

Freeport LNG
Houston, TX
Utility Truck
PCM Specification



BOCK SOLID QUALITY

LIABILITY INSURANCE

The manufacturer shall furnish with the bid a certificate of insurance for;

Workman's Compensation and Employer's Liability Insurance covering for all employees.

General Liability (each occurrence) of \$1,000,000.00. General Aggregate coverage of \$2,000,000.00. Products Completed / Operations Aggregate coverage of \$2,000,000.00. Medical Expense coverage of \$5,000 (any one person). Personal Injury of \$1,000,000.00.

Automobile liability of \$1,000,000.00 combined single limit (each accident), including any auto, all owned autos, scheduled autos, hired autos, non-owned autos, and garage liability.

Excess Umbrella Liability coverage of \$6,000,000.00 each occurrence, Aggregate of \$6,000,000.00.
Garage Keepers Liability coverage of \$6,000,000.00 combined limit.

All insurance policies must be;

- Maintained for the life of the contract,
- Must provide ten (10) days notice before cancellation,
- Must cover all operations of the contractor, or anyone employed by them.

INTERNET IN-PROCESS SITE

The manufacturer shall post and maintain a website where the Freeport LNG will be able to view digital images of their apparatus as its being built. The digital images shall be posted once a week starting when the body begins production or when the cab/chassis arrives and shall continue until the final completion of unit.

RESPONSIBILITY OF PURCHASER

It shall be the responsibility of the purchaser to specify the details of the apparatus in addition to the requirements in NFPA 1901 needed by the manufacturer to build the apparatus, including:

- 1) Requirements not uniquely specified in NFPA 1901, such as the type of apparatus desired.
- 2) Any features of the apparatus desired in addition to, or in excess of, the requirements in NFPA 1901.

After acceptance of the fire apparatus, the purchaser shall be responsible for ongoing training of personnel to develop and maintain proficiency regarding the proper and safe use of the apparatus and the associated equipment.

RESPONSIBILITY OF CONTRACTOR

The Contractor shall provide a detailed description of the apparatus, a list of equipment to be furnished, and other construction and performance details to which the apparatus shall conform. The detailed description of the apparatus shall include, but shall not be limited to,

1. Estimated In-Service Weight,
2. Wheelbase, Turning Clearance Radius,
3. Principal dimensions, Angle of Approach, Angle of Departure,
4. Transmission, Axle Ratios.

The Contractor's detailed description shall include a statement specifically describing each aspect of the delivered apparatus that will not be fully compliant with the requirements of this standard.

The purpose of these Contractor specifications shall be to define what the contractor intends to furnish and deliver to the purchaser.

Responsibility for the apparatus and equipment shall remain with the contractor until they are accepted by the purchaser.

VEHICLE STABILITY SUPPLIED WITH CAB/CHASSIS

The cab/chassis shall be equipped with a stability control system. The system shall have, at a minimum, a steering wheel position sensor, a vehicle yaw sensor, a lateral accelerometer and individual wheel brake controls.

FIRE APPARATUS PERFORMANCE

The fire apparatus shall meet the requirements of this standard at elevations of 2000 ft (600 m) above sea level.

The fire apparatus shall meet all the requirements of this standard while stationary on a grade of 6 percent in any direction.

The fire apparatus shall meet the requirements of this standard in ambient temperature conditions between 32°F (0°C) and 110°F (43°C).

HIGHWAY PERFORMANCE

The apparatus, when loaded to its estimated in-service weight, shall be capable of the following performance while on dry, paved roads that are in good condition:

- 1) Accelerating from 0 to 35 mph (55 km/hr) within 25 seconds on a 0 percent grade
- 2) Attaining a speed of 50 mph (80 km/hr) on a 0 percent grade
- 3) Maintaining a speed of at least 20 mph (32 km/hr) on any grade up to and including 6 percent

The maximum top speed of fire apparatus with a GVWR over 26,000 lb (11,800 kg) shall not exceed either 68 mph (109 km/hr) or the manufacturer's maximum fire service speed rating for the tires installed on the apparatus, whichever is lower.

If the combined water tank and foam agent tank capacities on the fire apparatus exceed 1250 gal (4732 L), or the GVWR of the vehicle is over 50,000 lb (22,680 kg), the maximum top speed of the apparatus shall not exceed either 60 mph (95 km/hr) or the manufacturer's maximum fire service speed rating for the tires installed on the apparatus, whichever is lower.

SERVICEABILITY

The fire apparatus shall be designed to allow the manufacturer's recommended routine maintenance checks of lubricant and fluid levels to be performed by the operator without lifting the cab of a tilt-cab apparatus or without the need for hand tools.

Where special tools are required for routine service on any component of the apparatus, such tools shall be provided with the apparatus.

Apparatus components that interfere with repair or removal of other major components shall be attached with fasteners, such as cap screws and nuts, so that the components can be removed and installed with ordinary hand tools. These components shall not be welded or otherwise permanently secured into place.

FIRE APPARATUS DOCUMENTATION

The contractor shall supply, at the time of delivery, at least one (1) copy of the following documents:

- 1) The manufacturers record of apparatus construction details, including the following documents:
 - a) Owner's name and address
 - b) Apparatus manufacturer, model, and serial number
 - c) Chassis make, model, and serial number
 - d) GAWR of front and rear axles and GVWR
 - e) Front tire size and total rated capacity in pounds (kilograms)
 - f) Rear tire size and total rated capacity in pounds (kilograms)
 - g) Chassis weight distribution in pounds (kilograms) with water and manufacturer-mounted equipment (front and rear)
 - h) Engine make, model, serial number, rated horsepower and related speed, and governed speed; and if so equipped, engine transmission PTO(s) make, model, and gear ratio
 - i) Type of fuel and fuel tank capacity
 - j) Electrical system voltage and alternator output in amps
 - k) Battery make, model, and capacity in cold cranking amps (CCA)
 - l) Chassis transmission make, model, and serial number; and if so equipped, chassis transmission PTO(s) make, model, and gear ratio
 - m) Ratios of all driving axles
 - n) Maximum governed road speed
 - o) Pump make, model, rated capacity in gallons per minute (liters per minute where applicable), maximum discharge pressure capability rating, and serial number
 - p) Pump transmission make, model, serial number, and gear ratio
 - q) Auxiliary pump make, model, rated capacity in gallons per minute (liters per minute where applicable), and serial number
 - r) Water tank certified capacity in gallons or liters
 - s) Foam tank (if provided) certified capacity in gallons (liters)
 - t) Aerial device type, rated vertical height in feet (meters), rated horizontal reach in feet (meters), and rated capacity in pounds (kilograms)
 - u) Paint manufacturer and paint number(s)
 - v) Company name and signature of responsible company representative
 - w) Weight documents from a certified scale showing actual loading on the front axle, rear axle(s), and overall fire apparatus (with the water tank full but without personnel, equipment, and hose)
- 2) Certification of compliance of the optical warning system (*see 13.8.16*)
- 3) Siren manufacturer's certification of the siren (*see 13.9.1.1*)
- 4) Written load analysis and results of the electrical system performance tests (*see 13.14.1 and Section 13.15*)
- 5) Certification of slip resistance of all stepping, standing, and walking surfaces (*see 15.7.4.5*)
- 6) If the apparatus has a fire pump, the pump manufacturer's certification of suction capability (*see 16.2.4.1*)
- 7) If the apparatus is equipped with a fire pump and special conditions are specified by the purchaser, the pump manufacturer's certification of suction capacity under the special conditions (*see 16.2.4.2*)
- 8) If the apparatus has a fire pump, a copy of the apparatus manufacturer's approval for stationary pumping applications (*see 16.3.1*)
- 9) If the apparatus has a fire pump, the engine manufacturer's certified brake horsepower curve for the engine furnished, showing the maximum governed speed (*see 16.3.2.2*)

- 10) If the apparatus has a fire pump, the pump manufacturer's certification of the hydrostatic test (*see 16.5.2.2*)
- 11) If the apparatus has a fire pump with a maximum discharge pressure capability rating that exceeds the hydrostatic test pressure of 16.5.2.1, the pump manufacturer's certification of the hydrodynamic test
- 12) If the apparatus has a fire pump, the certification of inspection and test for the fire pump (*see 16.13.1.1.5 or 16.13.1.2.4 as applicable*)
- 13) If the apparatus is equipped with an auxiliary pump, the apparatus manufacturer's certification of the hydrostatic test (*see Section 17.13*)
- 14) When the apparatus is equipped with a water tank, the certification of water tank capacity (*see Section 18.6*)
- 15) If the apparatus has an aerial device, the certification of inspection and test for the aerial device (*see Section 19.24*)
- 16) If the apparatus has an aerial device, all the technical information required for inspections to comply with NFPA 1911
- 17) If the apparatus has a foam proportioning system, the foam proportioning system manufacturer's certification of accuracy (*see 20.10.4.2*) and the final installer's certification the foam proportioning system meets this standard (*see 20.11.2*)
- 18) If the system has a CAFS, the documentation of the manufacturer's pre delivery tests (*see Section 21.9*)
- 19) If the apparatus has a line voltage power source, the certification of the test for the power source (*see 22.15.7.2*)
- 20) If the apparatus is equipped with an air system, air tank certificates (*see 24.5.1.2*), the SCBA fill station certification (*see 24.9.6*), and the results of the testing of the air system installation (*see 24.14.5 and 24.15.4*)
- 21) Any other required manufacturer test data or reports

OPERATIONS AND SERVICE DOCUMENTATION

The contractor shall deliver with the fire apparatus complete operation and service documentation covering the completed apparatus as delivered and accepted.

The documentation shall address at least the inspection, service, and operations of the fire apparatus and all major components thereof.

The contractor shall also deliver with the fire apparatus the following documentation for the entire apparatus and each major operating system or major component of the apparatus:

- 1) Manufacturer's name and address
- 2) Country of manufacture
- 3) Source for service and technical information
- 4) Parts replacement information
- 5) Descriptions, specifications, and ratings of the chassis, pump (if applicable), and aerial device (if applicable)
- 6) Wiring diagrams for low voltage and line voltage systems to include the following information:
 - a) Pictorial representations of circuit logic for all electrical components and wiring
 - b) Circuit identification
 - c) Connector pin identification
 - d) Zone location of electrical components
 - e) Safety interlocks
 - f) Alternator–battery power distribution circuits
 - g) Input/output assignment sheets or equivalent circuit logic implemented in multiplexing systems
- 7) Lubrication charts
- 8) Operating instructions for the chassis, any major components such as a pump or aerial device, and any auxiliary systems
- 9) Precautions related to multiple configurations of aerial devices, if applicable
- 10) Instructions regarding the frequency and procedure for recommended maintenance
- 11) Overall apparatus operating instructions
- 12) Safety considerations
- 13) Limitations of use
- 14) Inspection procedures

- 15) Recommended service procedures
- 16) Troubleshooting guide
- 17) Apparatus body, chassis and other component manufacturer's warranties
- 18) Special data required by this standard
- 19) A material safety data sheet (MSDS) for any fluid that is specified for use on the apparatus

The contractor shall deliver with the apparatus all manufacturer's operations and service documents supplied with components and equipment that are installed or supplied by the contractor.

NFPA REQUIRED DOCUMENTATION FORMAT - USB FLASH DRIVE

The vehicle construction details and the operations and service documentation as required per NFPA 1901 latest edition shall be provided on a USB Flash Drive. These manuals shall be divided into sections for ease of reference. There shall be two (2) USB flash drives provided with the completed vehicle.

FIRE APPARATUS SAFETY GUIDE

A Fire Apparatus Safety Guide published by Fire Apparatus manufacturer's Association shall be provided with delivered vehicle. This manual includes essential safety information for fire fighters, fire chiefs, apparatus mechanics, and fire department safety officers. The guide is applicable to municipal, wildland, and airport fire fighting apparatus manufactured on either custom or commercial chassis.

STATEMENT OF EXCEPTIONS

The final-stage manufacturer shall deliver with the fire apparatus either a certification that the apparatus fully complies with all requirements of this standard or alternatively, a Statement of Exceptions specifically describing each aspect of the completed apparatus that is not fully compliant with the requirements of this standard at the time of delivery.

The Statement of Exceptions shall contain, for each noncompliant aspect of the apparatus or missing required item, the following information:

- 1) A separate specification of the section of the applicable standard for which compliance is lacking
- 2) A description of the particular aspect of the apparatus that is not in compliance therewith or required equipment that is missing
- 3) A description of the further changes or modifications to the delivered apparatus that must be completed to achieve full compliance
- 4) Identification of the entity that will be responsible for making the necessary post delivery changes or modifications or for supplying and installing any missing required equipment to the apparatus to achieve full compliance with this standard

Prior to or at the time of delivery of the apparatus, the Statement of Exceptions shall be signed by an authorized agent of the entity responsible for final assembly of the apparatus and by an authorized agent of the purchasing entity, indicating mutual understanding and agreement between the parties regarding the substance thereof.

CARRYING CAPACITY

The GAWR and the GCWR or GVWR of the chassis shall be adequate to carry the weight of the completed vehicle when loaded to its estimated in-service weight. The manufacturer shall establish the estimated in service weight during the design of the vehicle.

The estimated in-service weight shall include the following:

1. The chassis, body and tank(s)
2. Full fuel, lubricant, and other chassis or component fluid tanks or reservoirs
3. Full water and other agent tanks
4. *250 lb (114 kg) in each seating position
5. Fixed equipment such as pumps, aerial devices, generators, reels and air systems as installed
6. Ground ladders, suction hose, designed hose load in their hose beds and on their reels
7. An allowance for miscellaneous equipment that is the greatest of the following:
 - a) The values shown for items 1 - 7
 - b) A purchaser-provided list of equipment to be carried with weights
 - c) A purchaser-specified miscellaneous equipment allowance

The manufacturer shall engineer and design the fire apparatus such that the completed apparatus, when loaded to its estimated in-service weight, with all movable weights distributed as close as is practical to their intended in-service configuration, does not exceed the GVWR.

