***ADD THE FOLLOWING SECTION TO DIVISION II – CONSTRUCTION DETAILS***

SECTION 695 – DIVERSION OF SEWAGE FLOW

**DESCRIPTION**

**695.01.01 GENERAL**

A. This section describes the existing conditions for temporary bypassing and dewatering of sewers during internal video inspection, cleaning operations, rehabilitation and removal and/or replacement or point repairs of the pipes and manholes.

B. The Contractor is responsible for the design of all pump equipment, piping, power, collection and distribution elements to achieve the bypassing of existing sewage from intake point to discharge point.

C. The quantity of sewage to be bypassed from point to point shall be the sum of all flows entering the pipeline before the point of discharge. [NOTE TO SPEC WRITER: IF FLOWS ARE ON PLANS USE (refer to the contract Plans for flow values).]

**695.01.02 REQUIREMENTS**

A. The Contractor or Subcontractor performing the Bypass Pumping work on this project, should have an “A” (General Engineering) classification license or “A-15” (Sewers, Drains, and Pipes) classification license.

B. The actual design of the bypass arrangement shall be prepared by the Contractor, and shall be submitted to the Engineer to determine conformance to project objectives. Design for maintaining access will be prepared by the Contractor and submitted to the controlling agency for approval. Lay flat hoses may not be authorized at all locations. Above ground installations will require ramps for these purposes.

C. Contractor shall provide labor, materials, and supervision to temporarily bypass flow around the Contractor’s work in accordance with the specific needs of the work being performed.

D. The Contractor shall be required to prepare a traffic control plan for the bypass equipment and piping in accordance with Section 624 “Accommodations for Public Traffic”. Pedestrian access and handicapped accessible routes must be maintained.

E. Requirements for temporary bypass pumping or flow diversion within City of Las Vegas (CLV) rights of way for purposes of installing bypass equipment including, but not limited to, bypass piping shall comply with the requirements of CLV. CLV permit requirements apply.

F. Requirements for temporary bypass pumping or flow diversion within Nevada Department of Transportation (NDOT) rights of way for purposes of installing bypass equipment including, but not limited to, bypass piping shall comply with the requirements of NDOT. NDOT encroachment permit requirements apply.

G. Requirements for temporary bypass pumping or flow diversion within Clark County (CC) rights of way for purposes of installing bypass equipment including, but not limited to, bypass piping shall comply with the requirements of CC. CC permit requirements apply.

H. Requirements for temporary bypass pumping or flow diversion within City of North Las Vegas (CNLV) rights of way for purposes of installing bypass equipment including, but not limited to, bypass piping shall comply with the requirements of CNLV. CNLV permit requirements apply.

I. The Contractor’s bypass plan must consider existing speed limits and allowable reductions in determining the location of piping and reduce speed at each location where the piping crosses perpendicular to lanes of traffic by 10 mph.

J. Contractor shall keep all driveway access to adjoining properties accessible to the public and fire and emergency vehicles. Final designs for maintaining access will be prepared by the Contractor and submitted to the controlling agency for approval as part of the Traffic Control Plan.

K. At each project site the Contractor shall have the entire bypassing system in place and tested before bypassing any sewage.

L. The Contractor shall notify the Engineer 48 hours prior to shutting down or bypassing any of the pipelines or lift stations.

M. The bypassed flow shall be continuously metered. The bypass equipments shall be continuously monitored to ensure proper operation at all times.

N. For purposes of bypass pumping lateral flows, right of entry onto private property is not permitted without property owner/homeowner association permission. Contractor shall be responsible to acquire this permission. Laterals shown on Drawings are from best available documents. Internal inspection may identify additional laterals not shown on the Drawings that may require bypass pumping.

**695.01.03 DEFINITIONS**

A. Average Flow: flow values based upon equivalent residential units (ERU) or mean flow value as determined by a 7-day flow monitoring.

B. Cumulative Average Flow: the summation of tributary average flow values contributing to flow at a given point.

C. Peak Flow: a product of Cumulative Average Flow and the corresponding Peak Flow Factor.

**MATERIALS**

**695.02.01 SUBMITTALS**

A. Prepare a detailed bypass pumping plan, prepared and sealed by a Nevada licensed professional engineer, that describes the measures to be used to control flows. Submit the plan to and obtain approval from the Engineer prior to beginning bypass pumping work. Contractor’s plan shall include, but not be limited to the following:

1. Drawings indicating the scheme and location of pumps, suction manhole, suction piping, discharge manhole, discharge piping, temporary sewer plugs, flow diversion structures, dams, odor control, and related materials and equipment for each of the bypass pumping sites.

a. Plan shall show location of all bypass pumping systems, including odor control, and shall discuss phasing, reuse, and movement of systems during construction as applicable.

b. Bypass pumping plan shall designate which system/setup will be used where and when applicable.

c. Structures and equipment within the public right-of-way shall be identified as such on the plans.

