

# SAN MARCOS FIRE DEPARTMENT

## **SCOPE AND GENERAL INFORMATION**

It is the intent of the SAN MARCOS FIRE DEPARTMENT to secure an emergency apparatus to withstand the continuous use encountered in the emergency service. The apparatus shall be of the latest type, symmetrically proportioned and constructed with due consideration of the load to be sustained.

All parts not specifically mentioned herein, but which are necessary in order to furnish a complete emergency apparatus, shall be furnished and shall conform to the best practices known to the emergency industry.

The apparatus and all major components shall be manufactured in North America. Where the following detailed specifications require specific brand names, model number, dimension or capacities of components such as: axles, brakes, spring suspension, frame, steering gear, drive line, universal joints, engine transmission, alternator, batteries, air brake system, they have been specified for the service because of their reliability/availability of replacement parts on a local basis.

All specifications herein contained are considered as minimum. No exceptions to these minimum standards shall be allowed relating to gauge, alloy, and type of metal, size of compartments and overall design.

The delivered apparatus shall have a certified G.V.W.R. weight sticker applied to vehicle on delivery to assure the apparatus meets all laws pertaining to the weight carrying capacity of the vehicle.

## **GENERAL CONSTRUCTION AND DESIGN**

The design of the equipment shall be in accordance with the best engineering practices. The equipment design and accessory installation shall permit accessibility for use, maintenance and service. All components and assemblies shall be free of hazardous protrusions, sharp edges, cracks or other elements which might cause injury to personnel or equipment. All components shall be designed and protected so that heavy rains or other adverse weather conditions will not interfere with normal servicing or operation.

All oil, hydraulic and air tubing lines, and electrical wiring shall be located in protective positions properly attached to the frame or body structure and shall have protective loom or grommets at each point where they pass through structural members, except where a through frame connector is necessary.

The apparatus shall be designed and the equipment mounted with due consideration to distribution of load between the front and rear axles so that all specified equipment including personnel will be carried without injury to the apparatus. All dimensions are approximate and subject to a plus or minus 1/4" tolerance.

The following specifications describe minimum requirements for an emergency services vehicle designed for severe duty applications.

The materials specified are considered absolute minimum.

Subletting any part of the fabrication, painting, or finishing of the apparatus will not be acceptable.

## **ACCESSIBILITY**

Parts and components shall be located or positioned for rapid and simple inspection and recognition of excessive wear or potential failure. Whenever functional layout of operating components determines that physical or visual interference between items cannot be avoided, the item predicted to require the most maintenance shall be located for best accessibility.

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Cover plates which must be removed for component adjustment or part removal should be equipped with quick disconnect fasteners or hinged panels.

Drains, filler plugs, grease fittings, hydraulic lines, bleeders, and check points for all components should be located so that they are readily accessible and do not require special tools for proper servicing. Design practices should minimize the number of tools required for maintenance.

## **MATERIALS**

The materials specifications are considered absolute minimum. Materials shall conform to the specifications listed herein. When not specifically listed, materials shall be of the best quality for purpose of commercial practice. Materials shall be free of all defects and imperfections that might affect the serviceability of finished product.

## **QUALITY AND WORKMANSHIP**

The manufacturing process, including quality control, shall be consistent with present industry standards. All equipment, material, and articles required under these specifications are to be new or fabricated from new materials produced from recovered materials. The term "Recovered Materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products is allowed under this document. The term "Heavy Duty", as used to describe an item, shall mean in excess of the standard, quantity, quality, or capacity and represents the best, most durable, strongest, etc., part, component, system, etc., that is available. The SAN MARCOS FIRE DEPARTMENT or their designate shall be the sole judge of quality, construction and stability of the apparatus and equipment being offered.

Welding shall not be employed in the assembly of the apparatus in a manner that will prevent the ready removal of any component part for service or repair. All steel and stainless steel welding shall be done to American Welding Society D1.1-83 recommendations for structural steel welding. All aluminum welding shall be done to American Welding Society and ANSI D1.2-83 requirements for structural welding of aluminum.

Defective components shall not be furnished. Parts, equipment, and assemblies, which have been repaired or modified to overcome deficiencies, shall not be furnished without the approval of the SAN MARCOS FIRE DEPARTMENT. Welded, bolted, and riveted construction utilized shall be in accordance with the highest standards of the industry. Component parts and units shall be manufactured to definite standard dimensions with proper fits, clearances, and uniformity. General appearance of the vehicle shall not show any evidence of poor quality of work.

## **LIABILITY INSURANCE**

The manufacturer shall furnish with the proposal 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 \$4,000,000.00 each occurrence, Aggregate of \$4,000,000.00.  
Garage Keepers Liability coverage of \$4,500,000.00 combined limit.

All insurance policies must be;

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- 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 SAN MARCOS FIRE DEPARTMENT 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.

## **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 10 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).

## **ROADABILITY**

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) From a standing start, the apparatus shall be able to attain a speed of 35 mph (55 km/hr) within 25 seconds on a level road.
- 2) The apparatus shall be able to attain a minimum top speed of 50 mph (80 km/hr) on a level road.
- 3) The apparatus shall be able to maintain 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 (105 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 (85 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.

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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.

## **CONSTRUCTION DOCUMENTATION**

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

The manufacturers record of apparatus construction details, including the following information:

- 4) Owner's name and address
- 5) Apparatus manufacturer, model, and serial number
- 6) Chassis make, model, and serial number
  - a) GAWR of front and rear axles and GVWR
  - b) Front tire size and total rated capacity in pounds (kilograms)
  - c) Rear tire size and total rated capacity in pounds (kilograms)
  - d) Chassis weight distribution in pounds (kilograms) with water and manufacturer-mounted equipment (front and rear)
  - e) 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
  - f) Type of fuel and fuel tank capacity
  - g) Electrical system voltage and alternator output in amps
  - h) Battery make, model, and capacity in cold cranking amps (CCA)
  - i) Chassis transmission make, model, and serial number; and if so equipped, chassis transmission PTO(s) make, model, and gear ratio
- 7) Pump make, model, rated capacity in gallons per minute (liters per minute where applicable), and serial number
- 8) Pump transmission make, model, serial number, and gear ratio
- 9) Auxiliary pump make, model, rated capacity in gallons per minute (liters per minute where applicable), and serial number
- 10) Water and Foam tank certified capacity in gallons or liters
- 11) Paint manufacturer and paint number(s)
- 12) Company name and signature of responsible company representative
- 13) If the apparatus is a mobile foam fire apparatus, the certification of foam tank capacity
- 14) Certification of compliance of the optical warning system
- 15) Siren manufacturer's certification of the siren
- 16) Written load analysis and results of the electrical system performance tests
- 17) Certification of slip resistance of all stepping, standing, and walking surfaces
- 18) If the apparatus has a fire pump, the pump manufacturer's certification of suction capability
- 19) 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
- 20) If the apparatus has a fire pump, a copy of the apparatus manufacturer's approval for stationary pumping applications
- 21) If the apparatus has a fire pump, the engine manufacturer's certified brake horsepower curve for the engine furnished, showing the maximum governed speed
- 22) If the apparatus has a fire pump, the pump manufacturer's certification of the hydrostatic test
- 23) If the apparatus has a fire pump, the certification of inspection and test for the fire pump
- 24) If the apparatus is equipped with an auxiliary pump, the apparatus manufacturer's certification of the hydrostatic test
- 25) When the apparatus is equipped with a water tank, the certification of water tank capacity
- 26) If the apparatus has a foam proportioning system, the foam proportioning system manufacturer's certification of accuracy and the final installer's certification the foam proportioning system meets this standard

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- 27) If the system has a CAFS, the documentation of the manufacturer's pre delivery tests
- 28) If the apparatus has a line voltage power source, the certification of the test for the power source
- 29) If the apparatus is equipped with an air system, air tank certificates, the SCBA fill station certification, and the results of the testing of the air system installation
- 30) Any other required manufacturer test data or reports.