A final manufacturer's certification of the GVWR or GCWR, along with a certification of each GAWR, shall be supplied on a label affixed to the vehicle.

The fire apparatus manufacturer shall permanently affix a high-visibility label in a location visible to the driver while seated.

The label shall show the height of the completed unequipped fire apparatus in feet and inches (meters), the length of the completed fire apparatus in feet and inches (meters), and the GVWR in tons (metric tons).

Wording on the label shall indicate that the information shown was current when the apparatus was manufactured and that, if the overall height changes while the vehicle is in service, the fire department must revise that dimension on the plate.

Apparatus Type	Equip. Storage Area	Apparatus Size	Equipment Allowance	
			lb.	kg.
Special Service Fire Apparatus	Minimum of 120 cu ft (3.4 cu mt) of enclosed compartmentation.	10,000 lb to 15,000 lb (4,500 kg to 7,000 kg) GVWR	2,000	910
		15,001 lb to 20,000 lb (7,001 kg to 9,000 kg) GVWR	2,500	1,135
		20,001 lb to 30,000 lb (9,001 kg to 14,000 kg) GVWR	3,000	1,350
		30,001 lb to 40,000 lb (14,001 kg to 18,000 kg) GVWR	4,000	1,800
		40,001 lb to 50,000 lb (18,001 kg to 23,000 kg) GVWR	6,000	2,700
		50,001 lb to 60,000 lb (23,001 kg to 27,000 kg) GVWR	8,000	3,600
		60,001 lb and up (27,001 kg)	10,000	4,500

		GVWR		
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TESTING

ROAD TEST

Each apparatus shall be tested by the manufacturer before delivery to verify that it meets the following criteria;

Tests shall be conducted at a location and in a manner that does not violate local, state or provincial, or federal traffic laws. Tests shall be conducted on a dry, level, paved surface that is free of loose material, oil, or grease. Tests shall be conducted with the water and foam tanks full (water or product).

The apparatus shall accelerate from 0 to 35 mph (55 km/hr) within 25 seconds. The apparatus shall attain a speed of 50 mph (80 km/hr).

The auxiliary braking system, if so equipped, shall function as intended by the auxiliary braking system manufacturer.

The air service brakes shall bring the apparatus to a complete stop from a speed of 20 mph (32.2 km/hr) in a distance not exceeding 35 ft (10.7 m).

The hydraulic service brakes shall bring the apparatus to a complete stop from a speed of 30 mph (48.2 km/hr) in a distance not exceeding 88 ft (26.8 m).

LOW VOLTAGE - ELECTRICAL SYSTEM PERFORMANCE TEST

The vehicles low voltage electrical system shall be tested and certified by the manufacturer. The certified test results shall be delivered with the completed vehicle. Tests shall be performed when the air temperature is between 0°F and 110°F (–18°C and 43°C).

TEST SEQUENCE

The following three (3) tests shall be performed in the order in which they appear below. Before each test, the batteries shall be fully charged until the voltage stabilizes at the voltage regulator set point and the lowest charge current is maintained for ten (10) minutes. Failure of any of these tests shall require a repeat of the sequence.

1. RESERVE CAPACITY TEST

The engine shall be started and kept running until the engine and engine compartment temperatures are stabilized at normal operating temperatures and the battery system is fully charged. The engine shall be shut off and the minimum continuous electrical load shall be activated for ten (10) minutes.

All electrical loads shall be turned off prior to attempting to restart the engine. The battery system shall then be capable of restarting the engine. Failure to restart the engine shall be considered a test failure of the battery system.

2. ALTERNATOR PERFORMANCE TEST

TEST AT IDLE

The minimum continuous electrical load shall be activated with the engine running at idle speed. The engine temperature shall be stabilized at normal operating temperature. The battery system shall be tested to detect the presence of battery discharge current. The detection of battery discharge current shall be considered a test failure.

TEST AT FULL LOAD

The total continuous electrical load shall be activated with the engine running up to the engine manufacturer's governed speed. The test duration shall be a minimum of two (2) hours. Activation of the load management system shall be permitted during this test.

An alarm sounded by excessive battery discharge, as detected by the warning system required in 13.3.4, or a system voltage of less than 11.8 V dc for a 12 V nominal system, 23.6 V dc for a 24 V nominal system, or 35.4 V dc for a 42 V nominal system for more than 120 seconds shall be considered a test failure.

3. LOW VOLTAGE ALARM TEST

The following test shall be started with the engine off and the battery voltage at or above 12 V for a 12 V nominal system, 24 V for a 24 V nominal system or 36 V for a 42 V nominal system.

With the engine shut off, the total continuous electrical load shall be activated and shall continue to be applied until the excessive battery discharge alarm activates. The battery voltage shall be measured at the battery terminals.

The test shall be considered a failure if the alarm does not sound in less than 140 seconds after the voltage drops to 11.70 V for a 12 V nominal system, 23.4 V dc for a 24 V nominal system, or 35.1 V for a 42 V nominal system.

The battery system shall then be able to restart the engine. Failure to restart the engine shall be considered a test failure.

LOW VOLTAGE - ELECTRICAL SYSTEM PERFORMANCE TEST

DOCUMENTATION

The manufacturer shall deliver the following with the fire apparatus:

- 1) Documentation of the electrical system performance tests
- 2) A written electrical load analysis, including the following:
 - a) The nameplate rating of the alternator
 - b) The alternator rating
 - c) Each of the component loads specified that make up the minimum continuous electrical load
 - d) Additional electrical loads that, when added to the minimum continuous electrical load, determine the total continuous electrical load
 - e) Each individual intermittent electrical load

UL 120/240 VAC CERTIFICATION

The 120/240 volt electrical system shall be third-party, independent, audit-certified through Underwriters Laboratory (UL) to the current edition of NFPA 1901 to perform as listed below;

The prime mover shall be started from a cold start condition, and the unloaded voltage and frequency shall be recorded.

The line voltage electrical system shall be loaded to at least 100% of the continuous rated wattage stated on the power source specification label. Testing with a resistive load bank shall be permitted.

The power source shall be operated in the manner specified by the apparatus manufacturer as documented on instruction plates or in operation manuals. The power source shall be operated at a minimum of 100% of the continuous rated wattage as stated on the power source specification label for a minimum of two (2) hours.

The load shall be adjusted to maintain the output wattage at or above the continuous rated wattage during the entire 2-hour test.

The following conditions shall be recorded at least every 1/2 hour during the test:

- 1) The power source output voltage, frequency and amperes
- 2) The prime mover's oil pressure, water temperature and transmission temperature, if applicable
- 3) The power source hydraulic fluid temperature, if applicable
- 4) The ambient temperature and power source air inlet temperature

The following conditions shall be recorded once during the test for power sources driven by dedicated auxiliary internal combustion engines:

- 1) Altitude
- 2) Barometric pressure
- 3) Relative humidity

If the generator is driven by the chassis engine and the generator allows for operation at variable speeds, the chassis engine speed shall be reduced to the lowest rpm allowed for generator operation and the voltage and frequency shall be recorded.

The load shall be removed and the unloaded voltage and frequency shall be recorded.

Voltage shall be maintained within $\pm 10\%$ of the voltage stated on the power source specification label during the entire test. Frequency shall be maintained within ± 3 Hz of the frequency stated on the power source specification label during the entire test.

The total continuous electrical loads, excluding those loads associated with the equipment defined in NFPA 22.15.7.3.11.2, shall be applied during the testing unless an auxiliary engine drives the power source.

If the apparatus is equipped with a fire pump, the 2-hour certification test of the power source shall be completed with the fire pump pumping at 100% capacity at 150 psi (1000 kPa) net pump pressure. The test shall be permitted to be run concurrently with the pump certification test.

DOCUMENTATION

The results of each test shall be recorded on an appropriate form and provided with the delivery of the fire apparatus.

DIELECTRIC VOLTAGE WITHSTAND TEST

The line voltage wiring and permanently connected devices and equipment shall be subjected to a dielectric voltage withstand test of 900 volts for one (1) minute. The testing shall be performed after all body work has been completed.

The test shall be conducted as follows:

- 1) Isolate the power source from the panel board and disconnect any solid state low voltage components
- 2) Connect one lead of the dielectric tester to all the hot and neutral buses tied together
- 3) Connect the other lead to the fire apparatus frame or body
- 4) Close any switches and circuit breakers in the circuit(s)
- 5) Apply the dielectric voltage for one (1) minute in accordance with the testing equipment manufacturer's instructions

The electrical polarity of all permanently wired equipment, cord reels and receptacles shall be tested to verify that wiring connections have been properly made.

Electrical continuity shall be verified from the chassis or body to all line voltage electrical enclosures, light housings, motor housings, light poles, switch boxes and receptacle ground connections that are accessible to fire fighters in normal operations.

If the apparatus is equipped with a transfer switch, it shall be tested to verify operation and that all non grounded conductors are switched.

Electrical light towers, floodlights, motors, fixed appliances and portable generators shall be operated at their full rating or capacity for 30 minutes to ensure proper operation.

WARRANTY

A full statement shall be provided of the warranties for the vehicle(s) being bid. Warranties should clearly describe the terms under which the vehicle manufacturer accepts responsibility for the cost to repair defects caused by faulty design, quality of work or material and for the applicable period of time after delivery.

Cost of repairs refers to all costs related thereto including, but not limited to, the cost of materials and the cost of labor.

The Body Manufacturer shall warrant all materials and accessories used on the vehicle(s), whether fabricated by manufacturer or purchased from an outside source and will deal directly with the Freeport LNG on all warranty work.

GENERAL LIMITED WARRANTY - TWO (2) YEARS

The vehicle shall be free of defects in material and workmanship for a period of two (2) years or 36,000 miles (or 57,936 kilometers), whichever occurs first starting thirty (30) days after the original invoice date.

The Contractor must be the "single source" coordinator of all warranties on the vehicle.

LOW VOLTAGE ELECTRICAL WARRANTY - FIVE (5) YEARS

The vehicle low voltage electrical system shall be free of defects in material and workmanship for a period of five (5) years or 60,000 miles (or 96,561 kilometers), whichever occurs first, starting thirty (30) days after the original invoice date.

STRUCTURAL WARRANTY - TEN (10) YEARS

The body shall be free of structural or design failure or workmanship for a period of ten (10) years, or 100,000 miles (or 160,934 kilometers), whichever occurs first, starting thirty (30) days after the original invoice date.

UNDERCOAT WARRANTY

The body undercoating shall have a warranty provided by the manufacturer for the lifetime of the vehicle or twenty (20) years, whichever occurs first. The warranty shall be transferable between vehicle owners. Should the undercoating material applied to the underside of the body and wheel wells of the vehicle ever flake off, peel, chip or crack due to drying out, the damaged area shall be re-sprayed without charge to the vehicle owner.

PAINT LIMITED WARRANTY - TEN (10) YEARS

The body shall be free of bubbling or peeling as a result of a defect in the method of manufacture for a period of ten (10) years or 100,000 miles (or 160,934 kilometers), whichever occurs first, starting thirty (30) days after the original invoice date. **Pro-rated warranties will not be acceptable.**

GRAPHICS LIMITED WARRANTY

The 3M graphics installation shall be warranted for a period of two (2) years. The 3M materials installed on completed vehicle shall be warranted for seven (7) years. The 3M Diamond grade film (if specified) shall be warranted for ten (10) years.

CONSTRUCTION PERIOD

The completed vehicle shall be delivered within five hundred ninety (590) days after pre-construction meeting and receipt and approval of any signed change orders from Freeport LNG.

Contractor shall not be held liable for delays of chassis delivery due to accidents, strikes, floods or other events not subject to their control. Contractor shall provide written notice to Freeport LNG as to delays and to what extent these delays have in completing vehicle within the stated construction time period.

DEALER MAKE READY PERIOD

The completed vehicle shall be delivered after fourteen (14) days for dealer preparation after completed apparatus delivered to dealer location.

OVERALL HEIGHT REQUIREMENT

There is no overall height (OAH) restriction for this vehicle.

OVERALL LENGTH REQUIREMENT

There is no overall length (OAL) restriction for this vehicle.

ANGLE OF APPROACH

The angle of approach for this vehicle shall not be less than eight (8) degrees when it is loaded to the estimated in-service weight as specified by the current edition of NFPA 1901.

ANGLE OF DEPARTURE

The angle of departure for this vehicle shall not be less than eight (8) degrees when it is loaded to the estimated in-service weight as specified by the current edition of NFPA 1901.

PRE-CONSTRUCTION CONFERENCE

A pre-construction conference shall be required at the Contractor's factory for two (2) personnel from the Freeport LNG to finalize all construction details prior to manufacturing.

The Contractor shall at his/her expense, provide transportation, lodging, rental car and meal expenses during the pre-construction conference. Any travel distance greater than 250 miles shall be by non-stop commercial air travel.

FINAL INSPECTION CONFERENCE

A final inspection conference shall be required at the Contractor's factory for two (2) personnel from the Freeport LNG to inspect the vehicle and construction details prior to shipment of the completed vehicle. This inspection shall take place after any specified striping and lettering is installed.

The Contractor shall at his/her expense, provide transportation, lodging, rental car and meal expenses during the final inspection conference. Any travel distance greater than 250 miles shall be by non-stop commercial air travel.

CAB TO AXLE DIMENSION

Cab to axle will be 134".