1. Right-of-Way ownership.
2. Vehicular and pedestrian access to public and private facilities shall be coordinated with the traffic control plan. The traffic control plan shall show how vehicles and pedestrians will be protected from injury resulting from bypass operations.
3. Contractor performed flow monitoring results.
4. Capacities and sizes of pumps, standby equipment, and power requirements if applicable.
5. Key operational control factors, (i.e., maximum flow elevations upstream of dams).
6. Design calculations proving adequacy of the system and selected equipment, including static lift, friction losses, fitting losses, flow velocity, pump curves identifying operating range and duty point, and pipe thickness calculations. Pipe thicknesses calculations shall assume an H20 live loading at crossings.
7. Sewer plugging method and type of plug.
8. Method of noise control for each pump and generator.
9. Thrust restraint block sizes and locations were space is limited.
10. Method of securing and bracing of sewer plug shall be submitted at a minimum, the plug must attach to a cable/chain which is then connected/tied off to an immobile object, as approved by the Owner.
11. Temporary pipe supports and anchoring required.
12. Staffing plan including name and qualifications for on-site operators. Trained bypass pumping personnel (pump operator) shall be present during the entire bypass operation. Logs shall be maintained by the bypass pumping personnel. Submit bypass pumping personnel qualifications for agency review and approval.
13. Odor control system manufacturer information.
14. Site layout showing all major components.
15. Wet weather event procedures.
16. An emergency response plan that addresses containment, notification procedures, and equipment failure procedures. An emergency contact list with 24 hour phone numbers shall be submitted and updated as needed.
17. Schedule including durations and dates for each sequence.
18. Protection method for existing utilities.

B. Number and size of pumps used in bypass pumping shall be such that if the largest pump is out of service, bypass flows will be maintained during the bypass operation.

C. Contractor shall field verify minimum, maximum, and average flow to be bypassed.

**695.02.02 PRODUCTS**

A. Contractor shall provide temporary pumps, conduits, and other equipment to bypass sewer flow around the Contractor’s work area as required by the work, and during video inspection and cleaning activities.

1. Contractor shall furnish all necessary labor and supervision to set up and operate the pumping and bypass system.
2. Engines shall be equipped with devices such as (but not limited to) mufflers and/or plywood/Styrofoam noise panels enclosing the engines to keep the noise level within limits specified by the Owner.
3. Pumps and bypass lines shall be of adequate capacity and size to handle the Peak Flow.
4. Bypass lines, fittings and all accessories shall withstand twice the maximum pressure of the system or 50 psi whichever is greater.

B. Contractor shall maintain on site, sufficient equipment and materials to ensure continuous and successful operation of the bypass and dewatering systems.

1. The Contractor shall have redundant bypass pumps, generator and pipe on site, manifold, connected and ready to operate immediately.
2. The Contractor shall have standby pumps on site for 100% redundancy of the bypass system design flow or Peak Flow, whichever is greater.
3. Standby pumps shall be plumbed, fueled and operational at all times.
4. The Contractor shall maintain on site a sufficient number of valves, tees, elbows, connections, tools, sewer plugs, piping, and other parts or system hardware to ensure immediate repair or modification of any part of the system as necessary.
5. In order to determine bypass pipe capacity, the Contractor shall use a maximum velocity of 10 feet/second.
	* 1. All pumps, generators and other equipment shall be placed on a new containment unit to protect against spills of petroleum products used by the equipment.
		2. Odor control during bypass operations shall be in accordance with Section 696 “Environmental Control Sanitary Sewer Rehabilitation”.

**CONSTRUCTION**

**695.03.01 AVAILABLE FLOW DATA**

A Estimated flow data for the sewers to be rehabilitated in the project sites, if available, is located on the Plans.

B. Flow data for service laterals, when available, is shown on the Plans.

C. The Contractor shall determine flow data not available or not shown.

D. It is anticipated that the work may be performed during the months when the Las Vegas valley experiences monsoon seasonal rain events.

1. It is likely that these events will influence the quantity of flow in the sewer lines.
2. Evidence exists suggesting that the sewer lines proposed for rehabilitation have flowed full in the past. The Contractor must consider this possibility when planning his diversion operations.

**695.03.02 OPERATIONS**

A. In areas where flows are bypassed, all bypass flows shall be discharged as approved by the Engineer.

B. No bypassing to the ground surface, receiving waters, storm drains, or bypassing which results in soil or groundwater contamination or any potential health hazards shall be permitted.

C. In the event of any sewage spill the Contractor will be responsible for the prompt cleanup and disinfecting of the spill as called for in his spillage cleanup plan. The Contractor is required to immediately notify the Owner in the event of any sewage spill per the emergency response plan.

D. The Contractor shall compensate the Owner for the cost of any fines levied as the result of a spill or unauthorized discharge.