## **OPERATIONS AND SERVICE DOCUMENTATION**

The Contractor shall deliver with the fire apparatus at least two (2) sets of 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:

- 31) Manufacturer's name and address
- 32) Country of manufacture
- 33) Source for service and technical information
- 34) Parts replacement information
- 35) Descriptions, specifications, and ratings of the chassis, pump (if applicable), and aerial device (if applicable)
- 36) 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
- 37) Lubrication charts
- 38) Operating instructions for the chassis, any major components such as a pump or aerial device, and any auxiliary systems
- 39) Precautions related to multiple configurations of aerial devices, if applicable
- 40) Instructions regarding the frequency and procedure for recommended maintenance
- 41) Overall apparatus operating instructions
- 42) Safety considerations
- 43) Limitations of use
- 44) Inspection procedures
- 45) Recommended service procedures
- 46) Troubleshooting guide
- 47) Apparatus body, chassis and other component manufacturer's warranties
- 48) Special data required by this standard
- 49) 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.

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## **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.

## **STATEMENT OF EXCEPTIONS**

The Contractor 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:

- 50) A separate specification of the section of the applicable standard for which compliance is lacking
- 51) A description of the particular aspect of the apparatus that is not in compliance therewith or required equipment that is missing
- 52) A description of the further changes or modifications to the delivered apparatus that must be completed to achieve full compliance
- 53) 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.

An apparatus that is delivered subject to a Statement of Exceptions other than a certification of full compliance shall not be placed in emergency service until the apparatus has been modified as necessary to accomplish full compliance with this standard.

## **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 Body Manufacturer shall establish the estimated in-service weight during the design of the vehicle

The estimated in-service weight shall include the following:

- 54) The chassis, body and tank(s)
- 55) Full fuel, lubricant, and other chassis or component fluid tanks or reservoirs
- 56) Full water and other agent tanks
- 57) \*250 lb (114 kg) in each seating position
- 58) Fixed equipment such as pumps, aerial devices, generators, reels and air systems as installed
- 59) Ground ladders, suction hose, designed hose load in their hose beds and on their reels
- 60) An allowance for miscellaneous equipment that is the greatest of the values for type of vehicle per NFPA 1901, a Purchaser provided list of equipment to be carried with weights or a Purchaser specified miscellaneous equipment allowance.

The Body Manufacturer shall engineer and design the vehicle such that the completed unit, 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.

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A final Body 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.

			<b>Equipment Allowance</b>	
<b>Apparatus Type</b>	<b>Equip. Storage Area</b>	<b>Apparatus Size</b>	<b>lb.</b>	<b>kg.</b>
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) GVWR	10,000	4,500

## **TESTING**

### **ROAD TEST**

Road test shall be conducted in accordance with this section to verify that the completed apparatus is capable of compliance with Roadability Section.

The tests shall be conducted at a location and in a manner that does not violate local, state or provincial or federal traffic laws.

The tests shall be conducted on dry, level, paved roads that are in good condition. The apparatus shall be loaded to its estimated in service weight.

The engine shall not operate in excess of the maximum governed speed. Acceleration tests shall consist of two runs in opposite directions over the same route. The fire apparatus shall attain a speed of 35 mph (55 km/hr) from a standing start within 25 seconds. The fire apparatus shall attain a minimum top speed of 50 mph (80 km/hr).

If the apparatus is equipped with an auxiliary braking system, the Body Manufacturer shall road test the system to confirm that the system is functioning as intended by the auxiliary braking system manufacturer.

If the apparatus is equipped with an air brake system, the service brakes shall bring the apparatus, when loaded to its GVWR, to a complete stop from an initial speed of 20 mph (32.2 km/hr) in a distance not exceeding 35 ft (10.7 m) by actual measurement on a paved, level, dry surface road that is free of loose material, oil or grease.

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If the apparatus is equipped with a hydraulic brake system, the service brakes shall bring the apparatus, when loaded to its GVWR, to a complete stop from an initial speed of 30 mph (48.2 km/hr) in a distance not exceeding 88 ft (26.8 m) by actual measurement on a paved, level, dry surface road that is free of loose material, oil or grease.

## **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.



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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:

- 61) Documentation of the electrical system performance tests
- 62) 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:

- 63) The power source output voltage, frequency and amperes
- 64) The prime mover's oil pressure, water temperature and transmission temperature, if applicable
- 65) The power source hydraulic fluid temperature, if applicable
- 66) 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:

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- 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  $\pm 3$  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 Body Manufacturer shall deliver the following with the fire apparatus:

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:

- 4) Isolate the power source from the panel board and disconnect any solid state low voltage components
- 5) Connect one lead of the dielectric tester to all the hot and neutral buses tied together
- 6) Connect the other lead to the fire apparatus frame or body
- 7) Close any switches and circuit breakers in the circuit(s)
- 8) 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.

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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 proposal. 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 SAN MARCOS FIRE DEPARTMENT 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.

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## **CONSTRUCTION PERIOD**

The completed vehicle shall be delivered within three hundred sixty (360) days after receipt of a purchase order or contract.

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 immediate written notice to SAN MARCOS FIRE DEPARTMENT as to delays and to what extent these delays have in completing vehicle within the stated construction time period.

## **OVERALL HEIGHT REQUIREMENT**

The overall height (OAH) of the vehicle shall be approximately 128" (10' - 8") from the ground. This measurement shall be taken on flat ground with the tires properly inflated, in the unloaded condition, at that highest point of the vehicle.

## **OVERALL LENGTH**

The overall length (OAL) of the vehicle shall be approximately 438" (36' - 6").

## **OVERALL WIDTH**

The overall width (OAW) of the body at drip rails shall be 102" (8' - 6"), and body shall be 100" (8' - 4").

## **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.

## **ENGINEERING SUPPORT AT PRE-CONSTRUCTION MEETING**

The Contractor shall provide an engineer to be present at the pre-construction meeting held at the factory location. The engineer will address all engineering related questions for the truck as purchased and for all proposed changes.

The engineer will have the 2D and/or 3D AutoCAD electronic drawings projected on screen and be able to provide dimensional data for proposed changes and proposed layouts. This will help ensure that the final design matches the SAN MARCOS FIRE DEPARTMENT intentions to the maximum extent possible.

## **PRE-CONSTRUCTION CONFERENCE**

A pre-construction conference shall be required at the Contractor's factory for three (3) personnel from the SAN MARCOS FIRE DEPARTMENT 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.

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## **FINAL INSPECTION CONFERENCE**

A final inspection conference shall be required at the Contractor's factory for three (3) personnel from the SAN MARCOS FIRE DEPARTMENT 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.

## **DELIVERY AND DEMONSTRATION**

The Contractor shall be responsible for the delivery of the completed unit to the SAN MARCOS FIRE DEPARTMENT's location. On initial delivery of the apparatus, the Contractor shall supply a qualified representative to demonstrate the apparatus and provide initial instruction to representatives of the SAN MARCOS FIRE DEPARTMENT regarding the operation, care and maintenance of the apparatus and equipment supplied at SAN MARCOS FIRE DEPARTMENT location.

The Delivery Engineer shall set delivery and instruction schedule with the person appointed by SAN MARCOS FIRE DEPARTMENT.

After delivery of the apparatus, the SAN MARCOS FIRE DEPARTMENT shall be responsible for ongoing training of its personnel to proficiency regarding the proper and safe use of the apparatus and associated equipment.

## **CHASSIS SPECIFICATION**

### **MODEL**

The chassis shall be a Spartan Motors Inc. Metro Star model. The cab and chassis shall include design considerations for multiple emergency vehicle applications, rapid transit and maneuverability. The chassis shall be manufactured for heavy duty service with the strength and capacity to support a fully laden apparatus, one hundred (100) percent of the time.

### **MODEL YEAR**

The chassis shall have a vehicle identification number that reflects a 2015 model year.

### **COUNTRY OF SERVICE**

The chassis shall be put in service in the country of United States of America (USA).

The chassis will meet applicable U.S.A. federal motor vehicle safety standards per CFR Title 49 Chapter V Part 571 as clarified in the incomplete vehicle book per CFR Title 49 Chapter V Part 568 Section 4 which accompanies each chassis. Spartan Chassis is not responsible for compliance to state, regional, or local regulations. Dealers should identify those regulations and order any necessary optional equipment from Spartan Chassis or their OEM needed to be in compliance with those regulations.

### **APPARATUS TYPE**

The apparatus shall be a rescue vehicle designed for emergency service use which shall include the functions of a multipurpose vehicle which primarily provides support services at emergency scenes.

### **VEHICLE TYPE**

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The chassis shall be manufactured for use as a straight truck type vehicle and designed for the installation of a permanently mounted apparatus behind the cab. The apparatus of the vehicle shall be supplied and installed by the apparatus manufacturer.