CHASSIS MODIFICATIONS

LUBRICATION AND TIRE DATA PLATE

A permanent label in the driving compartment shall specify the quantity and type of the following fluids used in the vehicle and tire information:

- Engine oil
- Engine coolant
- Chassis transmission fluid
- Pump transmission lubrication fluid . . (if applicable)
- Pump priming system fluid, if applicable . . (if applicable)
- Drive axle(s) lubrication fluid
- Air conditioning refrigerant . . (if applicable)
- Air conditioning lubrication oil . . (if applicable)
- Power steering fluid
- Cab tilt mechanism fluid . . (if applicable)
- Transfer case fluid . . (if applicable)
- Equipment rack fluid (if applicable)
- CAFS air compressor system lubricant . . (if applicable)
- Generator system lubricant . . (if applicable)
- Front tire cold pressure
- Rear tire cold pressure
- Maximum tire speed ratings

VEHICLE DATA PLATE

A permanent label in the driving compartment which indicates the following:

- Filter part numbers for the;
 - Engine
 - Transmission
 - Air
 - Fuel
- Serial numbers for the;
 - Engine
 - Transmission
- Delivered Weights of the Front and Rear Axles
- Paint Brand and Code(s)
- Sales Order Number

OVERALL HEIGHT, LENGTH DATA PLATE (US)

The fire apparatus manufacturer shall permanently affix a high-visibility label in a location visible to the driver while seated.

The label shall show the height of the completed unequipped vehicle in feet and inches (meters), the length of the completed vehicle in feet and inches (meters to nearest 1/10th), and the GVWR in tons (metric tons).

Wording on the label shall indicate that; "The information shown was current when the apparatus was manufactured. If the overall height changes while the vehicle is in service, the fire department must revise that dimension on the plate".

PERSONNEL CAPACITY

A label that states the number of personnel the vehicle is designed to carry shall be located in an area visible to the driver.

SEAT BELT WARNING - FAMA06/07

A safety sign FAMA06 shall be visible from each seat that is not equipped with occupant restraint and therefore not intended to be occupied while the vehicle is in motion.

A safety sign FAMA07, which warns of the importance of seat belt use, shall be visible from each seat that is intended to be occupied while the vehicle is in motion.

EQUIPMENT MOUNTING FAMA10

A safety sign FAMA10, which warns of the need to secure items in the cab, shall be visible inside the cab.

FIRE SERVICE TIRES - FAMA12

A safety sign FAMA12, which warns of the special requirements for fire service-rated tires, shall be visible to the driver entering the cab of any apparatus so equipped.

HELMET WARNING - FAMA15

A safety sign FAMA15, which warns not to wear helmets while the vehicle is in motion, shall be visible from each seat that is intended to be occupied while the vehicle is in motion.

CLIMBING METHOD - FAMA23

A safety sign FAMA23, which warns of the proper climbing method, shall be visible to personnel entering the cab and at each designated climbing location on the body.

REAR STEP CROSSWALK WARNING - FAMA24

A safety sign FAMA24, which warns personnel not to ride on the vehicle, shall be located at the rear step areas and at any cross walkways.

FINAL STAGE MANUFACTURER VEHICLE CERTIFICATION

A final stage manufacturer vehicle certification label shall be provided and installed in the driver cab door jamb area.

FRONT BUMPER

The front bumper shall be provided by the cab/chassis manufacturer.

FRONT TOW PROVISIONS

The front tow provisions if specified shall be supplied and installed by the cab/chassis manufacturer.

GROUND LIGHTS

There shall be two (2) OnScene 9" Night Axe white LED lights installed below bumper capable of providing illumination at a minimum level of 2 fc (20 lx) on ground areas within 30 in. (800 mm) of the edge of the vehicle in areas designed for personnel to climb onto or descend from the vehicle to the ground level.

Lighting shall be switchable but activated automatically when the vehicle park brake is set.

SIREN SPEAKER

Two (2) Cast Products Inc. siren speakers shall be provided, recessed in the front bumper.

One (1) Rigid Industries E-Series model 120313, 20" combination spot/flood LED light(s) with black housing color and cradle mount brackets shall be provided on front of vehicle. The E-Series 20" LED light(s) shall have 25,000 lumen output each.

Each light shall be wired directly to the 12 VDC electrical system with stranded copper wire. The floodlights shall be protected with circuit breakers rated at the proper amperage and wire size.

The lights shall be controlled at the multiplex display(s) in the cab.

AIR INTAKE SYSTEM

An air filter shall be provided in the engine's air intake system by the body builder. Air inlet restrictions shall not exceed the engine manufacturer's recommendations.

The air inlet shall be equipped with a means of separating water and burning embers from the air intake system.

This requirement shall be permitted to be achieved by either of the following methods:

1. Provision of a device such that burning particulate matter larger than 0.039 in. (1.0 mm) in diameter cannot reach the air filter element.
2. Provision of a multi screen ember separator capable of meeting the test requirements defined in the Parker Hannafin, Racor Division, publication LF 1093-90, *Ember Separation Test Procedure*, or an equivalent test.

EXHAUST

The exhaust system shall be as provided by cab/chassis manufacturer.

ZONE A - FRONT WARNING LIGHTS, UPPER

There shall be one (1) Whelen Freedom F4N0QLED LED 60" lightbar permanently mounted to the cab roof.

The lightbar configuration (streetside to curbside) shall be:

<u>SECTION</u>	<u>INTERNAL COMPONENTS</u>	<u>LENS COLOR</u>
1	Red Side LED	Clear
2	Red Front Corner LED	Clear
3	White Super Long-LED	Clear
4	White Super Long-LED	Clear
5	Red Super Long-LED	Clear
6	Red Super Long-LED	Clear
7	White Super Long-LED (Opticom if specified)	Clear
8	White Super Long-LED (Opticom if specified)	Clear
9	Red Super Long-LED	Clear
10	Red Super Long-LED	Clear
11	White Super Long-Led	Clear
12	White Super Long-LED	Clear
13	Red Front Corner LED	Clear
14	Red Side LED	Clear

All clear lights shall shut down when the parking brake is set to comply with "Blocking" mode requirements as outlined in NFPA 1901.

The lightbar(s) shall be separately controlled at multiplex display(s) in the cab.

ZONE A - FRONT WARNING LIGHTS

There shall be two (2) Whelen M6 linear super-LED Light(s) with full-fill optic provided, one (1) each side. The light head shall include an integral flasher with programmable flash patterns and Hi/Lo intensities.

Each Light shall have:

- Red LEDs
- Clear Lens

Each light shall have a chrome flange.

- Flash Pattern shall be (factory default) Action Scan.
- The Lo Power option will **NOT** be provided for the above lighting group.

The Lights shall be controlled at the Switch Panel in Cab.

ZONES B AND D - CAB INTERSECTOR LIGHT (CAB FRONT CORNERS)

There shall be two (2) Whelen M6 linear super-LED Light(s) with full-fill optic provided, one (1) each side. The light head shall include an integral flasher with programmable flash patterns and Hi/Lo intensities.

Each Light shall have:

- Red LEDs
- Clear Lens

Each light shall have a chrome flange.

- Flash Pattern shall be (factory default) Action Scan.
- The Lo Power option will **NOT** be provided for the above lighting group.

The Lights shall be controlled at the Switch Panel in Cab.

COMMUNICATION RADIO/ANTENNA INSTALLATION

There shall be three (3) mobile communication radio(s) with antenna installed in the cab. The location of radio shall be determined by the Freeport LNG at the pre-construction meeting. All required radio programming shall be responsibility of Freeport LNG. Radio(s) may not be fully tested if no radio program is provided with radio and will be responsibility of Freeport LNG after delivery.

Radio shall be installed per Manufacturer's requirements and wired for proper 12 volt power and ground.

- Radio shall be provided by Freeport LNG.

SEAT BELT COLOR AND MOUNTING

The seat belt webbing color requirement of 14.1.3.3 shall not apply to vehicles with a GVWR of 19,500 lb (8,845 kg) or less.

Section 14.1.3.3 of the NFPA 1901 Standards, requires all seat belt webbing in cab to be bright red or bright orange in color, and the buckle portion of the seat belt shall be mounted on a rigid or semi rigid stalk such that the buckle remains positioned in an accessible location.

SEAT BELT WEB LENGTH - COMMERCIAL CAB

The chassis seat belt web length as supplied by the commercial chassis manufacturer will not be compliant to NFPA Standards 14.1.3.2 and 14.1.3.3.

Sections 14.1.3.2 and 14.1.3.3 of the NFPA 1901 standards, require the effective seat belt web length for a Type 1 lap belt for pelvic restraint to be a minimum of 60", and a Type 2 pelvic and upper torso restraint-style seat belt assembly to be a minimum of 110".

Per Freeport LNG specification for a commercial chassis, this emergency vehicle may not have seat belts of this required length. These belts may not provide sufficient length for large firefighters in bunker gear. This specification for an

emergency fire apparatus for these seat belts shall be non-compliant to NFPA 1901 standards, effective at the time of order.

SEAT BELT MONITORING SYSTEM - COMMERCIAL CAB

Per Freeport LNG specification for a commercial chassis, this emergency vehicle may not have a seat belt monitoring system. Without this device, the driver must manually determine that all occupants are seated and belted before the apparatus is placed in motion. This specification for an emergency fire apparatus for the seat belt monitoring system shall be non-compliant to NFPA 1901 standards, effective at the time of order.

Section 14.1.3.9 of the NFPA 1901 Standards, requires that a seat belt warning system be provided. The seat belt warning device is intended to assist the driver or officer in determining whether all occupants are seated and belted before the vehicle is driven.

IGNITION KEY

If the vehicle is specified to have an ignition key it will be attached to steering column or dash with vinyl covered steel cable.

SIX (6) – LED TIRE PRESSURE VISUAL INDICATORS

Each tire valve stem shall be equipped with an LED Tire Alert (or equal), heavy duty valve cap LED indicator that indicates proper tire pressure. The LED Tire Alert valve cap is self-calibrating. When the cap is mounted on the valve stem the first time, it will memorize that tire pressure, and can be set to recognize a drop in pressure as little as 6 psi. It can be checked for functionality and battery condition by simply unscrewing the cap. If it is in working condition, it will immediately start blinking.

HELMET STORAGE, DRIVING AREA

No helmet storage is required in the cab driving area. A safety sign FAMA15, which warns not to wear helmets while the vehicle is in motion, shall be visible from each seat that is intended to be occupied while the vehicle is in motion.

HELMET STORAGE, CREW AREA

No helmet storage is required in the cab crew area. A safety sign FAMA15, which warns not to wear helmets while the vehicle is in motion, shall be visible from each seat that is intended to be occupied while the vehicle is in motion.

CAB TESTING CERTIFICATION

Section 14.3.2 of the NFPA 1901 standards, 2009 edition, require the cabs on apparatus with a GVWR greater than 26,000 lb. (11,800 kg) shall meet the requirements of one of the following sets of standards:

- 1) European Occupant Protection Standard ECE Regulation No. 29.
- 2) SAE J2422 Cab Roof Strength Evaluation - Quasi-Static Loading Heavy Trucks.

Per Freeport LNG specification for a commercial chassis, this emergency vehicle may not have a cab that has been tested to these standards. This specification for an emergency fire apparatus for the cab testing requirements shall be non-compliant to NFPA 1901 standards, effective at the time of the bid opening.

CAB PAINT

The finish paint and color as provided from the cab/chassis manufacturer shall be provided. Cab shall not be repainted.

(Note: Most departments do NOT find that the fleet paint finish from a commercial cab/chassis manufacturer is acceptable. The Body Builder will NOT be responsible for paint quality and finish issues.)

REFLECTIVE STRIPE - CAB DOOR INTERIOR

Any door of the apparatus designed to allow persons to enter or exit the apparatus shall have at least 96 in.2 (62,000 mm2) of retroreflective material affixed to the inside of the door.

The inside of each cab door shall have 4" Chevron style 3M Scotchlite 680 series graphic film.

This reflective chevron stripe shall alternate red and yellow in color.

CAB INTERIOR COMPONENT PAINT COLOR, OEM SUPPLIED

Powder coat shall be hammertone silver/grey. Cardinal T064-GR05

CAB RUNNING BOARDS

The chassis shall be provided with running boards each side, below the cab doors. The running boards shall be constructed of aluminum 3003H-14 alloy NFPA nonskid compliant tread plate.

CAB STEP LIGHTS / GROUND LIGHTS

Two (2) (one each side) OnScene Solutions Rough-Service 9" white LED light(s) installed on the vehicle capable of providing illumination at a minimum level of 2 fc (20 lx) on ground areas within 30 in. (800 mm) of the edge of the vehicle in areas designed for personnel to climb onto or descend from the vehicle to the ground level.

Each light shall be mounted in an extruded aluminum housing to protect against damage from personnel or equipment.

Lighting designed to provide illumination on areas under the driver and crew riding area exits shall be switchable but activated automatically when the exit doors are opened

STAINLESS STEEL WHEEL SIMULATOR KITS

Front and rear stainless steel wheel simulator kits shall be provided.

The kits shall include American made RealWheels brand mirror finish, 304L grade, non-corrosive stainless steel Universal wheel simulators meeting D.O.T. certification standards. They shall simulate the look of polished aluminum wheels and come complete with stainless steel hub covers and lug nut covers.

All stainless steel simulators shall carry a lifetime warranty.

MUDFLAPS

There shall be 1/4" rubber mudflaps with logo provided and installed behind rear axle tires to prevent throwing road debris and lower road spray.

ROAD EMERGENCY SAFETY KIT

The completed unit shall be supplied with one (1) set of three (3) dual faced reflective triangles, and three (3) warning flares complete with storage case per DOT requirements.

One (1) 2.5 lb. ABC type vehicle fire extinguisher with bracket per DOT requirements shall be provided and mounted inside cab area.

FUEL FILL

There shall be one (1) chassis supplied fuel fill mounted in the streetside exterior wheel well panel, behind the rear axle.

DEF FLUID FILL

The DEF fluid fill shall be as supplied by commercial cab/chassis manufacturer and located on the streetside fender panel.

DEF TANK RELOCATION

The cab/chassis supplied DEF tank shall be re-located as required for installation of specified generator or pump. Kit shall include OEM brackets, fasteners, harness extension, (4) connectors, and installation manual.

