

CONTRACT CHANGE ORDER NO. 61ROAD: 04-SF-80-13.2, 13.9 CONTRACT NO.: 04-0120F4 SHEET 2 of 104 SHEETS**Special Provisions changes:**

Revise the Special Provisions, Section 10-3.14 LIGHTING, Subsection NAVIGATION WARNING SYSTEM as follows:

NAVIGATION WARNING SYSTEM

The bridge navigation lights shall be marine signal lanterns of the make and model shown in the Contract Plans, or approved equal, and conforming to the requirements of Coast Guard Standards 33CFR 118.60, 33CFR84.13 and 33CFR 84.15. Lanterns identified in the Contract Plans as type NV-1 and NV-3 shall provide for remote lamp monitoring capability. The lanterns shall be constructed of painted or anodized cast aluminum, polycarbonate or fiberglass base; and ~~components with~~ a precision-molded, color impregnated, glass or acrylic 200-mm Fresnel lens. The lantern shall be hinged for easy access to the lamps and internal assembly. The lantern shall have a bird spike incorporated into the lantern to reduce fouling where post mounted. Lanterns mounted upside down on the bridge structure shall be provided without a bird spike. Closure of the lantern shall be by captive toggle bolts or other approved fasteners, and a watertight gasket. The lantern shall be capable of meeting IP-55 standards. The lantern top shall remain physically connected to the lantern base when opened for servicing. ~~The lantern shall accommodate a 4-place lampchanger with four each S-11 marine signal lamps.~~ Internal shock and vibration isolators are required to extend the life of the high flux LED unit. LED unit shall mount in a cluster to approximate a marine signal lamp and be located at the focal point of the lens. Life expectancy of the LED unit shall be in the minimum of 100,000 hours.

~~The lantern shall have lens tie rods (astragal) constructed of stainless steel. The tie rods shall be placed at an angle of approximately 27 degrees to allow the light beam to be uniform within 25 percent at all viewing angles. Vertical lens tie rods will not be allowed due to shadowing of the lens, which significantly reduces lantern output.~~ The lantern base shall incorporate a bottom cable entry and four attachment studs on a ~~120-65~~ 200 mm bolt circle. Closure bolts and attachment hardware shall be constructed of stainless steel.

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~~In order to operate the lampchanger and marine signal lamps, a transformer shall be fitted within the lantern to accept the supply voltage of 120 VAC and provide 10.0 V to 10.5 V to the lampchanger. Four 3.05 A, 12 V, marine signal lamps shall mount in the automatic lampchanger, which holds the operating lamps at the lens focal point and replaces the operating lamp upon failure. Only the operating lamp shall extend through the focal plane of the optic. Total lamp life for the optic shall exceed 25,000 hours.~~

The lantern shall accept the supply voltage of 120 VAC.

Revise the Special Provisions, Section 10-3.14 LIGHTING, Subsection FOG DETECTION SYSTEM as follows:

FOG DETECTION SYSTEM

Marine Infrared Fog Detection

The fog detector shall consist of a single station, backscatter device using modulated infrared light to monitor visibility and trigger operation of a fog signal. The detector shall be capable of remote monitoring of fault and visibility levels with contacts for remote On/Off function. All components shall be designed and constructed so as to provide service under exposed conditions commonly found along the seacoast. The equipment shall be suitable for single pole mounting. Workmanship shall be of the highest grade throughout.

The detector sampling light shall have a wavelength of 0.94 ~~pm~~ μm with modulated pulse frequency of 16 kHz. The detector shall be capable of triggering operation of a fog signal at three adjustable visibility thresholds over a range of 0.5 to 4 nautical miles. The detector shall have sampling zones of approximately 2 to 12 meters with adjustable sampling times not to exceed 12 seconds every two minutes and a threshold accuracy to within 10 percent of the threshold values. The detector shall automatically adjust for the accumulation of dirt on the lens panel with no effect on the performance. Threshold relays and remote alarm output shall use no volt contacts.

The detector casing shall be sealed to IP67 requirements with a Hammerite finish. The detector shall be supplied with 120 volt, single phase input 12 volt output power supply mounted in NEMA 4X box, complete with clips to mount on the same pole as the detector. Current drain is not to exceed 50 mA at 12 volts DC.

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Fog Signals

Fog horns and fog bells shall be compliant with USCG Title 33CFR Part 67.10. They shall be installed and synchronized as shown in the Contract Plans.

General requirements for sound signals shall include, but not limited to the following:

- a) Shall have rated range of 1 nm
- b) Shall be omnidirectional
- c) Shall be approved per USCG Title 33CFR Parts 67.10-15 and 67.10-20.

