SECTION 151502
ULTRASONIC DOPPLER FLOWMETER AND RECORDER (S-118)

1. DESCRIPTION

This specification shall govern all work necessary for furnishing and installing ultrasonic doppler flowmeters and recorders required to complete the project.

2. GENERAL

The flowmeter shall be ultrasonic of the doppler type for measuring flow rate in full pipes, and shall display instantaneous flow rate and shall have a totalizer and shall be capable of transmitting a signal to a Z-fold chart recorder. Flowmeter shall be POLYSONICS Model UFM84 with options specified below, or approved equal.

3. QUALIFICATIONS

The manufacturer shall have instruments of the Doppler type and configuration measuring flow in domestic wastewater for a minimum of eight years. The Contractor shall submit a suitability certification signed by both the manufacturer and the Contractor stating that the manufacturer has reviewed the plans and specifications and the equipment to be supplied will comply with the specifications and will function properly after installed.

4. EQUIPMENT

TRANSDUCERS: The electronic flow sensing device shall be mounted to the outside of the carrier pipe and be capable of removal without interruption of flow. Electrodes in contact with the liquid are not acceptable. The transducers shall be of the crystal type--one to transmit, the other to receive. The transducers shall be designed to operate in temperatures up to 320E F. The dual-head transducers shall be self-aligning with mount strap to be provided by the manufacturer.

CALIBRATION: The flowmeter calibration shall be capable of being changed to different flow ranges on 1" through 72" pipe without replacement of any components or flow sensing assembly.

ARMORED ASSEMBLY: The sensing element shall be supplied as a armored assembly with a jacketed flexible cable of sufficient length and shall be interchangeable between without recalibration of metering system.

SOLID-STATE: The sensing element shall be solid-state and the transformer isolated and designed to meet special requirements. The receiver circuit shall be double high-Q staged. The transmit circuit shall be cable length adjustable to permit transmit power to flow sensor cables up to 100 feet long.

RESPONSE: The flowmeter shall respond to flow rates as low as .2 feet per second when flow stream is nearly clean or contains particles and/or bubbles.

ENCLOSURE: The transmitter-indicator shall be housed in a NEMA 4X enclosure with gasketted shatterproof windows for meter viewing. The housing shall be front hinged for easy access for controls and be suitable for wall mounting.

FLOWMETER ELECTRONICS: The flowmeter electronics shall be designed to operate at temperatures between -10E and 140E F. All electronic

circuits shall be interchangeable with other flowmeters of the same model number. All electronic circuits shall be coated with an anti-fungus compound. The transmitter circuit and calibration frequency standard shall be crystal controlled. The transmitter shall be powered by 120 VAC at 50/60 Hz requiring less than 10 watts. Circuitry shall have automatic bleeds for lightning protection.

FILTER: An AC power line noise filter and voltage surge protector shall be provided.

SIGNAL LOSS PROTECTION: A signal strength meter and/or loss of signal indicator shall be provided. Output shall be driven to zero upon loss of signal.

DAMPING: The transmitter circuitry shall employ dual stage damping to detect flow variations and automatically change time constants to track the actual flow change for steady chart readings and smooth flow control.

ADJUSTMENTS: The transmitter shall include adjustments for range calibration, mA span, mA zero, output signal damping and AGC sensitivity.

CALIBRATION PANEL: The transmitter shall contain a calibration panel with switch and vernier dial directly calibrated in velocity units over a range of 0-1 Ft/Sec through 0-40 Ft/Sec. Dial resolution shall be in increments of .01 Ft/Sec.

CALIBRATION CHECKING DEVICE: A built-in calibration checking device shall be provided. This internal frequency standard shall consist of an on-board frequency device and separate reference frequencies. The manufacturer shall supply a multi-point flow calibration curve.

CURRENT OUTPUT: The 4-20 mA output shall be proportional to flow and isolated. The maximum resistive load shall be 600 ohms. Output current limiting circuitry shall be provided.

DIGITAL DISPLAY OF FLOWMETER: The transmitter shall contain a digital display of flow rate. The digital display shall be calibrated in gallons per minute.

CROSSTALK: The transmitter shall contain electronic means to allow crosstalk from other in-service sonic flowmeters of the same manufacturer.

RECORDER-TOTALIZER: The recorder shall be Z-fold 4" chart recorder with 3 continuous writing pins. The recorder-totalizer shall be a digital type to receive the 4-20 ma signal from two independent transponor assemblies. The signal from the two sources shall be integrated to display the total flow from the lift station by the third pen. The digital display will only display the instantaneous flows.

5. OPERATING CONDITIONS

GENERAL REQUIREMENT: The job will require that flow be measured at two locations by two separate transponder assemblies. The instantaneous flow at each location shall be independently displayed. The recorder-totalizer shall display the combined flow from the two locations.

10" PIPE CONNECTION AT LAGUNA SHORES:

Liquid to be measured: domestic sewage
Flow range: 0-1,200 GPM
Pipe: 10" ductile iron class 50 with
40 mil polyethylene lining
Diameter: OD=11.10".44" ID=10.44"
Transducer cable length: 55 feet

16" PIPE CONNECTION AT LAGUNA SHORES:
Liquid to be measured: domestic sewage
Flow range: 0-3,800 GPM
Pipe: 16" ductile iron class 50 with
40 mil polyethylene lining
Diameter: OD=17.40" ID=16.64"
Transducer cable length: 65 feet

6. INSTALLATION

STORAGE OF MATERIALS: The Contractor shall be responsible for the proper storage of equipment and materials.

PLACEMENT: The transducers shall be mounted to the pipes in the fiberglass manholes. The flowmeter and recorder-totalizer units shall be mounted on the wall of the control room of the lift station. Cables shall be installed in 1" PVC conduit along side the pipe for underground installation and in 1" aluminum conduit mounted to the exterior wall of the valve vault and interior wall of the existing structure for above-ground installation.

CALIBRATION AND INITIAL OPERATION: The equipment supplier shall provide the services of a qualified field representative to calibrate and set up equipment as required for proper operation. After the system is functioning properly, the equipment supplier shall prepare a final report to be submitted by the contractor to the engineer. The final report shall address any revisions or modifications which are not consistent with the original submittals for the equipment. Four copies of the report shall be submitted as part of the 0&M Manual.

7. MEASUREMENT AND PAYMENT

Unless indicated otherwise in the proposal as bid item, providing and installing of ultrasonic doppler flowmeter and recorder shall not be measured for pay but shall be considered subsidiary to other work.