BODY DESIGN

The importance of public safety associated with emergency vehicles requires that the construction of this vehicle meet the following specifications. These specifications are written to establish the minimum level of quality and design. All Bidders shall be required to meet these minimum requirements.

It is the intent of these specifications to fully describe the requirements for a custom built emergency type vehicle. In order to extend the expected service life of this vehicle, the body module shall be removable from the chassis frame and be capable of being installed on a new chassis.

The sheet metal material requirements, including alloy and material thickness, throughout the specifications are considered to be a minimum. Since such materials are available to all Manufacturers, the material specifications shall be strictly adhered to.

The fabrication of the body shall be formed sheet metal. Formed components shall allow the Freeport LNG to have the body repaired locally in the case where any object has struck the body and caused damage. The use of proprietary extrusions will prevent the Freeport LNG from such repair and shall NOT be used. All fabricated body components to be cut by a laser or water-jet for superior cut edge quality.

Following construction of the subframe, which supports the apparatus body, the sheet metal portion of the body shall be built directly on the subframe. The joining of the subframe and body shall be of a welded integral construction.

The sheet metal fabrication of the body shall be performed using inert gas continuous feed welders only. The entire body shall be welded construction. The use of pop rivets in any portion of structural construction may allow premature failure of the body structure. Therefore, pop rivets shall NOT be used in the construction of the structural portions of the body. This includes side body sheets, inner panels of compartment doors, and any other structural portions of the body.

EXTERIOR ALUMINUM BODY

The fabrication of the body shall be constructed from aluminum 3003H-14 alloy smooth plate. This shall include compartment front panel, vertical side sheets, side upper rollover panels, rear panels and compartment door frames.

The body compartment floors and exterior panels shall be constructed with not less than 1/8" (.125) aluminum 3003H-14 smooth plate. Interior compartment dividing walls shall be constructed with not less than 1/8" (.125) aluminum 3003H-14 smooth plate. Lighter gauge sheet metal will not be acceptable in these areas.

The front and rear corners of body shall be formed as part of the front or rear body panels. This provides a stronger body corner and finished appearance. The use of extruded corners, or caps will not be acceptable, No Exceptions.

The door side frame openings shall be formed "C" channel design. An electrical wiring conduit raceway running the full length of exterior compartments shall be provided. This raceway shall contain all 12 volt wiring running to the rear of the apparatus, permitting easy accessibility to wiring.

Individual compartment modules, with dead air space voids between compartments, will not be an acceptable method of compartment construction.

The compartments shall be an integral part of the body construction. Compartment floors from front of body to ahead of rear axle, also from rear axle to rear of body shall be single one-piece sections. Compartment floors shall be preformed, then positioned in body and welded into final position.

Compartment floors shall have a "sweep-out" design with door opening threshold positioned lower than compartment floor, permitting easy cleaning of compartments. Angles, lips, or door moldings are not acceptable in the base of compartment door opening. One-way rubber drain valves shall be provided in compartment floors so that a water hose may be used to flush-out compartment area.

All exterior seams in sheet metal below frame, and around the rear wheel well area shall be welded and caulked to resist moisture from entering the compartments. All other interior seams and corners shall be sealed with silicone based caulk prior to painting.

Only stainless steel bolts, nuts, and sheet metal screws shall be used in mounting exterior trim, hardware and equipment.

DRIP RAILS

The body shall have drip rails over the side full height compartments. The drip rails shall be formed into the upper body panels providing a ridged lower panel and a flat upper body panel surface. The use of mechanically fastened, taped or glued on drip rails will not be acceptable, No Exceptions.

ROOF CONSTRUCTION

The roof shall be integral with the body and shall be all welded construction. The roof of the body shall be not less than 1/8" aluminum 3003H-14 alloy smooth plate.

All seams in the roof area shall be welded to the radius and supports prior to paint to resist entry of moisture. All roof seams shall be stitch welded and caulked.

A formed radius shall be provided along the body sides. The use of extruded radius will not be acceptable, No Exceptions.

BODY SUBFRAME

The chassis frame rails shall be fitted with 1/4" custom extruded UHMW polyethylene rail cap to isolate the body frame members from direct contact with chassis frame rails.

The body subframe shall be constructed from 6061T6 aluminum alloy tubing. Subframe shall consist of two (2) 2" x 4" x 1/8" aluminum tubes minimum, the same width as the chassis frame rails. Welded to this tubing shall be cross members of 2" x 4" x 1/8" aluminum. Smaller dimension, lighter gauge tubing or angle material subframe shall not be accepted.

These cross members shall extend the full width of the body to support the compartments. Cross members shall be located at front and rear of the body, below compartment divider walls, and in front and rear of wheel well opening. Additional aluminum cross members shall be located as necessary to support walkway or heavy equipment.

To form the frame, the tubing shall be beveled and welded at each joint using 5356 aluminum alloy welding wire.

BODY MOUNTING

The body subframe shall be fastened to the chassis frame with four (4) spring loaded body mounts. Each mount shall be configured using a two-piece encapsulated slide bracket. The two (2) brackets shall be fabricated of heavy duty 1/4" thick steel and shall have a powder coat finish to resist any corrosion. Each mounting assembly shall utilize one (1) 3/4" diameter x 6" long grade 8 bolts and one (1) heavy duty spring. The assembly design shall allow the body and subframe to act as one (1) component, separate from the chassis. As the chassis frame twists under driving conditions, the spring mounting system shall eliminate any stress from being transferred into the body. The spring loaded body mounts shall also prevent frame side rail or body damage caused by unevenly distributed stress and strains due to load and chassis movement.

Body mountings that do not allow relief from chassis movement will not be acceptable.

10" REAR STEP BUMPER

The full width rear bumper shall be constructed from 2" x 2" x 1/8" steel tubing frame and covered with 3/16" aluminum tread plate. Any stepping surface shall have a grip surface insert to meet NFPA requirements. The bumper shall extend from the rear vertical body panel 10" and provide a rear step with a minimum of 1/2" space at body for water drainage.

REAR TOW EYES

There shall be two (2) heavy duty rear mounted tow eyes securely attached to the bumper subframe, below body. The tow eyes shall be fabricated from 1/2" thick steel plate with a 3" diameter opening. Tow eyes shall have a black powder coat finish.

TRAILER HITCH

A 2" square Class III weight carrying capacity rear hitch receiver shall be provided below the rear bumper. The receiver shall be attached to body sub-frame with a black hammertone powder coat paint finish.

A label shall be provided in a location in which it is visible to an operator making trailer connections. The label shall state the maximum GVWR and tongue weight of the trailer that can be safely towed with the hitch system.

Two (2) safety chain attachment points shall be provided near the hitch point for hitches designed to use safety chains, each designed with an ultimate strength of not less than the maximum GVWR specified on label.

Without the use of a "weight distribution" ball hitch the Class III receiver shall have a GTW capacity of 8,000 lbs. and a maximum tongue weight of 800 lbs. With the use of a "weight distribution" ball hitch the Class III receiver shall have a GTW capacity of up to 12,000 lbs. and a maximum tongue weight of 1,200 lbs.

TRAILER ELECTRICAL RECEPTACLE

For hydraulic brake equipped or electric brake equipped trailer towing capability, a primary electrical receptacle shall be provided near the hitch point and shall match the umbilical cable specified. Receptacle shall be a 7-Way Blade Type socket, the same as used on most Light Duty Trucks and RV's.

TRAILER AUXILIARY ELECTRICAL RECEPTACLE

An auxiliary electrical receptacle shall be provided near the hitch point and shall match the umbilical cable specified for optical warning lights. Receptacle shall be a 7-Way Pin Type Socket, ISO3731 compliant with a reverse ground terminal.

RECEIVER WITH TRAILER BALL

No hitch receiver with trailer ball will be provided with completed unit.

GROUND LIGHTS

There shall be two (2) OnScene 8" Access white LED lights installed below bumper capable of providing illumination at a minimum level of 2 fc (20 lx) on ground areas within 30 in. (800 mm) of the edge of the vehicle in areas designed for personnel to climb onto or descend from the vehicle to the ground level.

Lighting shall be switchable but activated automatically when the vehicle park brake is set.

WHEEL WELL EXTERIOR PANEL

The exterior panel of the body wheel well enclosure shall be constructed from 1/8" aluminum smooth plate and will be bolted on for easy removal and replacement.

RUBBER BODY FENDERETTES

The body wheel well openings shall be provided with round radius, rubber fenderettes. The fenderettes shall be bolted and easily replaceable if damaged. The fenderettes shall be installed using stainless steel fasteners with plastic isolators to help prevent corrosion.

WHEEL WELL LINERS

NO wheel well liners shall be provided.

BODY PAINT SPECIFICATIONS

BODY PAINT PREPARATION

After the body and components have been fabricated they shall be disassembled so when vehicle is complete there shall be finish paint beneath the removable components. The body shall be removed from chassis during the paint process to insure proper paint coverage. The body and components shall be metal finished as follows to provide a superior substrate for painting.

The exterior (and interior, if painted) body shall undergo a thorough cleaning process starting with a biodegradable phosphoric acid solution to begin the etching process followed by a complete clear water rinse. The next step shall consist of a chemical conversion coating applied to seal the metal substrate and become part of the metal surface for greater film adhesion.

All bright metal fittings, if unavailable in stainless steel or polished aluminum, shall be chrome plated. Iron fittings shall be copper under plated prior to chrome plating.

PAINT PROCESS

The paint process shall follow the strict standards set forth by PPG Industries guidelines. Painters applying PPG products will be PPG Certified Commercial Technicians, and re-certified every two (2) years. The body shall go through the following paint process;

- 1) Clean bare metal with a wax and grease remover using low lint rags.
- 2) Inspect, straighten, and hammer high points, grind all seams, sharp edges, and welds. DA sand entire paintable surfaces using 24-180 grit dry paper. Plastic fill all low spots and DA sand fill areas using 36-180 grit dry paper. Apply pinhole filler and DA sand areas using 80-180 grit dry paper.
- 3) Re-clean bare metal using a wax and grease remover and low lint rags.
- 4) Within 24 hours, a PPG Delfleet® epoxy color primer with proper hardener for corrosion resistance using a pressure pot spray gun and applying 2-5 full wet coats or 1.5-8.0 dry mils max. achieving full hiding and allow to air dry 60 minutes @ 70°F or bake for 45 minutes @ 140°F degree.
- 5) Inspect, putty fill, and dry guild coat entire body surface and DA sand using 180-400 grit dry paper.
- 6) Re-clean bare metal using a wax and grease remover using low lint rags.
- 7) A PPG Delfleet® primer sealer with proper hardener and thinner shall be sprayed using a pressure pot spray gun and applying 1 full wet coat or 1.0-2.0 dry mils achieving full hiding and allow to flash off in spray booth for minimum of 60 minutes @ 70°F.
- 8) A PPG Delfleet® FBCH basecoat (color) with proper hardener and dry additive shall then be sprayed using a pressure pot set @ 45-60 PSI and achieving full hiding or 1.5-2.0 wet mils and allow to flash off in spray booth 45-60 minutes before applying clearcoat.
- 9) A PPG Delfleet® clearcoat with proper hardener and thinner shall be sprayed using a pressure pot spray gun and applying 2-3 full wet coats or 5.0 wet mils for a uniform gloss and allow to flash off in spray booth 10 minutes and bake for 120-140 minutes @ 125°F (surface temp.).
- 10) After cooling, DA sand heavy orange peel or runs using 1000 grit dry sand paper and final DA sand using 1500-2000 grit dry sand paper. Wipe off all surfaces to remove dust and debris. Buff unit as needed using 3M rubbing compound and a white wool pad and inspect until all sand scratches are removed.
- 11) Polish as needed using 3M Perfect-It-Polish and a black foam pad, repeat as necessary and inspect until all sand scratches are removed.

PAINT - ENVIRONMENTAL IMPACT

The contractor shall meet or exceed their current State regulations concerning paint operations pollution control and shall include measures to protect the atmosphere, water and soil. PPG Delfleet® Evolution paint shall be free of all heavy metal (lead & chromate) components. Paint emissions from sanding and painting shall be filtered and collected. All paint wastes shall be disposed of in an environmentally safe manner. Solvents used in cleanup operations shall be collected, sent off-site for distillation and returned for reuse.

FASTENERS

Prior to the assembly and reinstallation of exterior components; i.e. warning and DOT lights, handrails, steps, door hardware, and miscellaneous items, an isolation tape, or gasket shall be used to prevent damage to the finish painted surfaces. These components shall be fastened to body using either a plastic insert into body metal with stainless steel screws or zinc coated nutserts into body surface using stainless steel bolts to resist corrosion from dissimilar metals.

ELECTROLYSIS CORROSION CONTROL

The apparatus shall be assembled using ECK or similar corrosion control on all high corrosion potential areas.

ECK protects aluminum and stainless steel against electrolytic reaction, isolates dissimilar metals and gives bedding protection for hardware and fasteners. ECK contains anti-seizing lubricant for threads. ECK is dielectric and perfect for use with electrical connectors.

PAINT FINISH - SINGLE COLOR

The body shall be painted with a single color of PPG Delfleet® Evolution paint per approved customer spray-out.

Touch-up paint shall be provided with completed vehicle.

- Paint Color: Match cab/chassis supplied paint color.

BODY UNDERCOATING

The entire underside of body shall be sprayed with black automotive undercoating. Undercoating shall cover all areas underside of body and wheel well area to help resist corrosion under the vehicle.

COMPARTMENT INTERIOR FINISH

The interior of all exterior body compartments shall be a "Maintenance Free" smooth unpainted finish. All body seams shall be finished with a caulk sealant for both appearance and moisture protection.

REFLECTIVE STRIPE REQUIREMENTS

Material

All retroreflective materials shall conform to the requirements of ASTM D4956, *Standard Specification for Retroreflective Sheeting for Traffic Control*, Section 6.1.1 for Type I Sheeting.

All retroreflective materials used that are colors not listed in ASTM D4956, Section 6.1.1, shall have a minimum coefficient of retro-reflection of 10 with observation angle of 0.2 degrees and entrance angle of -4 degrees.