The fog signal shall consist of an emitter array, a power supply and interconnection cables that, when assembled, ~~will produce a 300 cycle directional signal of not less than 132 db measured at 7.5 meters on the axis of the horns with a power input of 2000 watts maximum into the array.~~ Will produce sound characteristics conforming to the rated range. The interconnection cables shall not be part of the bid. All components shall be designed and constructed so as to provide extended satisfactory service under exposed conditions commonly found along seacoasts and industrial areas. The equipment shall be constructed to withstand the strains, jars, vibration and conditions incident to shipping, storage, installation and operation as an aid to navigation. Components shall be designed so the adjustments and repairs can be made easily and readily by relatively untrained personnel. Workmanship shall be of the highest grade throughout. All components shall be easily accessible and removable from the front of the power supply cabinets.

The emitter array and power supply shall be separate entities. The emitter shall be capable of mounting ~~on a horizontal platform or on a vertical framework.~~ as shown in the Contract Plans. ~~In use, it will be exposed to the weather. The power supply shall be housed in NEMA 12X enclosure designed for wall mounting. The emitter array shall consist of two transmitters each with two steel diaphragms tuned to 150 cycles per second to produce a tone of 3000 cycles per second, with directional horns to couple the mechanical vibrations to the air. Each transmitter shall be driven by a single fixed electromagnet. The horns shall be resonant at 3000 cycles per second and shall be spaced vertically so as to produce the optimum signal. A steel spacer shall be provided with each transmitter.~~ Steel spacers shall be provided if specified by the manufacturer.

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The power supply shall consist of ~~two~~ a solid state inverters, ~~each in its own cabinet~~, designed to operate from 120 volts, 50 or 60 cycles, single phase alternating current. The input ~~to each~~ shall not be more than 1800 W, 18 A at 120 volts AC, and the output of each shall be not less than 1000 watts of 150 cycle, +0.2 percent, square wave alternating voltage into a single transmitter. A tuning fork for maintaining frequency shall be incorporated ~~in each inverter~~ with provisions for ~~either~~ turning fork to maintain the frequency of ~~both~~ inverters ~~and to keep them in~~ at set phase. A solid state coding timer shall be installed ~~in each~~ the inverter with provisions for ~~either~~ timer to code ~~both~~ the inverters. ~~Provisions shall also be so that either inverter can operate one transmitter of the emitter array.~~ Provisions shall also be made for coding from an external timer. The characteristic shall be specified for each order. The power supply shall be capable of at least a 30 percent duty cycle with any characteristic with a minimum OFF time of one second and maximum ON time of 6 seconds. The power supply and timer shall operate over an ambient temperature range from -29°C to 49°C. The components shall be housed in ~~metal~~ type 316 stainless steel enclosures with gasketed doors. Cable entries shall be through stuffing tubes or similar sealing system. Cabinets shall be finished with one prime coat and one finish coat of enamel. ~~Each~~ The power supply shall contain a meter panel clearly labeled which consists of a DC inverter voltage meter, an AC horn current meter, an input AC circuit breaker, a DC inverter circuit breaker, a DC inverter circuit breaker, an adjustable horn level control zero to 100 percent continuously variable, a manual keying switch, a master slave switch, all with suitable permanent nameplates.

Submittal package shall consist of six copies. Submittals shall be delivered to the Engineer at least 180 days prior to the start of the installation. The Engineer will be allowed 90 days for review of the submittals.

The manufacturer shall provide 6 instruction manuals with each signal. The ~~instruction manual~~ submittal shall include, but not necessary be limited to, the following:

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- A. General description of the equipment, including weights of the major components.
- B. Installation instruction, scaled and dimensioned elevation and plan drawings, point to point wiring diagram and schematic wiring diagram. Drawings and installation shall be sufficiently detailed and complete to ensure proper installation and adjustment by others.
- C. Operating and maintenance instructions. These shall be complete and detailed enough to permit proper maintenance by persons not specifically trained on the equipment.
- D. List of all parts with description numbers and photographs or drawings sufficiently complete and clear to permit ready identification for ordering replacements for work or damaged parts in the future.
- E. **Factory Test Reports**

Contractor shall submit final as-built drawings for the Navigation Warning System.

TESTING

Prior to start of functional testing of the navigation and aviation warning systems, the Contractor shall perform the following tests on all circuits, in the presence of the Engineer, and shall be furnished in a tabulated form to the Engineer.

- A. Continuity Test.
- B. Ground Test.
- C. Insulation Resistance Test.

The above test shall conform to Section 86-2.14B(1), 86-2.14B(2) and 86-2.14B(3) of the Specification and CFR 33 Part 67, respectively. The function test shall consist of not less than 7 days of continuous satisfactory operation. If unsatisfactory performance of the system develops, the conditions shall be corrected and test shall be repeated until the 7 days of continuous, satisfactory operation is obtained.