE Pipe – Design and Installation” and the “Handbook of Polyethylene Pipe” by the Plastics Pipe Institute. The pipe shall be joined by the butt fusion procedure outlined in ASTM F 2620 or PPI TR-33. Fusion joints shall be made in compliance with the pipe or fitting manufacturer’s recommendations. Fusion joints shall be made by qualified fusion technicians per PPI TN-42.

3.4 OPERATION

- A. Maintain flows in the existing upstream pumps stations, sewer interceptors, and tributary collector and lateral lines at all times and under all weather conditions except for brief periods when mains and services are disconnected and reconnected. Take actions and precautions necessary to prevent discharge of wastewater during disconnection and reconnection of mains including performing those tasks during off peak hours or providing additional temporary bypass measures. Interruption of flows that result in the discharge of wastewater will not be permitted.
- B. Maintain sewer flow at the work area in a manner that will not cause surcharging of sewers or damage to sewers, and that will protect public and private property from damage and flooding.
- C. Anticipate severe weather conditions and increases in peak flows during rain events and design and plan for these accordingly.
- D. Immediately notify CFPUA should a sanitary sewer overflow (SSO) occur. Take necessary action to clean up and disinfect the spillage to the satisfaction of CFPUA and other governmental agencies with jurisdiction. If sewage is spilled onto public or private property, wash down, clean up, and disinfect the spillage to the satisfaction of the property owner, utility owner, and governmental regulatory agencies.
- E. Overflows from temporary bypass operations shall not be permitted to enter streams or bodies of water. The Contractor shall be solely responsible for paying fines imposed and legal actions taken by state and federal regulatory agencies if overflows occur as a result of the temporary bypass pumping operations. Reimburse CFPUA for any damages, operational costs, fines, and other effects. Immediately remove and dispose of wastewater and waste material spilled during the temporary bypass pumping at his own expense.

- F. Make every effort to avoid causing unplanned service outages. CFPUA will investigate service outages resulting from Contractor's operations. If the investigation determines that the Contractor could have avoided the service outage, then the outage shall result in disciplinary actions including but not limited to reimbursement to the CFPUA for any damages, operational costs, fines, and other effects.
- G. Provide pipeline plugs, temporary suction piping, pumps of adequate size to handle peak flow, and temporary discharge piping to ensure that the total flow of the sewer main can be safely diverted around the section of sewer designated for rehabilitation. Do not stop or impede the main flows without prior approval by CFPUA.
- H. Temporary bypass pumping systems for system shutdowns extending overnight shall be operated 24 hours per day.
- I. Where portions of the Work require that tributary pump stations be taken out of service for prolonged periods, the Contractor shall construct a temporary bypass pumping system for those pump stations that discharge into either the existing piping downstream of the affected area, or to a neighboring gravity sewer (as identified by CFPUA) that flows to an unaffected pump station.
- J. Temporary road ramps shall be used where necessary to maintain traffic flow in accordance with the Traffic Control Plan as required by Section 01 35 00, Special Procedures.
- K. Cease bypass pumping operations and return flows to the new or existing sewer when directed by CFPUA.
- L. Contractor shall repair, at his own expense, any damage to public or private property caused by his operations.
- M. A copy of the CFPUA approved Temporary Bypass Pumping Plan shall be available onsite at all times during temporary bypass pumping operations.

3.5 MONITORING

- A. Operators shall perform inspections of the temporary bypass pumping system and operation at a minimum of hourly intervals. Inspections shall include at a minimum:
 - 1. Observation of all components of the temporary bypass system, including all piping and appurtenances, to ensure the system is operating as specified and no leakage or damage is occurring.
 - 2. Observation of the suction and discharge locations of the temporary bypass pumping system, including upstream and downstream sewers, to ensure flow levels are as expected and no surcharging of the sewer or damage is occurring.
 - 3. Verification of adequate fuel supply.
- B. Inspections shall be documented in the operation log at the time that the inspection is performed.

3.6 PROTECTION

- A. Protect temporary bypass pumping systems from traffic in proximity to system components and vandalism. Repair or replace damaged components immediately.

3.7 MAINTENANCE

- A. Ensure that the temporary bypass pumping system is properly maintained in accordance with the Temporary Bypass Pumping Plan and manufacturer recommendations. There shall be no leakage from the temporary bypass pumping system.
- B. Sufficient spare parts for pumps and piping shall be kept on site to maintain operation of the redundant system. Immediately replace spare parts that are placed into service.

3.8 DISASSEMBLY AND REMOVAL

- A. When bypass operations are complete, bypass piping shall be flushed with fresh water and drained into the wastewater system prior to disassembly. Piping shall be disassembled in a manner to prevent an SSO.
- B. Upon completion of the bypass pumping operations, and after the receipt of written permission from CFPUA, the Contractor shall disassemble and remove piping and restore property to pre-construction condition.

END OF SECTION