Any printed or processed retroreflective film construction used shall conform to the standards required of an integral colored film as specified in ASTM D4956, Section 6.1.1.

Minimum Requirements

A retroreflective stripe(s) shall be affixed to at least 50 percent of the cab and body length on each side, excluding the pump panel areas, and at least 25 percent of the width of the front of the vehicle, not including mirrors or other protrusions.

The stripe or combination of stripes shall be a minimum of 4 in. (100 mm) in total width.

The 4 in. (100 mm) wide stripe or combination of stripes shall be permitted to be interrupted by objects (i.e., receptacles, cracks between slats in roll up doors) provided the full stripe is seen as conspicuous when approaching the apparatus.

A graphic design shall be permitted to replace all or part of the required striping material if the design or combination thereof covers at least the same perimeter length(s).

GRAPHICS PROOF

A color graphics proof of the reflective striping layout shall be provided for approval by Freeport LNG prior to installation. The graphics proof shall be submitted to Freeport LNG on 8.5" x 11" sheets with front, sides, rear and plan views, each on one (1) sheet. In addition if there is any special art work an additional sheet shall be provided showing all details. **Note:** The graphics color proof may not reflect the correct paint break lines on the chassis and body please refer to the paint section of your specifications for correct paint break lines.

REFLECTIVE STRIPE - CAB SIDE

The reflective stripe material shall be 4" wide, 3M Scotchlite 680 series graphic film.

- This reflective stripe shall be white in color.

REFLECTIVE STRIPE - CAB FRONT

The reflective stripe material shall be 4" wide, 3M Scotchlite 680 series graphic film.

- This reflective stripe shall be white in color.

CHEVRON STRIPE - CAB BUMPER

A reflective stripe shall be affixed to the front of cab. The stripe or combination of stripes shall be a minimum of 4 in. (100 mm) in total width.

The approximate 10" wide Chevron retroreflective stripe shall be affixed to at least 25 percent of the width of the front of the apparatus with retroreflective striping in a chevron pattern sloping downward and away from the centerline of the vehicle at an angle of 45 degrees. Each stripe shall be 6" width. Chevron panels shall have a 3M UV over laminate to protect from UV rays, scene damage, and everyday use. Chevron panels shall have a minimum 10 year warranty for material failure, and colorfastness.

- The stripe material shall be 3M Scotchlite Diamond Grade.

All retroreflective materials required shall conform to the requirements of ASTM D 4956, *Standard Specification for Retroreflective Sheeting for Traffic Control*, Section 6.1.1 for Type I Sheeting.

This reflective chevron stripe shall alternate red and fluorescent yellow-green in color.

REFLECTIVE STRIPE - BODY SIDES

The reflective stripe material shall be 4" wide, 3M Scotchlite 680 series graphic film.

- This reflective stripe shall be white in color.

The stripe shall remain in a straight line from the front of the front of cab to the rear body.

CHEVRON REFLECTIVE STRIPE - REAR SIDES PANELS

At least 50 percent of the rear-facing vertical surfaces, visible from the rear of the apparatus, excluding any pump panel areas not covered by a door, shall be equipped with retroreflective striping in a chevron pattern sloping downward and away from the centerline of the vehicle at an angle of 45 degrees. Each stripe shall be 6" width.

The rear side panels of the body on each side of a rear stairway or compartment shall have a chevron style reflective stripe, extending from bumper height up to side compartment drip rail height. Each chevron panel shall be a full sheet and shall have a 3M UV over laminate to protect from UV rays, scene damage, and everyday use.

The stripe material shall be 3M Diamond Grade.

This reflective chevron stripe shall alternate red and fluorescent yellow-green in color.

LETTERING

GRAPHICS PROOF

A color graphics proof of the lettering layout shall be provided for approval by Freeport LNG prior to installation. The graphics proof shall be submitted to Freeport LNG on 8.5" x 11" sheets with front, sides, rear and plan views, each on one (1) sheet. In addition if there is any special art work an additional sheet shall be provided showing all details.

The following lettering shall be provided and installed on the completed unit as follows;

SIDE CAB DOOR LETTERING

There shall be twenty two (22) 4" high reflective letters furnished and installed on the vehicle.

Provide details.

- This reflective lettering shall be white in color.

UPPER BODY SIDE LETTERING

REAR BODY LETTERING

There shall be four (4) 8" high reflective letters furnished and installed on the vehicle.

Provide details.

- This reflective lettering shall be white in color.

FRONT OF CAB LETTERING

CUSTOM DECAL LOGO - 12" -18"

One (1) custom designed 12" - 18" 3M Scotchlite type retroreflective logo shall be provided and located on the completed vehicle. The exact design and/or artwork shall be provided by the Freeport LNG prior to construction.

One (1) copy of the above custom logo shall be provided and located on the completed vehicle as directed by Freeport LNG.

ROLL-UP DOOR CONSTRUCTION - ROBINSON (ROM)

The vehicle shall be equipped with R•O•M Series IV roll-up exterior compartment doors. The R•O•M roll-up doors shall be complete with the following features;

Each shutter slat, track, bottom rail, and drip rail shall be constructed from anodized 6063 T6 aluminum. Shutter slats shall feature a double wall extrusion 0.315" thick with a concave interior surface to minimize loose equipment jamming the shutter door closed. Shutter slats shall feature an interlocking end shoe to prevent side to side binding of the shutter door during operation. Slat must have interlocking joints with an inverted locking flange. Slat inner seal shall be a one piece PVC extrusion; seal design will be such to prevent metal to metal contact while minimizing dirt and water from entering the compartment.

Shutter door track shall be one piece design with integral overlapping flange to provide a clean finished look without the need of caulk. Door track shall feature an extruded Santoprene rubber double lip low profile side seal with a silicone co-extruded back to reduce friction during shutter operation.

Shutter bottom rail shall be a one piece double wall extrusion with integrated finger pull. Finger pull shall be curved upward with a linear striated surface to improve operator grip while operating the shutter door. Bottom rail shall have a smooth contoured interior surface to prevent loose equipment from jamming the shutter door. Bottom rail seal shall be made from Santoprene; it will be a double "V" seal to resist water and debris from entering compartment. Bottom rail lift bar shall be a one piece "D" shaped aluminum extrusion with linear striations to improve operator grip during operation. Lift bar shall have a wall thickness of 0.125". Lift bar shall be supported by no less than two pivot blocks; pivot blocks shall be constructed from Type 66 Glass filled reinforced nylon for superior strength. Bottom rail end blocks shall have incorporated drain holes which will allow any moisture that collects inside the extrusion to drain out.

Shutter door shall have an enclosed counter balance system. Counter balance system shall be 4" in diameter and held in place by two (2) heavy duty 18 gauge zinc plated plates. Counter balance system shall have two (2) over-molded rubber guide wheels to provide a smooth transition from vertical track to counter balance system; no foam material of any kind shall be permitted or used in this area.

The R•O•M Series IV roll-up compartment doors shall be free of manufacturing defects for a period of up to 7 years from date of purchase provided doors are used under conditions of normal use, regular periodic maintenance and service is performed, and doors were installed in accordance with R•O•M's instructions.

ROM DOOR BOTTOM RAIL

All exterior compartment doors shall have the standard 3.0" tall bottom rail extrusion for easy one (1) hand opening and closing.

The specified retroreflective stripe material shall be applied on the roll-up compartment doors. The stripe shall be precision machine cut for each door slat of the roll-up doors. Under no circumstance will the stripe material be cut on roll-up door surface.

BODY HEIGHT MEASUREMENTS

The body height shall be approximately the same height as cab roof with vertical body dimensions as follows:

AHEAD OF REAR AXLE

	<u>Description</u>	<u>Dimension</u>
A	Bottom of Subframe to Top of Body	46.5"
B	Bottom of Subframe to Bottom of Body	12.5"
C	Vertical Door Opening -with roll-up door	43.2"

-with hinged door	46.2"
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ABOVE REAR AXLE

<u>Description</u>	<u>Dimension</u>
D Vertical Door Opening - Above Rear Wheel	
-with roll-up door	23.7"
-with hinged door	26.7"

BEHIND REAR AXLE

<u>Description</u>	<u>Dimension</u>
E Vertical Door Opening	
-with roll-up door	43.2"
-with hinged door	46.2"

GENERAL

<u>Description</u>	<u>Dimension</u>
F Bottom or Drip Rail to Top of Body	8.0"

(Dimensions are approximate and subject to change during construction or design process.)

BODY WIDTH DIMENSIONS

The body shall be 95.0" wide, and 97.5" wide at drip rails. Interior compartment depth dimensions shall be approximately:

<u>Area Description</u>	<u>Dimension</u>
Transverse above subframe	90.0"
Compartment depth below subframe	19.0"

STREETSIDE COMPARTMENT - FRONT (S1)

The interior useable compartment width shall be approximately 32.0" wide x 19" deep or transverse depending on depth of compartment RC1.

- This compartment shall have a R•O•M series IV roll-up door.
- The compartment door opening shall be approximately 27.5" wide.
- The roll-up door shall have an unpainted satin aluminum finish on the door slats and the door trim components.
- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior door track to activate compartment lighting and door ajar signal in cab when door is opened.
- There shall be NO keyed lock on this roll-up compartment door.
- Compartment threshold protection shall be provided on the bottom edge of the compartment door sill. The threshold protection shall be an extruded aluminum shape with an un-painted anodized finish.
- Two (2) 3-1/2" x 3-1/2" black plastic louvered vents shall be provided in the lower compartment.

COMPARTMENT LAYOUT

The following components shall be located above frame level:

- There shall be vertically mounted aluminum Shelf-Trac welded to compartment walls for specified component installation. Shelf-Trac extrusion shall have side extruded channels for use in mounting or securing special ancillary items, without need for drilling into body.
- There shall be one (1) adjustable shelf/shelves approximately 45" deep. Each shelf shall be fabricated from 3/16" 3003 aluminum sheet with a 2" vertical flange along the front and rear edges.
 - The above component(s) shall have a smooth un-painted finish.
 - 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front face of the shelf(s).
- This reflective stripe shall be red/white in color.

The following components shall be located at frame level:

- The floor of the compartment above the frame rails shall be extended to the interior edge of the door. The floor shall have a 2" vertical lip and a 1" return to increase strength.
- There shall be one (1) OnScene Solutions 83 series aluminum tray base with 70% extension, and rating of 1,000 lbs. Slide-out tray(s) base shall be full width (street/curb) and as wide as the compartment layout or door opening permits, capable of extending out either side of the body located above the level of the chassis frame rails. Each slide base shall have a cable operated, spring loaded latch complimented by a large hand opening and red pull handle (Pull to Release) which will lock the tray in the closed, 40% extended and 70% extended positions.

- Each tray shall be fabricated from 3/16" 3003 aluminum sheet and shall have welded corners to form a box type tray surface with an internal depth of approximately 3 ½".
 - The above component(s) shall have a smooth un-painted finish.
 - Vertical partition(s) shall be provided on slide-out tray base dividing the tray into left and right sides. Each vertical partition shall be horizontally adjustable; mounted on aluminum Shelf Trac on tray floor. The vertical partition(s) shall be 3/16" (.188) 3003H-14 alloy smooth aluminum sheet.
- There shall be six (6) Zico 1000 series KD-UH walkaway type SCBA air pack bracket(s) with high cycle coated spring clips and short foot plate.
- 3M™ Diamond Grade™ 2" wide conspicuity striping shall be provided on the front and side faces of the tray.
- This reflective stripe shall be red/white in color.
- The floor of the compartment above the frame rails shall cover the area directly above the frame rails ONLY (non-extended floor).
- Two (2) OnScene Access PRO white LED, full height compartment lights, vertically mounted.

STREETSIDE COMPARTMENT - ABOVE REAR WHEELS (S2)

The interior useable compartment width shall be approximately 47.0" wide x 19" deep or transverse depending on depth of compartment RC1.

- This compartment shall have a R•O•M series IV roll-up door.
- The compartment door opening shall be approximately 42.5" wide.
- The roll-up door shall have an unpainted satin aluminum finish on the door slats and the door trim components.
- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior door track to activate compartment lighting and door ajar signal in cab when door is opened.
- There shall be NO keyed lock on this roll-up compartment door.
- Compartment threshold protection shall be provided on the bottom edge of the compartment door sill. The threshold protection shall be an extruded aluminum shape with an un-painted anodized finish.
- Two (2) 3-1/2" x 3-1/2" black plastic louvered vents shall be provided in the lower compartment.

COMPARTMENT LAYOUT

The following components shall be located upper section of compartment:

- There shall be one (1) transverse module fabricated from 3/16" (.188) 3003H-14 aluminum alloy smooth sheet. The module will be designed for the following long tools and equipment:
 - Two (2) Freeport LNG supplied back board(s) shall be installed after delivery. Manufacturer, model number and dimensions to be provided during the pre-construction meeting.
 - There shall be one (1) OnScene Solutions Velcro cargo straps provided to secure the stored equipment.

The following components shall be located at frame level:

- The floor of the compartment above the frame rails shall be extended to the interior edge of the door. The floor shall have a 2" vertical lip and a 1" return to increase strength.
- There shall be two (2) OnScene Solutions 81 series aluminum tray base with rating of 1,000 lbs. Slide-out tray(s) base shall be approximately 45" deep and as wide as the compartment layout or door opening permits located above the level of the chassis frame rails. Slide base shall extend depth specified, less 4". Each slide base shall have a cable operated, spring loaded latch complimented by a large hand opening and red pull handle (Pull to Release) which will lock the tray in the closed and full extension positions.
- Each tray shall be fabricated from 3/16" 3003 aluminum sheet and shall have welded corners to form a box type tray surface with an internal depth of approximately 3 1/2".
 - The above component(s) shall have a smooth un-painted finish.
 - The above component(s) shall have a smooth un-painted finish.