**695.03.03 LEAKAGE TESTING AND INSPECTION**

1. The bypass pumping system shall be tested prior to being placed in service to insure there are no leaks.

B. The testing procedure shall be as follows:

1. The test shall run for a period of 24 hours.
2. The Contractor shall fill the line with water.
3. The line shall be sealed on the discharge end.
4. The Contractor shall pressurize the line to twice the maximum pressure of the system or 50 psi whichever is greater.
5. The Contractor shall walk the line every hour and keep a log of the findings. The line may be put in service if after the 24 hour period the pressure has been maintained and there are no observable leaks.
6. The Contractor shall inspect the entire bypass pumping and piping system for leaks or spills on an hourly basis.
7. For internal pipeline bypasses, the Contractor will inspect plugs and/or other diversion methods (gates, stop logs, etc) to ensure seal on a daily basis. The Contractor will also inspect the next 3 manholes on the bypass pipeline downstream of the internal diversion location during peak flow timeframe to ensure no surcharging is occurring on a daily basis. The Owner may require additional inspection further downstream in the bypass pumping plan.
8. The Contractor shall create an inspection log and shall enter the time of the inspections, the condition of the piping, and the name of the inspector into the log for review by the Engineer.

**695.03.04 DISMANTLING OF BYPASS PUMPING SYSTEM**

1. The bypass pumping system shall be cleaned and disinfected prior to being dismantled.
2. The Contractor shall alternate flushing and purging of the system to remove all loose material.
3. After the Contractor has cleaned the pipe, and prior to dismantling of the piping, the Contractor shall disinfect the pipe with 10% chlorine and water solution.

B. Disturbed Areas: Upon completion of bypass pumping operation, clean disturbed areas, restoring to original condition, including, but not limited to, pavement restoration, restoration of the striping and traffic control devices, landscaping, and private property improvements restoration, at least equal to that which existed prior to start of Work.

**695.03.05 SCHEDULING**

A. The bypassing system shall not be shut down between shifts, on holidays or weekends, or during work stoppages without written permission from the Engineer.

B. The bypass system shall have a trained and qualified attendant 24 hours per day, 7 days per week, whose only duty is to maintain the bypass pumping system until the bypassing of the specific pipeline is no longer required. The attendant shall be qualified to both operate and repair any and all problems that may occur.

C. The attendant shall have a cellular phone for communication between the Engineer, Owner, and the site in the event of emergencies. The cellular phone number shall be provided to the Engineer at the beginning of the project.

**695.03.06 FLOW CONDITIONS**

A. The Contractor is responsible for intercepting the flows at locations suitable to achieve the goal of dewatering the sewer lines scheduled for work.

B. The Owner may allow diversion of sewer flow that will reduce the amount entering the system.

1. The Contractor shall obtain permits from the Owner in order to install plugs and pumps and other equipment at specified locations to accomplish the diversions.
2. Flow values shown on the Plans reflect monitored or estimated flow.

**METHOD OF MEASUREMENT**

**695.04.01 MEASUREMENT**

The quantity of DIVERSION OF SEWAGE FLOW will be measured by lump sum.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**695.05.01 PAYMENT**

The accepted quantity of DIVERSION OF SEWAGE FLOW will be paid for at the contract unit price of lump sum and shall include all materials, equipment, labor and personnel necessary to dewater the sewer lines for the selected rehabilitation work, reliable, and operational system including, but not limited to, preparation of a bypass pumping plan; plugging sanitary sewer lines, temporary pumping of sewage; providing (as necessary) and closing stop logs and/or valves wherever applicable; furnishing, installing, testing, operating and maintaining bypass pumps and pump lines including spares, moving, handling and reinstalling pumps and lines as required to facilitate the construction; cleaning and disinfecting of piping prior to dismantling; maintaining storm flow to existing drop inlets; installation; excavation (regardless of depth); shoring; dewatering; backfill; aggregate base materials; granular backfill; select backfill; compaction; concrete; reinforcing steel; grout; removal; and restoration of pavement; plantmix bituminous surface; tack and prime coat; permanent and temporary patch; traffic striping, pavement markings, and curb markings; pavement markers; temporary pavement striping tape; repair damaged landscaping; repair of damaged irrigation system; private property improvements restoration; removal and reinstallation of existing manhole components; maintenance and restoration of trenches; sleeves and appurtenant facilities; handling all sewage not diverted; providing odor control; replace damaged traffic loops; repair or replace damaged existing utilities; disposal of all excess unsuitable material including disposal fees and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer. No additional payment will be made for multiple diversion operations.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

Payment will be made under:

|  |  |  |
| --- | --- | --- |
| **ITEM NO.** | **ITEM DESCRIPTION** | **UOM** |
| 695.0000 | DIVERSION OF SEWAGE FLOW | LS |

**END OF SECTION 695**