

ITEM 10551.9511 M - SCOUR MONITORING SYSTEM

DESCRIPTION

The work shall consist of furnishing, installing, and placing in satisfactory operating condition the electrical equipment as indicated on the Plans and/or as called for in these Specifications. Under this Item the Contractor shall furnish and install a scour monitoring system at Robert Moses Causeway over Fire Island Inlet at locations as shown on the Plans.

The system to be provided shall be capable of total scour monitoring including: maximum depth of scour, backfill of previous scour and present scour activity. The system shall incorporate an active sonar transducer at each specified pier as shown on the Plans, providing a sounding measurement of the streambed with a resolution of 30.5mm, cabling, structural housing, and weatherproof enclosure housing the visual display unit, battery and other electrical components. One data acquisition system shall be provided, as shown on the Plans. This system shall monitor and record the measurements taken by the sonar scour units to be installed at the designated piers. One water stage sensor shall also be provided and integrated into the data acquisition system as shown on the Plans. Surge suppressors shall be provided.

The Contractor shall furnish and install the electronic equipment packages, the sonar transducers and the water stage sensor including their housing, brackets and supports, the solar panel/wireless datalink antenna mast assemblies, cables for the antennas, sonar transducers and water stage sensor, PVC coated conduit and fittings, masonry anchors, materials for 110 VAC power at the master station, and all other plant and materials required to complete the work. The Contractor shall also provide installation supervision and test the system to ensure that it is operational.

It is the intent and purpose of these Specifications to cover and include all apparatus and appliances to properly install, wire, connect, equip, test, adjust, and put into approved working order the complete scour monitoring system herein specified and as shown on the Plans.

MATERIALS

Each piece of electrical equipment and apparatus shall have a phenolic nameplate on which is stamped the name of the manufacturer, model or part number, and the rating or capacity of the equipment or apparatus.

All metal parts of the installation, except structural steel or unless noted, shall be of corrosion-resisting material such as bronze or stainless steel. Cast-iron, malleable iron, or steel with a hot-dip galvanized finish shall be used where specified herein or permitted by the Engineer. All parts to be located below EL. 1.2 shall be stainless steel, Type 316. Materials will be specified where they appear in the following Sections of these Specifications. All materials placed below EL. 1.2 shall be of the type suitable for underwater application. Nuts shall be installed on each side of the connected part, as necessary, in order to insure a plumb mount for all the enclosures. Minimum bolt embedment lengths shall be measured in concrete only.

Electrical materials and workmanship not specifically described under these Specifications shall be as specified under NYSDOT Specifications, Section 670 - Highway Lighting System.

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CONSTRUCTION DETAILS

Working Drawings and Samples

The Contractor shall prepare and submit for review the following working drawings executed in accordance with the provisions of the Contract:

- (a) Certified dimension prints of all electrical equipment installed as part of the monitoring system.
- (b) A schematic wiring diagram of the monitoring system.
- (c) A complete set of layout and installation drawings for the scour monitoring system showing the location and installation, including support and mounting details, of all apparatus and equipment.
- (d) Construction drawings of all new multiconductor cables, including the sizes of conductors, type and thickness of insulation, jackets and other components, and giving the outer diameter of each finished cable.

Certified dimension prints of the apparatus shall state in the certification the name of the job, the application of the apparatus, device designation, number required, right-hand or left-hand assembly, electrical rating, number of poles or contacts, material, finish, and any other pertinent data to show that the apparatus meets the specified requirements.

Upon completion of the work, the Contractor shall correct all electrical shop or working drawings to show the work as constructed and provide one (1) set of Mylar reproducible, along with an operations and maintenance manual. The O&M manual will provide, at minimum, a complete description of operation, catalog cuts of all major components, maintenance instructions, instruction for programming and retrieving data using operating software, and any other non proprietary information needed by the State. This manual will be submitted to the Engineer for review.

The Contractor shall submit for inspection and test, if directed by the Engineer, samples of any apparatus or device which he proposes to use as a part of the electrical installation.

Monitoring System Vendor

Except as otherwise noted, all apparatus and equipment comprising the scour monitoring system, including, but not limited to the remote transducer units, the data acquisition system, the acoustic water stage sensor, surge suppressers, all interconnection cabling, device programming, and other apparatus required to provide the complete functioning system, shall be assembled and integrated by a single qualified Monitoring System Vendor. The system shall be manufactured by ETI Instrument Systems, Fort Collins, Colorado, or approved equal. The water stage sensor shall be a Judd Communications Depth Gage, Analog Version, Model JCDG-2, or equivalent.

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The Monitoring System Vendor shall have experience in providing scour monitoring systems for various structures. Such experience shall be demonstrated by identifying a minimum of three installations for which the system vendor has provided complete monitoring systems within the past 5 years. The Monitoring System Vendor shall report to and be directed by the Contractor. The Monitoring System Vendor shall have their qualifications submitted to the Engineer for approval prior to the beginning of work.

The Monitoring System Vendor shall assume complete system responsibility for the integrated functioning of all components to provide a satisfactorily assembled scour monitoring system operating in accordance with specified requirements. The monitoring system shall be compatible in all respects with the existing installation at Wantagh Parkway over Goose Creek. The Vendor shall be responsible for the detailed schematics, fabrication, and software development of the total monitoring system to ensure compatibility of equipment and suitability for the scour monitoring system. The Monitoring System Vendor shall also review all contractor shop drawings to be used under this Item prior to submission to the Engineer.