- 3M™ Diamond Grade™ 2" wide conspicuity striping shall be provided on the front and side faces of the tray.
- This reflective stripe shall be red/white in color.
- Two (2) OnScene Access PRO white LED, full height compartment lights, vertically mounted.

STREETSIDE COMPARTMENT - REAR (S3)

The interior useable compartment width shall be approximately 23.0" wide x 19" deep or transverse depending on depth of compartment RC1.

- This compartment shall have a R•O•M series IV roll-up door.
- The compartment door opening shall be approximately 17.5" wide.
- The roll-up door shall have an unpainted satin aluminum finish on the door slats and the door trim components.
- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior door track to activate compartment lighting and door ajar signal in cab when door is opened.
- There shall be NO keyed lock on this roll-up compartment door.
- Compartment threshold protection shall be provided on the bottom edge of the compartment door sill. The threshold protection shall be an extruded aluminum shape with an un-painted anodized finish.
- Two (2) 3-1/2" x 3-1/2" black plastic louvered vents shall be provided in the lower compartment.

COMPARTMENT LAYOUT

The following components shall be located above frame level:

- There shall be two (2) adjustable shelf/shelves approximately 18" deep. Each shelf shall be fabricated from 3/16" 3003 aluminum sheet with a 2" vertical flange along the front and rear edges.
 - The above component(s) shall have a smooth un-painted finish.
 - 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front face of the shelf(s).
- This reflective stripe shall be red/white in color.

The following components shall be located at frame level:

- The floor of the compartment above the frame rails shall cover the area directly above the frame rails ONLY (non-extended floor).
- There shall be one (1) adjustable shelf/shelves approximately 18" deep. Each shelf shall be fabricated from 3/16" 3003 aluminum sheet with a 2" vertical flange along the front and rear edges.
 - The above component(s) shall have a smooth un-painted finish.
 - 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front face of the shelf(s).
- This reflective stripe shall be red/white in color.

- The floor of the compartment above the frame rails shall cover the area directly above the frame rails ONLY (non-extended floor).
- Two (2) OnScene Access PRO white LED, full height compartment lights, vertically mounted.

CURBSIDE COMPARTMENT - FRONT (C1)

The interior useable compartment width shall be approximately 32.0" wide x 19" deep or transverse depending on depth of compartment RC1.

- This compartment shall have a R•O•M series IV roll-up door.
- The compartment door opening shall be approximately 27.5" wide.
- The roll-up door shall have an unpainted satin aluminum finish on the door slats and the door trim components.
- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior door track to activate compartment lighting and door ajar signal in cab when door is opened.
- There shall be NO keyed lock on this roll-up compartment door.
- Compartment threshold protection shall be provided on the bottom edge of the compartment door sill. The threshold protection shall be an extruded aluminum shape with an un-painted anodized finish.
- Two (2) 3-1/2" x 3-1/2" black plastic louvered vents shall be provided in the lower compartment.

COMPARTMENT LAYOUT

The following components shall be located above frame level:

- There shall be vertically mounted aluminum Shelf-Trac welded to compartment walls for specified component installation. Shelf-Trac extrusion shall have side extruded channels for use in mounting or securing special ancillary items, without need for drilling into body.

The following components shall be located at frame level:

- The floor of the compartment above the frame rails shall be extended to the interior edge of the door. The floor shall have a 2" vertical lip and a 1" return to increase strength.
- There shall be one (1) OnScene Solutions 83 series aluminum tray base with 70% extension, and rating of 1,000 lbs. Slide-out tray(s) base shall be approximately 94" deep; capable of extending out either side of the body located above the level of the chassis frame rails. (Specified in opposite side compartment.)
- 3M™ Diamond Grade™ 2" wide conspicuity striping shall be provided on the front and side faces of the tray.
- This reflective stripe shall be red/white in color.
- The floor of the compartment above the frame rails shall cover the area directly above the frame rails ONLY (non-extended floor).
- Two (2) OnScene Access PRO white LED, full height compartment lights, vertically mounted.

CURBSIDE COMPARTMENT - ABOVE REAR WHEEL (C2)

The interior useable compartment width shall be approximately 47.0" wide x 19" deep or transverse depending on depth of compartment RC1.

- This compartment shall have a R•O•M series IV roll-up door.
- The compartment door opening shall be approximately 42.5" wide.
- The roll-up door shall have an unpainted satin aluminum finish on the door slats and the door trim components.
- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior door track to activate compartment lighting and door ajar signal in cab when door is opened.
- There shall be NO keyed lock on this roll-up compartment door.
- Compartment threshold protection shall be provided on the bottom edge of the compartment door sill. The threshold protection shall be an extruded aluminum shape with an un-painted anodized finish.
- Two (2) 3-1/2" x 3-1/2" black plastic louvered vents shall be provided in the lower compartment.

COMPARTMENT LAYOUT

The following components shall be located upper section of compartment:

- There shall be a transverse storage module which extends from the opposite side of the body (specified in opposite side compartment).
 - The SCBA cylinder module shall be capable of storing two (2) SCBA cylinders up to 7-5/8" diameter.
 - There shall be four (4) OnScene Solutions Velcro cargo straps provided to secure the stored equipment.

The following components shall be located at frame level:

- There shall be vertically mounted aluminum Shelf-Trac welded to compartment walls for specified component installation. Shelf-Trac extrusion shall have side extruded channels for use in mounting or securing special ancillary items, without need for drilling into body.
- There shall be one (1) OnScene Solutions 81 series aluminum tray base with rating of 1,000 lbs. Slide-out tray(s) base shall be approximately 45" deep and as wide as the compartment layout or door opening permits located above the level of the chassis frame rails. Slide base shall extend depth specified, less 4". Each slide base shall have a cable operated, spring loaded latch complimented by a large hand opening and red pull handle (Pull to Release) which will lock the tray in the closed and full extension positions.
- Each tray shall be fabricated from 3/16" 3003 aluminum sheet and shall have welded corners to form a box type tray surface with an internal depth of approximately 3 1/2".
 - The above component(s) shall have a smooth un-painted finish.
 - The above component(s) shall have a smooth un-painted finish.

- 3M™ Diamond Grade™ 2" wide conspicuity striping shall be provided on the front and side faces of the tray.
- This reflective stripe shall be red/white in color.
- Two (2) OnScene Access PRO white LED, full height compartment lights, vertically mounted.

CURBSIDE COMPARTMENT - REAR (C3)

The interior useable compartment width shall be approximately 23.0" wide x 19" deep or transverse depending on depth of compartment RC1.

- This compartment shall have a R•O•M series IV roll-up door.
- The compartment door opening shall be approximately 17.5" wide.
- The roll-up door shall have an unpainted satin aluminum finish on the door slats and the door trim components.
- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior door track to activate compartment lighting and door ajar signal in cab when door is opened.
- There shall be NO keyed lock on this roll-up compartment door.
- Compartment threshold protection shall be provided on the bottom edge of the compartment door sill. The threshold protection shall be an extruded aluminum shape with an un-painted anodized finish.
- Two (2) 3-1/2" x 3-1/2" black plastic louvered vents shall be provided in the lower compartment.

COMPARTMENT LAYOUT

The following components shall be located above frame level:

- There shall be two (2) adjustable shelf/shelves approximately 18" deep. Each shelf shall be fabricated from 3/16" 3003 aluminum sheet with a 2" vertical flange along the front and rear edges.
 - The above component(s) shall have a smooth un-painted finish.
 - 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front face of the shelf(s).
- This reflective stripe shall be red/white in color.

The following components shall be located at frame level:

- The floor of the compartment above the frame rails shall cover the area directly above the frame rails ONLY (non-extended floor).

The following components shall be located at base of lower compartment:

- There shall be one (1) 400 lbs. slide-out tray(s) approximately 18" deep and as wide as the compartment layout or door opening permits. The tray top shall be fabricated from 3/16" 3003 aluminum sheet with a 3" vertical lip and welded corners to form a box type tray surface. The sliding tracks shall extend 100% of the slide length. The tray assembly shall utilize a pneumatic cylinder mounted on underside to hold the tray in both the extended and closed positions.
 - The above component(s) shall have a smooth un-painted finish.

- 3M™ Diamond Grade™ 2" wide conspicuity striping shall be provided on the front and side faces of the tray.
- This reflective stripe shall be red/white in color.
- The floor of the compartment above the frame rails shall cover the area directly above the frame rails ONLY (non-extended floor).
- Two (2) OnScene Access PRO white LED, full height compartment lights, vertically mounted.

REAR COMPARTMENT - CENTER (RC1)

The rear storage area will be closed in to provide a rear center compartment. Compartment shall be approximately 22" deep.

The interior useable compartment width shall be approximately 53.0" wide.

- This compartment shall have a R•O•M series IV roll-up door.
- The compartment door opening shall be approximately 50.5" wide.
- The roll-up door shall have an unpainted satin aluminum finish on the door slats and the door trim components.
- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior door track to activate compartment lighting and door ajar signal in cab when door is opened.
- There shall be NO keyed lock on this roll-up compartment door.
- Compartment threshold protection shall be provided on the bottom edge of the compartment door sill. The threshold protection shall be an extruded aluminum shape with an un-painted anodized finish.
- Two (2) 3-1/2" x 3-1/2" black plastic louvered vents shall be provided in the lower compartment.

COMPARTMENT LAYOUT

The following components shall be located upper section of compartment:

The following components shall be located above frame level:

- There shall be vertically mounted aluminum Shelf-Trac welded to compartment walls for specified component installation. Shelf-Trac extrusion shall have side extruded channels for use in mounting or securing special ancillary items, without need for drilling into body.
- There shall be one (1) adjustable shelf/shelves approximately 21" deep. Each shelf shall be fabricated from 3/16" 3003 aluminum sheet with a 2" vertical flange along the front and rear edges.
 - The above component(s) shall have a smooth un-painted finish.

The following components shall be located at frame level:

- There shall be one (1) OnScene Solutions 81 series aluminum tray base with rating of 1,000 lbs. Slide-out tray(s) base shall be approximately 24" deep and as wide as the compartment layout or door opening permits located below the level of the chassis frame rails. Slide base shall extend depth specified, less 4". Each slide base shall have a cable operated, spring loaded latch complimented by a large hand opening and red pull handle (Pull to Release) which will lock the tray in the closed and full extension positions.
- Each tray shall be fabricated from 3/16" 3003 aluminum sheet and shall have welded corners to form a box type tray surface with an internal depth of approximately 3 1/2".
 - The above component(s) shall have a smooth un-painted finish.

- The specified portable winch shall be mounted in compartment using a heavy duty "U" shaped channel. Winch receiver tube and mounting pin shall be utilized to hold in place during travel.
- 3M™ Diamond Grade™ 2" wide conspicuity striping shall be provided on the front and side faces of the tray.
- This reflective stripe shall be red/white in color.

BODY OPTIONS AND UPGRADES

NO Plastic Grating (LR, WA)

ROPE ANCHOR OR PORTABLE WINCH RECEIVERS

The completed unit shall have an integrated receiver or anchor system for use with removable rope anchor point and/or a portable electric winch, when specified.

Receivers or anchors installed at any location on the apparatus for use as removable winch anchors shall be designed and affixed to provide at least a 2.0 to 1 straight line pull no-yield safety factor over the load rating of the removable winch.

Receivers or anchors installed at any location on the apparatus for use with rope operations shall be designed and affixed to the apparatus to provide at least a 9,000 lbf (40,000 N) no-yield condition with a straight line pull.

A safety sign FAMA28 shall be located on or near each receiver or anchor stating the maximum straight line pull rating.

Side receiver(s) (if specified) shall have the following load rating:

	<u>STRAIGHT PULL</u>	<u>SAFETY FACTOR</u>
Rope Tie Off:	600 Lbs.	15:1
Winch:	5,000 Lbs.	2:1

Front and/or rear receiver(s) (if specified) shall have the following load rating:

	<u>STRAIGHT PULL</u>	<u>SAFETY FACTOR</u>
Rope Tie Off:	600 Lbs.	15:1
Winch:	Winch Load Rating (9,000 Lbs. Max)	2:1

The following items shall be provided to accomplish rope rescue and/or portable winch operation;

ACCESSORIES

- Two (2) removable rope anchor(s) shall be provided for use with lower body specified receivers. Each rope anchor shall be fabricated from 3/4" steel, 2" high x 11.5" long with a 3" OD/2" ID eyelet. Eyelet end shall have radiused edge to prevent damage to rope or carabineer. Each rope anchor shall have a black powder coat paint finish.
- An aluminum mounting bracket shall be provided to store rope anchor(s) inside a body compartment as close to receiver location as possible.

PORTABLE WINCH

- One (1) Warn Zeon 8-S multi-mount, 8,000 lb. 12 VDC electric winch shall be provided with the completed unit. Winch shall be capable of being mounted to the vehicle by inserting the 2" tube of carrier into a properly rated receiver and pinned into place for use. Winch shall be supplied with 100' of 3/8" synthetic rope with pinned utility hook. A 12' remote control shall be provided that permits the operator to stand at a safe operating distance from the cable and winch. Winch shall have a black powder coat paint finish with a limited lifetime warranty.

FRONT BUMPER

- There shall be one (1) 2" x 2" x 1/4" wall steel receiver tube(s) with a black hammertone powder coat paint finish located at the front bumper for use with removable rope anchor point and/or a portable electric winch (if specified).
- A steel 5/8" x 3" hitch pin shall be provided with each receiver tube.
 - There shall be one (1) 12 VDC plug(s) with quick connect provided to power a Ramsey portable winch. All 12 VDC cables to be sized according to Ramsey and installation for intended use.
 - The receiver(s) shall have one (1) rubber cover(s) provided.

REAR BUMPER

- The specified rear trailer hitch shall be compatible with the removable rope anchor point and/or a portable electric winch (when specified).
- A steel 5/8" x 3" hitch pin shall be provided with each receiver tube.
 - There shall be one (1) 12 VDC plug(s) with quick connect provided to power a Warn portable winch. All 12 VDC cables to be sized according to Warn and installation for intended use.
 - The receiver(s) shall have one (1) rubber cover(s) provided.