## **AXLE CONFIGURATION**

The chassis shall feature a 4 x 2 axle configuration consisting of a single rear drive axle with a single front steer axle.

## **GROSS AXLE WEIGHT RATINGS FRONT**

The front gross axle weight rating (GAWR) of the chassis shall be 21,500 pounds.

This front gross axle weight rating shall be adequate to carry the weight of the completed apparatus including all equipment and personnel.

## **GROSS AXLE WEIGHT RATINGS REAR**

The rear gross axle weight rating (GAWR) of the chassis shall be 24,000 pounds.

This rear gross axle weight rating shall be adequate to carry the weight of the completed apparatus including all equipment and personnel.

## **CAB STYLE**

The cab shall be a custom, fully enclosed, ELFD model with a 10.00 inch raised roof over the driver, officer, and crew area, designed and built specifically for use as an emergency response vehicle by a company specializing in cab and chassis design for all emergency response applications. The cab shall be designed for heavy-duty service utilizing superior strength and capacity for the application of protecting the occupants of the vehicle. This style of cab shall offer up to ten (10) seating positions.

The cab shall incorporate a fully enclosed design with side wall roof supports, allowing for a spacious cab area with no partition between the front and rear sections of the cab. To provide a superior finish by reducing welds that fatigue cab metal; the roof, the rear wall and side wall panels shall be assembled using a combination of welds and proven industrial adhesives designed specifically for aluminum fabrication for construction.

The cab shall be constructed using multiple aluminum extrusions in conjunction with aluminum plate, which shall provide proven strength and the truest, flattest body surfaces ensuring less expensive paint repairs if needed. All aluminum welding shall be completed to the American Welding Society and ANSI D1.2-96 requirements for structural welding of aluminum.

All interior and exterior seams shall be sealed for optimum noise reduction and to provide the most favorable efficiency for heating and cooling retention.

The cab shall be constructed of 5052-H32 corrosion resistant aluminum plate. The cab shall incorporate tongue and groove fitted 6061-T6 0.13 & 0.19 inch thick aluminum extrusions for extreme duty situations. A single formed, one (1) piece extrusion shall be used for the "A" pillar, adding strength and rigidity to the cab as well as additional roll-over protection. The cab side walls and lower roof skin shall be 0.13 inch thick; the rear wall and raised roof skins shall be 0.09 inch thick; the front cab structure shall be 0.19 inch thick.

The exterior width of the cab shall be 94.00 inches wide with a minimum interior width of 88.00 inches. The overall cab length shall be 151.10 inches with 74.00 inches from the centerline of the front of the axle to the back of the cab.

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The cab interior shall be designed to afford the maximum usable interior space and attention to ergonomics with hip and legroom while seated which exceeds industry standards. The crew cab floor shall be flat across the entire walking area for ease of movement inside the cab.

The cab shall offer an interior height of 57.50 inches from the front floor to the headliner and a rear floor to headliner height of 65.00 inches in the raised roof area, at a minimum. The cab shall offer an interior measurement at the floor level from the rear of the engine tunnel to the rear wall of the cab of 71.88 inches. All interior measurements shall include the area within the interior trimmed surfaces and not to any unfinished surface.

The cab shall include a driver and officer area with two (2) cab doors large enough for personnel in full firefighting gear. The front doors shall offer a clear opening of 40.25 inches wide X 53.50 inches high, from the cab floor to the top of the door opening. The cab shall also include a crew area with up to two (2) cab doors, also large enough for personnel in full firefighting gear. The rear doors shall offer a clear opening of 32.25 inches wide X 61.00 inches high, from the cab floor to the top of the door opening.

The cab shall incorporate a progressive two (2) step configuration from the ground to the cab floor at each door opening. The progressive steps are vertically staggered and extend the full width of each step well allowing personnel in full firefighting gear to enter and exit the cab easily and safely.

The first step for the driver and officer area shall measure approximately 11.50 inches deep X 31.13 inches wide. The intermediate step shall measure approximately 8.50 inches deep X 32.50 inches wide. The height from the first step to the intermediate step and the intermediate step to the cab floor shall not exceed 11.00 inches.

The first step for the crew area shall measure approximately 11.50 inches deep X 20.44 inches wide. The intermediate step shall measure approximately 10.25 inches deep X 22.75 inches wide. The height from the first step to the intermediate step and the intermediate step to the cab floor shall not exceed 12.80 inches.

## **OCCUPANT PROTECTION**

The vehicle shall include the Advanced Protection System™ (APS) which shall secure belted occupants and increase the survivable space within the cab. The APS shall selectively deploy integrated systems to protect against injuries in qualifying frontal impact, side impact, and rollover events. The increase in survivable space and security of the APS shall also provide ejection mitigation protection.

The system components shall include:

- Driver steering wheel airbag
- Driver dual knee air bags (patent pending) with energy management mounting (patent pending) and officer knee airbag.
- Large driver, officer, and crew area side curtain airbags
- APS advanced seat belt system - retractor pre-tensioners tighten the seat belts around the occupants, securing the occupants in seats and load limiters play out some of the seat belt webbing to reduce seat belt to chest and torso force upon impact as well as mitigate head and neck injuries
- Heavy truck Restraints Control Module (RCM) - receives inputs from the outboard sensors, selectively deploys APS systems, and records sensory inputs immediately before and during a detected qualifying event

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- Integrated outboard crash sensors mounted at the perimeter of the vehicle - detects a qualifying front or side impact event and monitors and communicates vehicle status and real time diagnostics of all critical subsystems to the RCM
- Fault-indicating Supplemental Restraint System (SRS) light on the driver's instrument panel

Frontal impact protection shall be provided by the outboard sensors and the RCM. In a qualifying front impact event the outboard sensors provide inputs to the RCM. The RCM activates the steering wheel airbag, driver side dual knee airbags (patent pending), officer side knee airbag, and advanced seat belts for each occupant in the cab.

The APS frontal impact system shall be independently tested to ensure occupant injury criteria does not exceed injury criteria defined in Federal Motor Vehicle Safety Standard (FMVSS) 208. Frontal impact into a rigid barrier at 25 mph shall be conducted by an independent third party test facility using belted 95<sup>th</sup> percentile Hybrid II test dummies.

Rollover, side impact, and ejection mitigation shall be provided by the outboard sensors and the RCM. In qualifying rollover or side impact events the outboard sensors provide inputs to the RCM. The RCM activates the side curtain airbags and advanced seat belts for each occupant in the cab. The RCM measures roll angle, lateral acceleration, and roll rate to determine if a rollover event or side impact event is imminent or occurring.

In the event of a qualifying offset or other non-frontal impact, the RCM shall determine and intelligently deploy the front impact protection system, the side impact protection system, or both front and side impact protection systems based on the inputs received from the outboard crash sensors.

The APS side impact system shall be independently tested to ensure occupant injury criteria does not exceed injury criteria defined in Federal Motor Vehicle Safety Standard (FMVSS) 214. Side impact from a moving barrier at 17 mph shall be conducted by an independent third party test facility using belted 50<sup>th</sup> percentile ES-2re test dummies.

## **CAB FRONT FASCIA**

The front cab fascia shall be constructed of 5052-H32 Marine Grade, 0.13 of an inch thick aluminum plate which shall be an integral part of the cab.

The cab fascia will encompass the entire front of the aluminum cab structure from the bottom of the windshield to the bottom of the cab and shall be the "Classic" design.

The front cab fascia shall include two (2) molded plastic modules on each side accommodating a total of up to four (4) Hi/Low beam headlights and two (2) turn signal lights or up to four (4) warning lights. A chrome plated molded plastic bezel shall be provided on each side around each set of four lamps.

## **FRONT GRILLE**

The front cab fascia shall include a classic box style, 304 stainless steel front grille with a Spartan logo. The grille shall measure 44.45 inches wide at the top tapering to 39.30 inches wide at the bottom X 33.50 inches high X 1.50 inches deep. The grille shall include a minimum free air intake of 632.90 square inches.

## **CAB UNDERCOAT**

There shall be a rubberized undercoating applied to the underside of the cab that provides abrasion protection, sound deadening and corrosion protection.

## **CAB SIDE DRIP RAIL**



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There shall be a drip rail along the top radius of each cab side. The drip rails shall help prevent water from the cab roof running down the cab side.