The Monitoring System Vendor shall provide an on-site staff to ensure proper final field terminations within remote and master electronic enclosures, and to provide system programming and final adjustments. Upon final acceptance, the System Vendor's staff shall provide on-call warranty service for a period of one year. Field staff shall be capable of responding to an emergency within 24 hours.

Field Testing

The Contractor shall arrange and provide for all the necessary field tests, as directed by the Engineer, to demonstrate that the scour monitoring system is in proper working order and in accordance with the Plans and Specifications.

Should such testing demonstrate that any piece of equipment, cable or wiring connection is defective or functions improperly in the judgement of the Engineer, adjustments and/or replacements shall be made by the Contractor as to make the installation satisfactory to the Engineer, and at no additional cost to the State.

Grounding

All metal conduits, equipment enclosures, frames, housings, and all other metal parts of electrical systems installed or connected under this Item in the proximity of current-carrying conductors or equipment shall be bonded to the existing equipment ground conductor per the National Electrical Code.

Grounding system terminals shall be solderless type and shall be secured by means of hexagonal-head, copper plated, steel machine bolts with lock washers or lock nuts. Ground system conductors shall be continuous unspliced connections between terminal lugs. Paint, rust, and scale shall be removed over the contact area. All connections shall be made up tightly as possible, and any bare metal or paint undercoat remaining exposed shall be spot painted to restore the surface with the same coating and number of coats as applied to the adjacent metal.

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Remote Transducer Units

Each of the pier locations to be monitored shall be provided with an active electronic remote transducer unit. Each unit shall consist of an 81-cone angle transducer, complete with supports and brackets as shown on the Plans. Each transducer shall be wired to a sonar electronic board controlled by an interface "smart" card. Each remote unit will be provided with a wireless datalink transceiver to transmit sonar readings to the master data acquisition unit. The remote units will be provided with solar panels to maintain the batteries. The equipment shall be wired using wire and cable recommended by the manufacturer of the sonar and transducer units. All electronics equipment will be housed in NEMA 4X stainless steel enclosures equal to Weigmann Type SSN4 with locks. The housings will be fastened with 12.7mm stainless steel hardware as shown on the Plans, and in locations specified by the Engineer.

The active sonar transducer shall transmit a pulse of sound to the streambed and measure the time required for the echo to return. These readings shall be recorded such that the changing elevations of the streambed are stored by the master data acquisition system.

Data Acquisition System

The pier mounted remote transducer units shall be monitored by a data acquisition system. This system shall be installed as shown on the Plans and as directed by the Engineer. The system shall be capable of on-site non-volatile memory data storage. The data shall be retrieved via a portable computer through a standard serial or parallel port connection as directed by the Department. All electronics equipment for the data acquisition system shall be housed in NEMA 4X stainless steel enclosures equal to Weigmann Type SSN4 with locks. The housing will be fastened with 12.7mm stainless steel hardware as shown on the Plans, and in a location specified by the Engineer.

The Monitoring System Vendor shall program the Department's portable computer used for the scour monitoring system at Wantagh Parkway over Goose Creek, so that it can download the stored data of this installation. Five copies of the data acquisition software and the data viewing software shall be provided and licensed to the State.

Data Retrieval System

The data stored by the acquisition system shall be capable of being retrieved from a remote location via landline telephone. The data acquisition system shall be provided with a modem with suitable interface and operating software. The Contractor shall coordinate with the local Communications Utility for the installation of a telephone line with all necessary equipment. The Vendor will coordinate with the State to provide monitoring of the telephone link and the emergency response center. A voice synthesizer shall be provided so that the master unit may be called from any telephone and a recording of the current streambed elevations can be heard.

Electrical Power Supply

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The Contractor shall provide and install the necessary materials for the provision of 110 VAC power at the master unit. The conduit and conductors shown on the Plans will run between the existing service and terminate in a suitably sized NEMA 4X Stainless Steel enclosure with an enclosed receptacle equal to Weigmann Type SSN4 with a lock.

Miscellaneous Materials

Conduit, boxes, hardware and supports, wire and cable furnished and installed under this work shall be as specified by NYSDOT unless otherwise required by the manufacturer of the equipment.

Spare Parts

The following spare parts shall be provided:

- One data logger, preprogrammed for the master station
- One modem/voice synthesizer
- One wireless transceiver
- One sonar unit
- One baud rate converter
- Four solid state relays
- Two data link antennas with cables
- Two sonar transducers with cables
- Two solar panels
- One stainless steel bracket assembly
- One can anti-fouling paint
- Two batteries
- One power supply/battery charger
- Five diskette sets with complete configuration software for all data loggers

Spare parts, other than the bracket assembly, shall be packed in substantial cartons clearly labeled with the contents and delivered to the NYSDOT as directed by the Engineer.

METHOD OF MEASUREMENT

Payment for the Scour Monitoring System will be made on a lump sum basis.

BASIS OF PAYMENT

The lump sum price paid for the Scour Monitoring System shall be full compensation for furnishing and installing all materials and tools, and for all labor, equipment, and incidentals necessary for the work hereinbefore specified. The cost of maintaining the existing facilities in operation, repairing and/or patching facilities as required in the course of the work, and furnishing, maintaining and removing any temporary facilities which may be required for the installation of the system, shall be included in the lump sum bid.