FRONT GRAVEL GUARDS

Gravel guards shall be provided on front lower body corners. Guards shall be 12" high, extend from behind cab or step and wrap around to the front compartment door opening fabricated from 20 gauge brushed stainless steel.

REAR BODY HANDRAILS

There shall be two (2) 24" vertical handrails on rear body. Handrails shall be NFPA compliant 1-1/4" knurled 304 stainless steel with welded end stanchions.

A safety sign FAMA23, which warns of the proper climbing method, shall be visible to personnel entering the cab and at each designated climbing location on the body.

A safety sign FAMA24, which warns personnel not to ride on the vehicle, shall be located at the rear step areas and at any cross walkways.

LOW VOLTAGE ELECTRICAL SYSTEM- 12 VDC

General

Any low voltage electrical systems or warning devices installed on the fire apparatus shall be appropriate for the mounting location and intended electrical load.

Where wire passes through sheet metal, grommets shall be used to protect wire and wire looms. Electrical connections shall be with double crimp water-tight heat shrink connectors.

All 12 VDC wiring running from front to back of vehicle body shall be run in full length electrical wiring raceway down each side of body.

Wiring

All electrical circuit feeder wiring supplied and installed by the fire apparatus manufacturer shall meet the requirements of NFPA Chapter 13.

The circuit feeder wire shall be stranded copper or copper alloy conductors of a gauge rated to carry 125 % of the maximum current for which the circuit is protected. Voltage drops in all wiring from the power source to the using device shall not exceed 10 %. The use of star washers for circuit ground connections shall not be permitted.

All circuits shall otherwise be wired in conformance with SAE J1292, *Automobile, Truck, Truck-Tractor, Trailer, and Motor Coach Wiring*.

Wiring and Wire Harness Construction

All insulated wire and cable shall conform to SAE J1127, *Low Voltage Battery Cable*, or SAE J1128, *Low Voltage Primary Cable*, type SXL, GXL, or TXL.

All conductors shall be constructed in accordance with SAE J1127 or SAE J1128, except where good engineering practice dictates special strand construction. Conductor materials and stranding, other than copper, shall be permitted if all applicable requirements for physical, electrical, and environmental conditions are met as dictated by the end application. Physical and dimensional values of conductor insulation shall be in conformance with the requirements of SAE J1127 or SAE J1128, except where good engineering practice dictates special conductor insulation. The overall covering of conductors shall be moisture-resistant loom or braid that has a minimum continuous rating of 194°F (90°C) except where good engineering practice dictates special consideration for loom installations exposed to higher temperatures. The overall covering of jacketed cables shall be moisture resistant and have a minimum continuous temperature rating of 194°F (90°C), except where good engineering practice dictates special consideration for cable installations exposed to higher temperatures.

All wiring connections and terminations shall use a method that provides a positive mechanical and electrical connection. The wiring connections and terminations shall be installed in accordance with the device manufacturer's instructions. All ungrounded electrical terminals shall have protective covers or be in enclosures. Wire nut, insulation displacement, and insulation piercing connections shall not be used.

Wiring shall be restrained to prevent damage caused by chafing or ice buildup and protected against heat, liquid contaminants, or other environmental factors.

Wiring shall be uniquely identified at least every 2 ft (0.6 m) by color coding or permanent marking with a circuit function code. The identification shall reference a wiring diagram.

Circuits shall be provided with properly rated low voltage over-current protective devices. Such devices shall be readily accessible and protected against heat in excess of the over-current device's design range, mechanical damage, and water spray. Circuit protection shall be accomplished by utilizing fuses, circuit breakers, fusible links, or solid state equivalent devices.

If a mechanical-type device is used, it shall conform to one of the following SAE standards:

- 1) SAE J156, *Fusible Links*
- 2) SAE J553, *Circuit Breakers*
- 3) SAE J554, *Electric Fuses (Cartridge Type)*
- 4) SAE J1888, *High Current Time Lag Electric Fuses*
- 5) SAE J2077, *Miniature Blade Type Electrical Fuses*

Switches, relays, terminals, and connectors shall have a direct current (dc) rating of 125 % of maximum current for which the circuit is protected.

Power Supply

A 12 V or greater electrical alternator shall be provided. The alternator shall have a minimum output at idle to meet the minimum continuous electrical load of the vehicle, at 200°F (93°C) ambient temperature within the engine compartment, and shall be provided with full automatic regulation.

Minimum Continuous Electrical Load

The minimum continuous electrical load shall consist of the total amperage required to simultaneously operate the following in a stationary mode during emergency operations:

- 1) The propulsion engine and transmission
- 2) All legally required clearance and marker lights, headlights, and other electrical devices except windshield wipers and four-way hazard flashers
- 3) The radio(s) at a duty cycle of 10 percent transmit and 90 % receive (for calculation and testing purposes, a default value of 5 A continuous)
- 4) The lighting necessary to produce 2 fc (20 lx) of illumination on all walking surfaces on the apparatus and on the ground at all egress points onto and off the apparatus, 5 fc (50 lx) of illumination on all control and instrument panels, and 50 percent of the total compartment lighting loads
- 5) The minimum optical warning system, where the apparatus is blocking the right-of way
- 6) The continuous electrical current required to simultaneously operate any fire pumps, aerial devices, and hydraulic pumps
- 7) Other warning devices and electrical loads defined by the purchaser as critical to the mission of the apparatus

If the apparatus is equipped to tow a trailer, an additional 45 A shall be added to the minimum continuous electrical load to provide electrical power for the federally required clearance and marker lighting and the optical warning devices mounted on the trailer.

The condition of the low voltage electrical system shall be monitored by a warning system that provides both an audible and a visual signal to persons on, in, or near the apparatus of an impending electrical system failure caused by the excessive discharge of the battery set.

The charge status of the battery shall be determined either by direct measurement of the battery charge or indirectly by monitoring the electrical system voltage.

If electrical system voltage is monitored, the alarm shall sound if the system voltage at the battery or at the master load disconnect switch drops below 11.8 V for 12 V nominal systems, 23.6 V for 24 V nominal systems, or 35.4 V for 42 V nominal systems for more than 120 seconds.

A voltmeter shall be mounted on the driver's instrument panel to allow direct observation of the system voltage.

Electromagnetic Interference

Electromagnetic interference suppression shall be provided, as required, to satisfy the radiation limits specified in SAE J551/1, *Performance Levels and Methods of Measurement of Electromagnetic Compatibility of Vehicles, Boats (up to 15 m), and Machines (16.6 Hz to 18 GHz)*.

Wiring Diagram

A complete electrical wiring schematic of actual system shall be provided with finished apparatus. Similar or generic type electrical schematics shall NOT BE ACCEPTABLE.

Low Voltage Electrical System Performance Test

A low voltage electrical system test certification shall be provided with delivered apparatus.

12 VOLT DIAGNOSTIC RELAY CONTROL CENTER

The 12 volt power distribution shall be conveniently located with easy access for service. All relays and circuit breakers shall be plug-in type allowing for removal for repairs without necessitating soldering or tools. The sockets mounts for both the relays and circuit breakers shall be of a design that permits the use of standard automotive type components.

The 12 volt distribution panel shall utilize printed circuit boards mounted in high strength enclosure. Each printed circuit board shall be provided with twelve (12) heavy duty independent switching relays. Each relay shall have the ability to be configured either normally open or normally closed and be protected by a 20 amp automatic reset breaker. Each circuit will be provided with a LED for visual diagnostic.

Power distribution panel shall be located in apparatus body within a protected enclosure with removable or hinged cover.

CAB CONSOLE

A center cab console shall be provided between the Driver's and Officer's seats extending to rear wall of cab. Console shall be as large as possible and fabricated of 1/8" smooth aluminum. A textured powder coat paint finish shall be provided for durability and finished appearance.

Console shall include;

- Forward section of cab console shall include;

ROCKER SWITCH PANEL

The control of the 12 volt equipment installed on chassis and body shall be centrally located in the cab. The individual rocker style switches shall be located on a separate electrical panel, complete with backlit name tags describing function of each individual switch. The back lighting shall have two (2) levels of intensity, low level lights activated when the vehicle lights or ignition switch is turned "On", and high level lights activated when individual switch is turned "On". An internally lighted rocker switch shall be furnished to the left of specified emergency lighting switches, and identified as "MASTER EMERGENCY SWITCH".

Switch circuitry shall be on a printed circuit board. The lights shall be solid state type and have a 100,000 hour life span.

- Forward section, driver side of cab console shall include;
 - No components provided at this position.
- Forward section, officer side of cab console shall include;
 - No components provided at this position.
- Cab console, panel position forward shall include;
- There shall be one (1) communications radio and/or siren 3" filler plate(s) with black powdercoat paint finish provided for future radio/siren location in specified console.
- Cab console, panel position center shall include;

- There shall be one (1) communications radio and/or siren 3" filler plate(s) with black powdercoat paint finish provided for future radio/siren location in specified console.
- Cab console, panel position rearward shall include;

ELECTRONIC SIREN

One (1) Whelen model 295SLSA1 electronic siren control with selectable 100 or 200 watt output, hands-free operation, user selectable siren tones, park kill, and standard hard wired microphone shall be provided and installed in cab within easy reach of Driver. Siren power shall be wired through the master warning light switch.

- There shall be one (1) communications radio and/or siren 3" recess mount(s) with black powdercoat paint finish in specified console.

The specified siren functions shall be controlled by siren mounted switches.

ELECTRICAL SYSTEM MANAGER

LOAD MANAGEMENT

If the total continuous electrical load exceeds the minimum continuous electrical output rating of the installed alternator(s), an Innovative Controls automatic electrical load management system shall be required. The minimum continuous electrical loads shall not be subject to automatic load management.

The apparatus 12 volt electrical system shall be provided with a system manager for:

- Monitoring chassis battery voltage
- Shedding pre-determined electrical circuits
- Sequencing pre-determined electrical circuits
- Automatically controlling chassis engine fast-idle
- Monitor master switch and parking brake applications
- Automatically control warning light modes ("Calling-For" and "Blocking Right of Way")
- Provide low voltage alarm
- Programmable control circuits
- Remote system status indicator panel

System manager shall perform all electrical functions required by current NFPA 1901 Standards.

BATTERY MONITORING

The system manager shall monitor the vehicle battery voltage. When electrical loads exceed the alternator output and the voltage drops, the load manager shall start shutting down electrical outputs. The system shall shut down only as many outputs required to maintain the system voltage. A special indicator to show different states of the electrical system by flashing at rate proportional to the battery discharge.

LOAD SEQUENCING AND SHEDDING

The system shall be capable of sequentially switching and shedding 12 volt loads. The Master light switch starts the sequential switch when it is turned "On". Likewise turning the Master Switch "Off" will sequentially de-energize the loads.

BATTERY SYSTEM

Any body builder supplied battery connections shall be heavy duty type with cables terminating in heat shrink loom. Heavy duty battery cables shall provide maximum power to the electrical system. Where required, the cables shall be shielded from exhaust tubing and the muffler. Large rubber grommets shall be provided where cables enter the battery compartment.

If an enclosed battery compartment is provided, it shall be ventilated to the exterior to prevent the buildup of heat and explosive fumes. The batteries shall be protected against vibration and temperatures that exceed the battery manufacturer's recommendation.

BATTERY SWITCH

The chassis ignition key shall activate a heavy duty relay to provide 12 volt battery power to the vehicle.

- A green "BATTERY ON" pilot light shall be visible from the driver's position.

BATTERY SOLENOID

Battery switch shall consist of a minimum 200 ampere, constant duty solenoid to feed from positive side of battery.

BATTERY CONDITIONER

One (1) Blue Sea model P12 battery charger with 120 VAC input, and 25 amp 12 VDC output shall be provided. The P12 is a four stage, three output, dry mount charger designed for use in harsh environments where reliability, ease of use, and high performance are of primary importance. Backed by a 5-year warranty.

Five Critical Features Extend Battery Life

- User Defined Charge Profiles for setting voltages to match the battery manufacturer's recommendations
- User Defined Absorption Stage Values determine when the charger should exit Absorption Stage in order to prevent overcharging
- Charge Coordination™ integrates with Blue Sea Systems' Automatic Charging Relays to separate battery banks while the P12 is operational
- PreFloat™ Stage prevents over charging by individually moving batteries out of Absorption Stage
- Battery Temperature Compensation adjusts charging voltage up (for colder batteries) or down (for warmer batteries) as recommended by battery manufacturers for proper battery performance

Additional Features

- Rugged finned aluminum case dissipates heat
- Universal line voltage 90–265V AC, 45–65 Hz for worldwide use
- Large bright full graphic control screen with user interface
- Plain-language text in English, French, Italian, German and Spanish
- Intuitive screens provide fault alerts and plain language diagnostics

BATTERY CHARGE INDICATOR

A Blue Sea EV battery charger display shall be provided and located near driver's door area. It can display a graphical representation of voltage with or without connection to a P12 battery charger. When connected to a P12 battery charger it can display the charger's summary screen, displaying voltage, current charging stage, and faults from the charger with other features as follows;

- Drop in replacement for traditional rectangular displays
 - Automatically detects 1-3 battery banks
 - AC charge indication verifies that power is connected and the battery charger is charging
 - Plain language fault indication relays if there is a fault with the battery charger
 - Dip switch selectable screen configuration allows the display to show voltage bar graphs or the P12 Battery Charger summary screen
 - Displays voltage bar graphs even when AC power is not present
 - Optional standby mode shuts off screen after 4 hours of inactivity
 - Automatic ON based on motion with integrated knock sensor
 - Bright, daylight readable, OLED display
- The charge indicator display shall be located at Driver step area.