## **CAB PAINT EXTERIOR**

The cab shall be painted prior to the installation of glass accessories and all other cab trim to ensure complete paint coverage and the maximum in corrosion protection of all metal surfaces.

All metal surfaces on the entire cab shall be ground by disc to remove any surface oxidation or surface debris which may hinder the paint adhesion. Once the surface is machine ground a high quality acid etching of base primer shall be applied. Upon the application of body fillers and their preparation, the cab shall be primed with a coating designed for corrosion resistance and surface paint adhesion. The maximum thickness of the primer coat shall be 2.00 mils.

The entire cab shall then be coated with an intermediate solid or epoxy surfacing agent that is designed to fill any minor surface defects, provide an adhesive bond between the primer and the paint and improve the color and gloss retention of the color. The finish to this procedure shall be a sanding of the cab with 360 grit paper followed by sealing the seams with SEM brand seam sealer.

The cab shall then be painted the specific color designated by the customer with an acrylic urethane type system designed to retain color and resist acid rain and most atmospheric chemicals found on the fire ground or emergency scene. The paint shall have a minimum thickness of 2.00 mils, followed by a clear top coat not to exceed 2.00 mils. The entire cab shall then be baked at 180 degrees for one (1) hour to speed the curing process of the coatings.

## **CAB PAINT MANUFACTURER**

The cab shall be painted with PPG Industries paint.

## **CAB PAINT PRIMARY/LOWER COLOR**

The primary/lower paint color shall be PPG FBCH 926234 red.

## **CAB PAINT SECONDARY/UPPER COLOR**

The secondary/upper paint color shall be PPG FBCH 925885 white.

## **CAB PAINT EXTERIOR BREAKLINE**

The upper and lower paint shall meet at a breakline on the cab which shall be located approximately 1.00 inch below the door windows on each side of the cab. The breakline shall curve down at the front cab corners to approximately 5.00 inches below the windshields on the front of the cab.

## **CAB PAINT PINSTRIPE**

Where the upper and lower paint colors meet a temporary 0.50 inch wide black pinstripe shall be applied over this break line to offer a more finished look prior to the final pinstripe being installed by the OEM.

## **CAB PAINT WARRANTY**

The cab and chassis shall be covered by a limited manufacturer paint warranty which shall be in effect for ten (10) years from the first owner's date of purchase or in service or the first 100,000 actual miles, whichever occurs first.

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## **CAB PAINT INTERIOR**

The visible interior cab structure surfaces shall be painted with medium gray Spar-Liner spray on bed liner product which shall mold to each surface of the cab interior. The Spar-Liner shall be environmentally friendly and chemically resistant.

## **CAB ENTRY DOORS**

The cab shall include four (4) entry doors, two (2) front doors and two (2) crew doors designed for ease of entering and egress when outfitted with an SCBA. The doors shall be constructed of extruded aluminum with a nominal thickness of 0.13 inch. The exterior skins shall be constructed of 0.13 inch aluminum plate.

The doors shall include a double rolled style automotive rubber seal around the perimeter of each door frame and door edge which ensures a weather tight fit.

All door hinges shall be hidden within flush mounted cab doors for a pleasing smooth appearance and perfect fit along each side of the cab. Each door hinge shall be piano style with a 0.38 inch pin and shall be constructed of stainless steel.

## **CAB ENTRY DOOR TYPE**

All cab entry doors shall be full length in design to fully enclose the lower cab steps.

## **CAB INSULATION**

The cab ceiling and walls shall include 1.00 inch thick foam insulation. The insulation shall act as a barrier absorbing noise as well as assisting in sustaining the desired climate within the cab interior.

## **LH EXTERIOR REAR COMPARTMENT**

The cab shall offer an exterior compartment on the left side of the cab behind the rear door. The compartment opening shall be 17.00 inches wide X 31.19 inches high. The compartment size shall be 17.34 inches wide X 31.19 inches high X 21.19 inches deep. The compartment shall have a 16.63 inch wide, 32.00 inch high and 1.50 inch thick hinged box pan style flush mount door with a bright aluminum tread plate inner panel and a bent D-ring slam latch. The door shall open towards the rear of the cab. There shall be a switch to activate a light inside the compartment and the open compartment warning light in the cab in the event the door is left ajar.

## **LEFT HAND EXTERIOR REAR COMPARTMENT LIGHTING**

There shall be one (1) On-Scene brand Night Axe LED strip light installed to illuminate the exterior rear compartment on the left side of the cab. The strip light shall be 9.00 inches long and shall include six (6) bright white LEDs.

## **LH EXTERIOR COMPARTMENT INTERIOR FINISH**

The interior of the left hand exterior compartment shall have a gray Spar-Liner finish.

## **RH EXTERIOR REAR COMPARTMENT**

The cab shall offer an exterior compartment on the right side of the cab behind the rear door. The compartment opening shall be 17.00 inches wide X 31.19 inches high. The compartment size shall be 17.34 inches wide X 31.19 inches high X 21.19 inches deep. The compartment shall have a 16.63 inch wide, 32.00 inch high and 1.50 inch thick hinged box pan style flush mount door with a bright aluminum tread plate inner panel and a bent D-ring

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slam latch. The door shall open towards the rear of the cab. There shall be a switch to activate a light inside the compartment and the open compartment warning light in the cab in the event the door is left ajar.

## **RIGHT HAND EXTERIOR REAR COMPARTMENT LIGHTING**

There shall be one (1) On-Scene brand Night Axe LED strip light installed to illuminate the exterior rear compartment on the right side of the cab. The strip light shall be 9.00 inches in length and shall include six (6) bright white LEDs.

## **RH EXTERIOR COMPARTMENT INTERIOR FINISH**

The interior of the right hand exterior compartment shall have a gray Spar-Liner finish.

## **CAB STRUCTURAL WARRANTY**

Summary of Warranty Terms:

THE FOLLOWING IS SUMMARY OF WARRANTY TERMS FOR INFORMATION ONLY. THE ACTUAL LIMITED WARRANTY DOCUMENT, WHICH IS ATTACHED TO THIS OPTION, CONTAINS THE COMPLETE STATEMENT OF THE SPARTAN CHASSIS, INC. LIMITED WARRANTY. SPARTAN'S RESPONSIBILITY IS TO BE ACCORDING TO THE TERMS OF THE COMPLETE LIMITED WARRANTY DOCUMENT.

The cab structure shall be warranted for a period of ten (10) years or one hundred thousand (100,000) miles which ever may occur first. The warranty period shall commence on the date the vehicle is delivered to the first end user.

## **CAB TEST INFORMATION**

The cab shall have successfully completed the preload side impact, static roof load application and frontal impact without encroachment to the occupant survival space when tested in accordance with Section 4 of SAE J2420 COE Frontal Strength Evaluation Dynamic Loading Heavy Trucks, Section 5 of SAE J2422 Cab Roof Strength Evaluation Quasi –Static Loading Heavy Trucks and ECE R29 Uniform Provisions Concerning the Approval of Vehicles with regard to the Protection of the Occupants of the Cab of a Commercial Vehicles Annex 3 Paragraph 5.

The above tests have been witnessed by and attested to by an independent third party. The test results were recorded using cameras, high speed imagers, accelerometers and strain gauges. Documentation of the testing shall be provided upon request.

## **ELECTRICAL SYSTEM**

The chassis shall include a single starting electrical system which shall include a 12 volt direct current Weldon brand of multiplexing system, suppressed per SAE J551. The 12V system breaker and relay panel shall be located as close to the windshield as possible. The wiring shall be appropriate gauge cross link with 311 degree Fahrenheit insulation. All SAE wires in the chassis shall be color coded and shall include the circuit number and function where possible. The wiring shall be protected by 275 degree Fahrenheit minimum high temperature flame retardant loom. All nodes and sealed Deutsch connectors shall be waterproof.

## **APPARATUS WIRING PROVISION**

An apparatus wiring panel shall be installed in the center dash area behind the rocker switch panel which shall include eight (8) open circuits consisting of three (3) 20 amp, one (1) 30 amp, three (3) 10 amp, and one (1) 15 amp circuit, with relays and breakers with trigger wires which shall be routed to the rocker switch panel.

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## **MULTIPLEX DISPLAY**

The multiplex electrical system shall include a Weldon Vista IV display which shall be located on the left side of the dash in the switch panel. The Vista IV shall feature a full color LCD display screen which includes a message bar displaying the time of day and important messages requiring acknowledgement by the user which shall all be displayed on the top of the screen in the order they are received. There shall be eight (8) push button virtual controls, four (4) on each side of the display for the on-board diagnostics. The display screen shall be video ready for back-up cameras, thermal cameras, and DVD.

The Vista IV display shall offer varying fonts and background colors. The display shall be fully programmable to the needs of the customer and shall offer virtually infinite flexibility for screen configuration options.

## **DATA RECORDING SYSTEM**

The chassis shall have a Weldon Vehicle Data Recorder (VDR) system installed. The system shall be designed to meet NFPA 1901 and shall be integrated with the Weldon Multiplex electrical system. The following information shall be recorded:

- Vehicle Speed
- Acceleration
- Deceleration
- Engine Speed
- Engine Throttle Position
- ABS Event
- Seat Occupied Status
- Seat Belt Status
- Master Optical Warning Device Switch Position
- Time
- Date

Each portion of the data shall be recorded at the specified intervals and stored for the specified length of time to meet NFPA 1901 guidelines and shall be retrievable by connecting a laptop computer to the VDR system.

## **ACCESSORY POWER**

The electrical distribution panel shall include two (2) power studs. The studs shall be size #10 and each of the power studs shall be circuit protected with a fuse of the specified amperage. One (1) power stud shall be capable of carrying up to a 40 amp battery direct load. One (1) power stud shall be capable of carrying up to a 15 amp ignition switched load. The two (2) power studs shall share one (1) #10 ground stud. A 225 amp battery direct power and ground stud shall be provided and installed on the chassis near the left hand battery box for OEM body connections.

## **AUXILIARY ACCESSORY POWER**

An auxiliary six (6) position Blue Sea Systems 5025 blade type fuse panel shall be installed behind the switch panel. The fuse panel shall be protected by a 40 amp fuse. The panel shall be capable of carrying up to a maximum 40 amp battery direct load.

## **EXTERIOR ELECTRICAL TERMINAL COATING**

All terminals exposed to the elements will be sprayed with a high visibility protective rubberized coating to prevent corrosion.

## **ENGINE**

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The chassis engine shall be a Cummins ISL9 engine. The ISL9 engine shall be an in-line six (6) cylinder, four cycle diesel powered engine. The engine shall offer a rating of 450 horse power at 2100 RPM and shall be governed at 2200 RPM. The torque rating shall feature 1250 foot pounds of torque at 1400 RPM with 543 cubic inches (8.9 liters) of displacement.

The ISL9 engine shall feature a VGT™ Turbocharger, a high pressure common rail fuel system, fully integrated electronic controls with an electronic governor, and shall be EPA certified to meet the 2013 emissions standards using cooled exhaust gas recirculation and selective catalytic reduction technology.

The engine shall include an engine mounted combination full flow/by-pass oil filter with replaceable spin on cartridge for use with the engine lubrication system. The engine shall include Citgo brand Citgard 500, or equivalent SAE 15W40 CJ4 low ash engine oil which shall be utilized for proper engine lubrication.

A wiring harness shall be supplied ending at the back of the cab. The harness shall include a connector which shall allow an optional harness for the pump panel. The included circuits shall be provided for a tachometer, oil pressure, engine temperature, hand throttle, high idle and a PSG system. A circuit for J1939 data link shall also be provided at the back of the cab.

## **CAB ENGINE TUNNEL**

The cab interior shall include an integrated engine tunnel constructed of 5052-H32 Marine Grade, 0.19 of an inch thick aluminum. The tunnel shall be a maximum of 41.50 inches wide X 25.50 inches high.

## **DIESEL PARTICULATE FILTER CONTROLS**

There shall be two (2) controls for the diesel particulate filter. One (1) control shall be for regeneration and one (1) control shall be for regeneration inhibit.

## **ENGINE PROGRAMMING HIGH IDLE SPEED**

The engine high idle control shall maintain the engine idle at approximately 1250 RPM when engaged.

## **ENGINE HIGH IDLE CONTROL**

The vehicle shall be equipped with an automatic high-idle speed control. It shall be pre-set so when activated, it will operate the engine at the appropriate RPM to increase alternator output. This device shall operate only when the master switch is activated and the transmission is in neutral with the parking brake set. The device shall disengage when the operator depresses the brake pedal, or the transmission is placed in gear, and shall be available to manually or automatically re-engage when the brake is released, or when the transmission is placed in neutral. There shall be an indicator on the Vista display and control screen for the high idle speed control.

## **ENGINE PROGRAMMING ROAD SPEED GOVERNOR**

The engine shall include programming which will govern the top speed of the vehicle.

## **AUXILIARY ENGINE BRAKE**

A compression brake, for the six (6) cylinder engine shall be provided. A cutout relay shall be installed to disable the compression brake when in pump mode or when an ABS event occurs. The engine compression brake shall activate upon 0% accelerator when in operation mode and actuate the vehicle's brake lights.

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The engine shall utilize a variable geometry turbo (VGT) as an integrated auxiliary engine brake to offer a variable rate of exhaust flow, which when activated in conjunction with the compression brake shall enhance the engine's compression braking capabilities.

## **AUXILIARY ENGINE BRAKE CONTROL**

An engine compression brake control device shall be included. The electronic control device shall monitor various conditions and shall activate the engine brake only if all of the following conditions are simultaneously detected:

- A valid gear ratio is detected.
- The driver has requested or enabled engine compression brake operation.
- The throttle is at a minimum engine speed position.
- The electronic controller is not presently attempting to execute an electronically controlled final drive gear shift.

The compression brake shall be controlled via an off/low/medium/high virtual button on the Vista display and control screen. The virtual button will default to high setting when vehicle power is switched from off to on.

## **ELECTRONIC ENGINE OIL LEVEL INDICATOR**

The engine oil shall be monitored electronically and shall send a signal to activate a warning in the instrument panel when levels fall below normal. The warning shall activate in a low oil situation upon turning on the master battery and ignition switches without the engine running.

## **FLUID FILLS**

The engine oil, coolant, transmission, and power steering fluid fills shall be located under the cab. The windshield washer fill shall be accessible through the front left side mid step.

## **ENGINE DRAIN PLUG**

The engine shall include an original equipment manufacturer installed magnetic oil drain plug.

## **ENGINE WARRANTY**

The Cummins engine shall be warranted for a period of five (5) years or 100,000 miles, whichever occurs first.

## **ENGINE PROGRAMMING REMOTE THROTTLE**

The engine ECM (Electronic Control Module) discreet wire remote throttle circuit shall be turned off for use with a J1939 based pump controller or when the discreet wire remote throttle controls are not required.

## **ENGINE PROGRAMMING IDLE SPEED**

The engine low idle speed will be programmed at 750 rpm.

## **ENGINE FAN DRIVE**

The engine cooling system fan shall incorporate a thermostatically controlled, Horton clutched type fan drive.

When the clutched fan is disengaged it shall facilitate improved vehicle performance, cab heating in cold climates, and fuel economy. The fan clutch design shall be fail safe so that if the clutch drive fails the fan shall engage to prevent engine overheating due to the fan clutch failure.

## **ENGINE COOLING SYSTEM**

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There shall be a heavy-duty aluminum cooling system designed to meet the demands of the emergency response industry. The cooling system shall have the capacity to keep the engine properly cooled under all conditions of road and pumping operations. The cooling system shall be designed and tested to meet or exceed the requirements specified by the engine and transmission manufacturer and all EPA requirements. The complete cooling system shall be mounted to isolate the entire system from vibration or stress. The individual cores of the cooling system shall be mounted in a manner to allow expansion and contraction at various rates without inducing stress into the adjoining cores.

The cooling system shall utilize a charge air cooler to radiator serial flow package that provides the maximum cooling capacity for the specified engine as well as serviceability. The main components shall include a surge tank, an air to air charge air cooler bolted to the front of the radiator, recirculation shields, a shroud, a fan, and required tubing.

The radiator shall be a down-flow design constructed with aluminum cores, plastic end tanks, and a steel frame. The radiator shall be equipped with a drain cock to drain the coolant for serviceability.

The cooling system shall include a one piece injection molded polymer eleven (11) blade fan with a fiberglass fan shroud.

The cooling system shall be equipped with a surge tank that is capable of removing entrained air from the system. The surge tank shall be equipped with a low coolant probe and sight glass to monitor the level of the coolant. The surge tank shall have a dual seal cap that meets the engine manufacturer's pressure requirements, and allows for expansion and recovery of coolant into a separate integral expansion chamber.