SHORE POWER INLET

One (1) Blue Sea Sure Eject model 7851, 120 VAC, 20 amp shore power inlet(s) shall be provided. The shore power connection shall automatically disengage from vehicle when chassis ignition is engaged. A matching keyed plug shall be shipped loose with completed vehicle.

The protective ground from the shoreline inlet shall be bonded to the vehicle frame.

- The outlet cover shall be yellow.
- The shore power plug shall be located near the Driver door area.

ENGINE COMPARTMENT LIGHT

Per current NFPA 1901 Standards there shall be an LED engine compartment light installed by the commercial chassis manufacturer or by the body manufacturer.

CAB HAZARD WARNING LIGHT

A Truck-Lite red LED flashing light shall be provided and located in the driving compartment and be illuminated automatically whenever the vehicles parking brake is not fully engaged and any of the following conditions exist:

- Any passenger or equipment compartment door is not closed.
- Any ladder or equipment rack is not in the stowed position.
- Stabilizer system is not in its stowed position.
- Powered light tower is not stowed.
- Any other device permanently attached to the apparatus is open, extended, or deployed in a manner that is likely to cause damage to the apparatus if the apparatus is moved.

Compartments and equipment meeting all of the following conditions shall be permitted to be exempt from being wired to the hazard light:

- The volume is less than or equal to 4 ft³ (0.1 m³).
- The compartment has an opening less than or equal to 144 in.² (92,900 mm²).
- The open door does not extend sideways beyond the mirrors or up above the top of the fire apparatus.
- All equipment in the compartment is restrained so that nothing can fall out if the door is open while the apparatus is moving.

- Manually raised pole lights with an extension of less than 5 ft (1.5 m).

The hazard light shall be labeled; "Do not move apparatus when light is on."

In addition, label shall be in both English/French for units built for Canada; "*Ne pas déplacer l'engin lorsque la lumière est allumée.*"

An audible alarm shall be provided for the door ajar light.

BACK-UP ALARM

The body manufacturer shall furnish and install one (1) 107 dB(A) electronic back-up alarm. Back-up alarm to actuate automatically when the transmission gear selector is placed in reverse.

REAR VIEW CAMERA

There shall be one (1) ASA Voyager rear observation camera system provided and installed on completed unit. The system shall include one (1) model VCMS155 high resolution box style camera with white housing installed on rear of body.

- The camera image shall be displayed on a Voyager AOM718 or latest model, 7" color flat panel display (up to 3 camera inputs) located within the driver's range of view.

SIDE LED SCENE LIGHTS

There shall be four (4) HiViz Guardian JR model FT-GSMJR, 6" x 4" surface mounted scene light(s) provided on the upper body. Light quantity shall be divided equally per side. The Guardian series light shall have 3,125 useable lumens each. Each light shall have a chrome flange.

Two (2) switches shall be provided, one (1) for the streetside scene lights, and one (1) for the curbside scene lights.

The lights shall be controlled at the multiplex display(s) in the cab.

REAR LED SCENE LIGHTS

There shall be Two (2) HiViz Guardian JR model FT-GSMJR, 6" x 4" surface mounted scene light(s) provided on the upper rear body to light the work area immediately behind the vehicle. The Guardian series light shall have 3,125 useable lumens each. Each light shall have a chrome flange.

The above scene lights shall light to a level of at least 3 fc (30 lx), measured at 25 equally spaced points on a 2.5 ft (750 mm) grid with in a 10 ft x 10 ft (3 m x 3m) square to the rear of vehicle.

The lights shall be controlled at the multiplex display(s) in the cab.

TAIL LIGHTS

Rear body tail lights shall be vertically mounted and located per Federal Motor Vehicle Safety Standards, FMVSS and Canadian Motor Vehicle Safety Standards CMVSS. The following lights shall be furnished;

- Two (2) Whelen M6 Series M6BTT red LED stop/tail/turn lights
- Two (2) Whelen M6 Series M6BUW clear LED back-up lights with clear lens

Each light shall have a chrome flange.

MARKER LIGHTS

The body shall be equipped with all necessary clearance lights and reflectors in accordance with Federal Motor Vehicle Safety Standards (FMVSS) and Canadian Motor Vehicle Safety Standards (CMVSS) regulations. All body clearance lights shall be Truck-Lite Mini LED to reduce the need for maintenance and lower the amp draw. Clearance lights shall be wired to the headlight circuit of the chassis.

CAB STEP LIGHTS / GROUND LIGHTS

There shall be two (2) OnScene 8" Access white LED light(s) installed on the vehicle (equally divided per side) capable of providing illumination at a minimum level of 2 fc (20 lx) on ground areas within 30 in. (800 mm) of the edge of the vehicle in areas designed for personnel to climb onto or descend from the vehicle to the ground level.

Lighting designed to provide illumination on areas under the driver and crew riding area exits shall be switchable but activated automatically when the exit doors are opened.

LICENSE PLATE MOUNTING BRACKET

There shall be one (1) Cast Products aluminum license plate mounting with chrome shielded license plate light mounted on the rear of the body.

LIGHT TOWER INSTALLATION

The completed vehicle shall be supplied with one (1) all-electric Command Light flood light tower(s). The unit shall not require tapping into vehicle braking system to be operated, eliminating the chance for vehicle brake problems. Hydraulic or pneumatic type floodlights are not acceptable alternatives to the all-electric light tower specified.

The Command Light light tower(s) shall be purchased and supplied by the Freeport LNG or dealer to the OEM body builder.

The light tower controls shall be located per the itemized compartment list.

A red flashing or rotating light located in the driving compartment shall be illuminated automatically whenever the vehicles parking brake is not fully engaged, indicating that the light tower is not in stowed position, as required by NFPA 1901.

Light Tower Mounting

The specified light tower(s) shall be mounted on the roof of the body.

Where the light tower is to be mounted above a finished walk-in area; the roof backing plates and structure shall have threaded holes to allow removal of light tower without removal of the interior paneling.

Where the light tower is mounted in close proximity to other roof mounted items (i.e. antennas, air conditioners, and weather stations) the light tower shall be orientated in order to help prevent a operator driven collision.

TREE LIMB GUARD

A three-sided tree limb guard shall be provided fabricated from 1/8" smooth aluminum and painted to match the upper paint color to provide protection to the specified roof mounted equipment from small tree branches.

WARNING LIGHT PACKAGE

Each apparatus shall have a system of optical warning devices that meets or exceeds the requirements of this section.

The optical warning system shall consist of an upper and a lower warning level. The requirements for each level shall be met by the warning devices in that particular level without consideration of the warning devices in the other level.

For the purposes of defining and measuring the required optical performance, the upper and lower warning levels shall be divided into four (4) warning zones. The four zones shall be determined by lines drawn through the geometric center of the apparatus at 45 degrees to a line drawn lengthwise through the geometric center of the apparatus. The four (4) zones shall be designated A, B, C, and D in a clockwise direction, with zone A to the front of the apparatus.

Each optical warning device shall be installed on the apparatus and connected to the apparatus's electrical system in accordance with the requirements of this standard and the requirements of the manufacturer of the device.

A master optical warning system switch that energizes all the optical warning devices shall be provided.

The optical warning system on the fire apparatus shall be capable of two (2) separate signaling modes during emergency operations. One (1) mode shall signal to drivers and pedestrians that the apparatus is responding to an emergency and is calling for the right-of-way. One (1) mode shall signal that the apparatus is stopped and is blocking the right-of-way. The use of some or all of the same warning lights shall be permitted for both modes provided the other requirements of this chapter are met.

A switching system shall be provided that senses the position of the parking brake or the park position of an automatic transmission. When the master optical warning system switch is closed and the parking brake is released or the automatic transmission is not in park, the warning devices signaling the call for the right-of-way shall be energized. When the master optical warning system switch is closed and the parking brake is on or the automatic transmission is in park, the warning devices signaling the blockage of the right-of-way shall be energized. The system shall be permitted to have a method of modifying the two (2) signaling modes.

The optical warning devices shall be constructed or arranged so as to avoid the projection of light, either directly or through mirrors, into any driving or crew compartment(s). The front optical warning devices shall be placed so as to maintain the maximum possible separation from the headlights.

Steadily burning, non flashing optical sources shall be permitted to be used.

UPPER LEVEL OPTICAL WARNING DEVICES

The upper-level optical warning devices shall be mounted as high and as close to the corner points of the apparatus as is practical to define the clearance lines of the apparatus. The upper-level optical warning devices shall not be mounted above the maximum height, specified by the device manufacturer.

ZONE A - FRONT WARNING LIGHTS

See Chassis Modification section for cab mounted warning lights.

ZONES B AND D - SIDE WARNING LIGHTS

UPPER REAR CORNER WARNING LIGHTS

There shall be two (2) Whelen M6 linear super-LED Light(s) with full-fill optic provided, one (1) each side. The light head shall include an integral flasher with programmable flash patterns and Hi/Lo intensities.

Each Light shall have:

- Red LEDs
- Clear Lens

Each light shall have a chrome flange.

- Flash Pattern shall be (factory default) Action Scan.
- The Lo Power option will **NOT** be provided for the above lighting group.

The Lights shall be controlled at the Switch Panel in Cab.

ZONE C - REAR WARNING LIGHTS

There shall be two (2) Whelen M6 linear super-LED Light(s) with full-fill optic provided, one (1) each side. The light head shall include an integral flasher with programmable flash patterns and Hi/Lo intensities.

Each Light shall have:

- Red LEDs
- Clear Lens

Each light shall have a chrome flange.

- Flash Pattern shall be (factory default) Action Scan.
- The Lo Power option will **NOT** be provided for the above lighting group.

The Lights shall be controlled at the Switch Panel in Cab.

LOWER LEVEL OPTICAL WARNING DEVICES

To define the clearance lines of the apparatus, the optical center of the lower-level optical warning devices in the front of the vehicle shall be mounted on or forward of the front axle centerline and as close to the front corner points of the apparatus as is practical.

The optical center of the lower-level optical warning devices at the rear of the vehicle shall be mounted on or behind the rear axle centerline and as close to the rear corners of the apparatus as is practical. The optical center of any lower-level device shall be between 18 in. and 62 in. (460 mm and 1600 mm) above level ground for large apparatus, and 18 in. and 48 in. (460 mm and 1600 mm) above level ground.

A midship optical warning device shall be mounted right and the left sides of the apparatus if the distance between the front and rear lower-level optical devices exceeds 25 ft (7.6 m) at the optical center. Additional midship optical warning devices shall be required, where necessary, to maintain a horizontal distance between the centers of adjacent lower-level optical warning devices of 25 ft (7.6 m) or less. The optical center of any midship mounted optical warning device shall be between 18 in. and 62 in. (460 mm and 1600 mm) above level ground.

ZONES B AND D - CAB INTERSECTOR LIGHT (CAB FRONT CORNERS)

ZONES B AND D - BODY LIGHT (BODY WHEELWELL AREA)

There shall be two (2) Whelen M6 linear super-LED Light(s) with full-fill optic provided, one (1) each side. The light head shall include an integral flasher with programmable flash patterns and Hi/Lo intensities.

Each Light shall have:

- Red LEDs
- Red Lens

Each light shall have a chrome flange.

- Flash Pattern shall be (factory default) Action Scan.
- The Lo Power option will **NOT** be provided for the above lighting group.

The Lights shall be controlled at the Switch Panel in Cab.

ZONES B AND D - BODY INTERSECTOR LIGHT (BODY REAR CORNERS)

There shall be two (2) Whelen M6 linear super-LED Light(s) with full-fill optic provided, one (1) each side. The light head shall include an integral flasher with programmable flash patterns and Hi/Lo intensities.

Each Light shall have:

- Red LEDs
- Clear Lens

Each light shall have a chrome flange.

- Flash Pattern shall be (factory default) Action Scan.
- The Lo Power option will **NOT** be provided for the above lighting group.

The Lights shall be controlled at the Switch Panel in Cab.

ZONE C - REAR WARNING LIGHTS (LOWER REAR CORNERS)

There shall be two (2) Whelen M6 linear super-LED Light(s) with full-fill optic provided, one (1) each side. The light head shall include an integral flasher with programmable flash patterns and Hi/Lo intensities.

Each Light shall have:

- Red LEDs
- Clear Lens

Each light shall have a chrome flange.

- Flash Pattern shall be (factory default) Action Scan.
- The Lo Power option will **NOT** be provided for the above lighting group.

The Lights shall be controlled at the Switch Panel in Cab.

EQUIPMENT PAYLOAD WEIGHT ALLOWANCE

In compliance with NFPA 1901 standards, the special service vehicle shall be designed for an equipment loading allowance of 2,500 lbs. of Freeport LNG provided equipment based on a 15,001 - 20,000 pound gross vehicle weight rating.

EQUIPMENT

The following equipment shall be furnished with the completed special service vehicle;

- One (1) container of assorted stainless steel nuts, bolts, screws and washers used in the construction of the apparatus shall be provided with the completed apparatus.
- There shall be two (2) Zico SAC-44-E NFPA approved folding aluminum wheel chocks provided for 44" diameter tires that together will hold the vehicle when loaded to its GVWR or GCWR, on a hard surface with a 20 % grade, with the transmission in neutral, and the parking brake released.
 - The wheel chock(s) shall be mounted behind rear wheels, below body on streetside.
- Four (4) Streamlight Survivor, C4 LED flashlight(s) shall be provided with 140 lumens, and 3.5/14 hour run time. Each flashlight shall be orange in color and have a 12 volt DC charger and vehicle mount kit. Each flashlight shall have an LED spotlight style bulbs and reflectors. The flashlight(s) shall be wired to battery direct unless otherwise specified by Freeport LNG.
 - Four (4) flashlight(s) shall be mounted in the cab on center console.

REMAINING NFPA MINOR EQUIPMENT BY PURCHASER

All other minor equipment not specified above, but required by NFPA 1901 for special service vehicles, section 10.9.3 shall be supplied and mounted by Freeport LNG before the unit is placed in emergency service.