All radiator tubes shall be formed from aluminized steel tubing. Recirculation shields shall be installed where required to prevent heated air from reentering the cooling package and affecting performance.

The charge air cooler shall be a cross-flow design constructed completely of aluminum with cast tanks. All charge air cooler tubes shall be formed from aluminized steel tubing and installed with silicone hump hoses and stainless steel "constant torque" style clamps meeting the engine manufacturer's requirements.

## **ENGINE COOLING SYSTEM PROTECTION**

The engine cooling system shall include a recirculation shield designed to act as a light duty skid plate below the radiator to provide additional protection for the engine cooling system from light impacts, stones, and road debris. The skid plate shall be painted to match the frame color.

## **ENGINE COOLANT**

The cooling package shall include Extended Life Coolant (ELC). The use of ELC provides longer intervals between coolant changes over standard coolants providing improved performance. The coolant shall contain a 50/50 mix of ethylene glycol and de-ionized water to keep the coolant from freezing to a temperature of -34 degrees Fahrenheit.

Proposals offering supplemental coolant additives (SCA) shall not be considered, as this is part of the extended life coolant makeup.

## **ELECTRONIC COOLANT LEVEL INDICATOR**

The instrument panel shall feature a low engine coolant indicator light which shall be located in the center of the instrument panel. An audible tone alarm shall also be provided to warn of a low coolant incident.

## **COOLANT HOSES**

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The cooling system hoses shall be silicone heater hose with rubber hoses in the cab interior. The radiator hoses shall be formed silicone coolant hoses with formed aluminized steel tubing. All heater hose, silicone coolant hose, and tubing shall be secured with stainless steel constant torque band clamps.

## **ENGINE AIR INTAKE**

The engine air intake system shall include an ember separator air intake filter which shall be located in the front of the cab behind the right hand side fascia. This filter shall protect the downstream air filter from embers using a combination of unique flat and crimped metal screens constructed into a corrosion resistant steel frame. This multilayered screen shall be designed to trap embers or allow them to burn out before passing through the pack, while creating only minimal air flow restriction through the system. Periodic cleaning or replacement of the screen shall be all that is required after installation.

The engine shall also include an air intake filter which shall be bolted to the frame and located under the front of the cab on the right hand side. The system shall utilize a replaceable dry type filter which ensures dust and debris remains safely contained inside the housing during operation via leak-tight seals. The service cover shall be located on the bottom of the housing, eliminating the chance of contaminating the air intake system during air filter service.

The air flow distribution and dust loading shall be uniform throughout the high-performance filter element, which shall result in pressure differential for improved horsepower and fuel economy. The air intake ember separator shall be mounted within easy access via a hinged panel behind the right hand side headlight module. The air intake system shall include a restriction indicator light in the warning light cluster on the instrument panel, which shall activate when the air cleaner element requires replacement.

## **AIR INTAKE PROTECTION**

A light duty skid plate shall be supplied for the engine air intake system below the right front side of the cab. The skid plate shall provide protection for the air intake system from light impacts, stones, and road debris.

## **ENGINE EXHAUST SYSTEM**

The exhaust system shall include a diesel particulate filter (DPF), a diesel oxidation catalyst, and a selective catalytic reduction catalyst (SCR) to meet current EPA standards. The selective catalytic reduction catalyst utilizes a diesel exhaust fluid solution consisting of urea and purified water to convert NOx into nitrogen, water, and trace amounts of carbon dioxide. The solution shall be injected into the system through the decomposition tube between the DPF and SCR.

The system shall utilize 0.07 inch thick stainless steel exhaust tubing between the engine turbo and the DPF. Zero leak clamps seal all system joints between the turbo and DPF.

The DPF, the decomposition tube, and the SCR canister through the end of the tailpipe shall be connected with zero leak clamps. The discharge shall terminate horizontally on the right side of the vehicle ahead of the rear tires.

The exhaust system shall be mounted below the frame in the inboard position with the SCR canister in line rearward of the DPF.

## **DIESEL EXHAUST FLUID TANK**

The exhaust system shall include a molded cross linked polyethylene tank for Diesel Exhaust Fluid (DEF). The tank shall have a capacity of six (6) usable gallons and shall be mounted on the left hand side of the chassis frame behind the batteries below the frame.



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The DEF tank shall be designed with capacity for expansion in case of fluid freezing. Engine coolant, which shall be thermostatically controlled, shall be run through lines in the tank to help prevent the DEF from freezing and to provide a means of thawing the fluid if it should become frozen.

The tank fill tube shall be routed under the rear of the cab with the fill neck and splash guard accessible in the top rear step.

## **ENGINE EXHAUST ACCESSORIES**

An exhaust temperature mitigation device shall be shipped loose for installation by the body manufacturer on the vehicle. The temperature mitigation device shall lower the temperature of the exhaust by combining ambient air with the exhaust gasses at the exhaust outlet.

## **ENGINE EXHAUST WRAP**

The exhaust tubing between the engine turbo and the diesel particulate filter (DPF) shall be wrapped with a thermal cover in order to retain the necessary heat for DPF regeneration. The exhaust wrap shall also help protect surrounding components from radiant heat which can be transferred from the exhaust.

## **TRANSMISSION**

The drive train shall include an Allison model EVS 3000 torque converting, automatic transmission which shall include electronic controls and an output retarder. The transmission shall feature two (2) 10-bolt PTO pads located on the converter housing.

The transmission shall include two (2) internal oil filters and Castrol TranSynd™ synthetic TES 295 transmission fluid which shall be utilized in the lubrication of the EVS transmission. An electronic oil level sensor shall be included with the readout located in the shift selector.

The transmission gear ratios shall be:

1st	3.49:1
2nd	1.86:1
3rd	1.41:1
4th	1.00:1
5th	0.75:1
6th	0.65:1 (if applicable)
Rev	5.03:1

## **TRANSMISSION MODE PROGRAMMING**

The transmission, upon start-up, will select a six (6) speed operation without the need to press the mode button.

## **TRANSMISSION FEATURE PROGRAMMING**

The Allison Gen V-E transmission EVS group package number 127 shall contain the 227 vocational package in consideration of the duty of this apparatus for rescue. This package shall incorporate an automatic neutral with selector override. This feature commands the transmission to neutral when the park brake is applied, regardless of drive range requested on the shift selector. This requires re-selecting drive range to shift out of neutral for the override.

A transmission interface connector shall be provided in the cab. This package shall contain the following input/output circuits to the transmission control module. The Gen V-E transmission shall include prognostic

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diagnostic capabilities. These capabilities shall include the monitoring of the fluid life, filter change indication, and transmission clutch maintenance.

<u>Function ID</u>	<u>Description</u>	<u>Wire assignment</u>
<b>Inputs</b>		
C	PTO Request	143
F	Aux. Function Range Inhibit (Special)	101/142
<b>Outputs</b>		
G	PTO Enable Output (See Input Function C)	130
S	Neutral Indicator for PTO	145
	Signal Return	103

## **ELECTRONIC TRANSMISSION OIL LEVEL INDICATOR**

The transmission fluid shall be monitored electronically and shall send a signal to activate a warning in the instrument panel when levels fall below normal.

## **TRANSMISSION SHIFT SELECTOR**

An Allison pressure sensitive range selector touch pad shall be provided and located to the right of the driver within clear view and easy reach. The shift selector shall have a graphical Vacuum Florescent Display (VFD) capable of displaying two lines of text. The shift selector shall provide mode indication and a prognostic indicator (wrench symbol) on the digital display. The prognostics monitor various operating parameters and shall alert you when a specific maintenance function is required.

## **TRANSMISSION RETARDER CONTROL**

The Allison transmission retarder shall be engaged with the first one-third at 0% throttle and the remaining two-thirds shall be modulated by brake pedal actuation. The system shall include a retarder on/off virtual button on the Vista display and control screen. The engagement of the retarder shall activate the brake lights. The retarder shall be inactive during pump mode.

## **TRANSMISSION RETARDER CAPACITY LEVEL**

The transmission retarder shall be programmed so the maximum retardation shall be at the high capacity level.

## **TRANSMISSION PRE-SELECT WITH AUXILIARY BRAKE**

When the auxiliary brake is engaged, the transmission shall automatically shift to second gear to decrease the rate of speed assisting the secondary braking system and slowing the vehicle.

## **TRANSMISSION COOLING SYSTEM**

The transmission shall include a water to oil cooler system located in the cooling loop between the radiator and the engine. The transmission cooling system shall meet all transmission manufacturer requirements. The transmission cooling system shall feature continuous flow of engine bypass water to maintain uninterrupted transmission cooling.

## **TRANSMISSION DRAIN PLUG**

The transmission shall include an original equipment manufacturer installed magnetic transmission fluid drain plug.

## **TRANSMISSION WARRANTY**

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The Allison EVS series transmission shall be warranted for a period of five (5) years with unlimited mileage. Parts and labor shall be included in the warranty.

## **PTO LOCATION**

The transmission shall have two (2) power take off (PTO) mounting locations, one (1) in the 8:00 o'clock position and one (1) in the 4:00 o'clock position.

## **DRIVELINE**

All drivelines shall be heavy duty metal tube and equipped with Spicer 1710 series universal joints. The shafts shall be dynamically balanced prior to installation to alleviate future vibration. In areas of the driveline where a slip shaft is required, the splined slip joint shall be coated with Glide Coat®.

## **FUEL FILTER/WATER SEPARATOR**

The fuel system shall have a Fleetguard FS1003 fuel filter/water separator as a primary filter. The fuel filter shall have a drain valve.

A water in fuel sensor shall be provided and wired to an instrument panel lamp and audible alarm to indicate when water is present in the fuel/water separator.

A secondary fuel filter shall be included as approved by the engine manufacturer.

## **FUEL LINES**

The fuel system supply and return lines installed from the fuel tank to the engine shall be black textile braided lines which are reinforced with braided high tensile steel wire. The fuel lines shall be connected with reusable steel fittings.

## **FUEL SHUTOFF VALVE**

A fuel shutoff valve shall be installed in the fuel draw line at the primary fuel filter to allow the fuel filter to be changed without loss of fuel to the fuel pump.

A second fuel shutoff valve shall be installed in the fuel draw line, near the fuel tank to allow maintenance to be performed with minimal loss of fuel.

## **ELECTRIC FUEL PRIMER**

Integral to the engine assembly is an electric lift pump that serves the purpose of pre-filter fuel priming.

## **FUEL COOLER**

An aluminum cross flow air to fuel cooler shall be provided to lower fuel temperature allowing the vehicle to operate at higher ambient temperatures. The fuel cooler shall be located behind the rear axle.

## **FUEL TANK**

The fuel tank shall have a capacity of sixty-eight (68) gallons and shall measure 35.00 inches in width X 17.00 inches in height X 29.00 inches in length. The baffled tank shall be made of 14 gauge aluminized steel. The exterior of the tank shall be painted with a PRP Corsol™ black anti-corrosive exterior metal treatment finish. This results in a tank which offers the internal and external corrosion resistance.

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The tank shall have a vent port to facilitate venting to the top of the fill neck for rapid filling without "blow-back" and a roll over ball check vent for temperature related fuel expansion and draw.

The tank is designed with dual draw tubes and sender flanges. The tank shall have 2.00 inch NPT fill ports for right or left hand fill. A 0.50 inch NPT drain plug shall be centered in the bottom of the tank.

The fuel tank shall be mounted below the frame, behind the rear axle. Two (2) three-piece strap hanger assemblies with "U" straps bolted midway on the fuel tank front and rear shall be utilized to allow the tank to be easily lowered and removed for service purposes. Rubber isolating pads shall be provided between the tank and the upper tank mounting brackets. Strap mounting studs through the rail, hidden behind the body shall not be acceptable.

## **FUEL TANK FILL PORT**

The fuel tank fill ports shall be provided with two (2) left fill ports located one (1) in the forward position and one (1) in the middle position and the right fill port located in the middle position of the fuel tank.

A 1.50 inch diameter hole shall be provided in the left and right frame rails for vent hose routing provisions. The holes shall be located adjacent to the fuel tank and 5.13 inches up from the bottom of each rail.

## **FUEL TANK DRAIN PLUG**

A 0.5 inch NPT drain plug shall be centered in the bottom of the fuel tank.

## **FRONT AXLE**

The front axle shall be a Meritor Easy Steer Non drive front axle, model number MFS-20. The axle shall include a 3.74 inch drop and a 71.00 inch king pin intersection (KPI). The axle shall include a conventional style hub with a standard knuckle. The weight capacity for the axle shall be rated to 21,500 pounds FAWR.

## **FRONT AXLE WARRANTY**

The front axle shall be warranted by Meritor for two (2) years with unlimited miles under the general service application. Details of the Meritor warranty are provided on the PDF document attached to this option.

## **FRONT WHEEL BEARING LUBRICATION**

The front axle wheel bearings shall be lubricated with oil. The oil level can be visually checked via clear inspection windows in the front axle hubs.

## **FRONT SHOCK ABSORBERS**

Two (2) Bilstein inert, nitrogen gas filled heavy duty shock absorbers shall be provided and installed as part of the front suspension system. The shocks shall be a monotubular design and fabricated using a special extrusion method, utilizing a single blank of steel without a welded seam, achieving an extremely tight peak-to-valley tolerance and maintains consistent wall thickness. The monotubular design shall provide superior strength while maximizing heat dissipation and shock life.

The ride afforded through the use of a gas shock is more consistent and shall not deteriorate with heat, the same way a conventional oil filled hydraulic shock would.

The Bilstein front shocks shall include a digressive working piston assembly allowing independent tuning of the compression and rebound damping forces to provide optimum ride and comfort without compromise. The

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working piston design shall feature fewer parts than most conventional twin tube and "road sensing" shock designs and shall contribute to the durability and long life of the Bilstein shock absorbers.

The heavy duty shock absorbers shall be tuned to provide higher damping forces.

Proposals offering the use of conventional twin tube or "road sensing" designed shocks shall not be considered.

## **FRONT SUSPENSION**

The front suspension shall include a nine (9) leaf spring pack in which the longest leaf measures 54.00 inch long and 4.00 inches wide and shall include a military double wrapped front eye. Both spring eyes shall have a case hardened threaded bushing installed with lubrication counter bore and lubrication land off cross bore with grease fitting. The spring capacity shall be rated at 21,500 pounds.

## **STEERING COLUMN/ WHEEL**

The cab shall include a Douglas Autotech steering column which shall include a seven (7) position tilt, a 2.25 inch telescopic adjustment, and an 18.00 inch, four (4) spoke steering wheel located at the driver's position. The steering wheel shall be covered with black polyurethane foam padding.

The steering column shall contain a horn button, self-canceling turn signal switch, four-way hazard switch and headlamp dimmer switch.

## **ELECTRONIC POWER STEERING FLUID LEVEL INDICATOR**

The power steering fluid shall be monitored electronically and shall send a signal to activate an audible alarm and visual warning in the instrument panel when fluid level falls below normal.

## **POWER STEERING PUMP**

The hydraulic power steering pump shall be a TRW PS and shall be gear driven from the engine. The pump shall be a balanced, positive displacement, sliding vane type.

## **FRONT AXLE CRAMP ANGLE**

The chassis shall have a front axle cramp angle of 48-degrees to the left and 44-degrees to the right.

## **POWER STEERING GEAR**

The power steering gear shall be a TRW model TAS 65 with an assist cylinder.

## **CHASSIS ALIGNMENT**

The chassis frame rails shall be measured to insure the length is correct and cross checked to make sure they run parallel and are square to each other. The front and rear axles shall be laser aligned. The front tires and wheels shall be aligned and toe-in set on the front tires by the chassis manufacturer.

## **REAR AXLE**

The rear axle shall be a Meritor model RS-23-186 single drive axle. The axle shall include precision forged, single reduction differential gearing, and shall have a fire service rated capacity of 24,000 pounds.

The axle shall be built of superior construction and quality components to provide the rugged dependability needed to stand up to the fire industry's demands. The axle shall include rectangular shaped, hot-formed

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housing with a standard wall thickness of 0.50 of an inch for extra strength and rigidity and a rigid differential case for high axle strength and reduced maintenance.

The axle shall have heavy-duty Hypoid gearing for longer life, greater strength and quieter operation. Industry-standard wheel ends for compatibility with both disc and drum brakes, and unitized oil seal technology to keep lubricant in and help prevent contaminant damage will be used.

## **REAR AXLE DIFFERENTIAL LUBRICATION**

The rear axle differential shall be lubricated with oil.

## **REAR AXLE WARRANTY**

The rear axle shall be warranted by Meritor for two (2) years with unlimited miles under the general service application. Details of the Meritor warranty are provided on the PDF document attached to this option.

## **REAR WHEEL BEARING LUBRICATION**

The rear axle wheel bearings shall be lubricated with oil.

## **REAR AXLE DIFFERENTIAL CONTROL**

A driver controlled differential lock shall be installed on the rear axle. This feature shall allow the main differential to be locked and unlocked when encountering poor road or highway conditions, where maximum traction is needed, for use at speeds no greater than 25 MPH. The differential lock shall be controlled by a guarded toggle switch located on the switch panel. There shall be an LED indicator light next to the switch in the switch panel to signal positive engagement of the differential control. The switch shall be labeled "do not exceed 25mph rear axle differential is locked."

## **VEHICLE TOP SPEED**

The top speed of the vehicle shall be approximately 65 MPH +/-2 MPH at governed engine RPM.

## **REAR SUSPENSION**

The single rear axle shall feature a Hendrickson Firemaax™ air suspension. The suspension shall include two optimized air springs mounted to cast structural trailing arms, a transverse cross beam for increased roll stability and two heavy duty shock absorbers. Dual air height control valves shall be installed to ensure equal frame height on both sides of the vehicle regardless of the load. Axle alignment is maintained using two eccentric bushings at each frame bracket.

The rear suspension capacity shall be rated at 24,000 pounds.

## **REAR SHOCK ABSORBERS**

Shock absorbers shall be supplied by the suspension manufacturer and installed on the rear axle suspension.

## **FRONT TIRE**

The front tires shall be Michelin 425/65R-22.5 20PR "L" tubeless radial XZY3 mixed service tread.

The front tire stamped load capacity shall be 22,800 pounds per axle with a speed rating of 65 miles per hour when properly inflated to 120 pounds per square inch.

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The Michelin Tire Intermittent Service Rating load capacity shall be 24,400 pounds per axle with a speed rating of 65 miles per hour when properly inflated to 120 pounds per square inch. The Michelin Intermittent Service Rating limits the operation of the emergency vehicle to one (1) hour of loaded travel with a one (1) hour cool down prior to another loaded run.

## **REAR TIRE**

The rear tires shall be Michelin 12R-22.5 16PR "H" tubeless radial XZY3 mixed service tread.

The rear tire stamped load capacity shall be 27,120 pounds per axle with a speed rating of 65 miles per hour when properly inflated to 120 pounds per square inch.

The Michelin Tire Intermittent Service Rating load capacity shall be 28,880 pounds per axle with a speed rating of 75 miles per hour when properly inflated to 120 pounds per square inch. The Michelin Intermittent Service Rating limits the operation of the emergency vehicle to one (1) hour of loaded travel with a one (1) hour cool down prior to another loaded run.

## **REAR AXLE RATIO**

The rear axle ratio shall be 5.63:1.

## **TIRE PRESSURE EQUALIZATION SYSTEM**

There shall be a voucher provided with the chassis for Crossfire dual tire equalization system provided on both sets of dual tires on the rear axle. The Crossfire pressure system shall equalize and monitor tire pressure through the valve which is mounted between the dual tires. This shall bolt easily to the drive axle end allowing air to flow freely from one tire to the other, maintaining equal tire pressure and load distribution. The Crossfire system shall maximize tire life, decrease rolling resistance for increased fuel mileage and improve stability braking and overall safety.

The Crossfire dual tire equalization system shall be redeemed upon the vehicle manufacture's receipt of the voucher along with the vehicle in-service weight for each axle.

## **TIRE PRESSURE INDICATOR**

There shall be a voucher provided with the chassis for a pop up style tire pressure indicator at the front tire valve stem. The indicator shall provide visual indication of pressure in the specific tire.

The tire pressure indicators shall be redeemed upon the vehicle manufacturer's receipt of the voucher for installation by the customer.

## **FRONT WHEEL**

The front wheels shall be Alcoa hub piloted, 22.50 inch X 12.25 inch LvL One™ polished aluminum wheels. The hub piloted mounting system shall provide easy installation and shall include two-piece flange nuts. The wheels shall feature one-piece forged strength and shall include Alcoa's Dura-Bright® finish with XBR technology as an integral part of the wheel surface. Alcoa Dura-Bright® wheels keep their shine without polishing. Brake dust, grime and road debris are easily removed by simply cleaning the wheels with soap and water.

## **REAR WHEEL**

The rear wheels shall be Alcoa hub piloted, 22.50 inch X 8.25 inch LvL One™ aluminum wheels with a polished outer surface and Alcoa Dura-Bright® wheel treatment with XBR® technology as an integral part of the wheel. The hub piloted mounting system shall provide easy installation and shall include two-piece flange nuts.

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## **BALANCE WHEELS AND TIRES**

All of the wheels and tires, including any spare wheels and tire assemblies, shall be dynamically balanced.

## **BRAKE SYSTEM**

A rapid build-up air brake system shall be provided. The air brakes shall include a two (2) air tank, three (3) reservoir system with a total of 4152 cubic inch of air capacity. A floor mounted treadle valve shall be mounted inside the cab for graduated control of applying and releasing the brakes. An inversion valve shall be installed to provide a service brake application in the unlikely event of primary air supply loss. All air reservoirs provided on the chassis shall be labeled for identification.

The rear axle spring brakes shall automatically apply in any situation when the air pressure falls below 25 PSI and shall include a mechanical means for releasing the spring brakes when necessary. An audible alarm shall designate when the system air pressure is below 60 PSI.

A four (4) sensor, four (4) modulator Anti-lock Braking System (ABS) shall be installed on the front and rear axles in order to prevent the brakes from locking or skidding while braking during hard stops or on icy or wet surfaces. This in turn shall allow the driver to maintain steering control under heavy braking and in most instances, shorten the braking distance. The electronic monitoring system shall incorporate diagonal circuitry which shall monitor wheel speed during braking through a sensor and tone ring on each wheel. A dash mounted ABS lamp shall be provided to notify the driver of a system malfunction. The ABS system shall automatically disengage the auxiliary braking system device when required. The speedometer screen shall be capable of reporting all active defaults using PID/SID and FMI standards.

Additional safety shall be accommodated through Automatic Traction Control (ATC) which shall be installed on the single rear axle. The ATC system shall apply the ABS when the drive wheels loose traction. The system shall scale the electronic engine throttle back to prevent wheel spin while accelerating on ice or wet surfaces.

A virtual style switch shall be provided and properly labeled "mud/snow". When the switch is pressed once, the system shall allow a momentary wheel slip to obtain traction under extreme mud and snow conditions. During this condition the ATC light shall blink continuously notifying the driver of activation. Pressing the switch again shall deactivate the mud/snow feature.

The Electronic Stability Control (ESC) unit is a functional extension of the electronic braking system. It is able to detect any skidding of the vehicle about its vertical axis as well as any rollover tendency. The control unit comprises an angular-speed sensor that measures the vehicle's motion about the vertical axis, caused, for instance, by cornering or by skidding on a slippery road surface. An acceleration sensor measures the vehicle's lateral acceleration. The Controller Area Network (CAN) bus provides information on the steering angle. On the basis of lateral acceleration and steering angle, an integrated microcontroller calculates a theoretical angular speed for the stable vehicle condition.

## **FRONT BRAKES**

The front brakes shall be Meritor EX225 Disc Plus disc brakes with 17.00 inch vented rotors.

## **REAR BRAKES**

The rear brakes shall be Meritor 16.50 inch X 7.00 inch S-cam drum type.

## **PARK BRAKE**



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Upon application of the push-pull valve in the cab, the rear brakes will engage via mechanical spring force. This is accomplished by dual chamber rear brakes, satisfying the FMVSS parking brake requirements.

In addition to the mechanical rear brake engagement, the front service brakes will also engage via air pressure, providing additional braking capability.

## **PARK BRAKE CONTROL**

A Meritor-Wabco manual hand control push-pull style valve shall operate the parking brake system. The control shall be yellow in color.

The parking brake actuation valve shall be mounted in the switch panel. A horizontal orientation guard shall be installed over the parking brake control to prevent accidental application or release.

## **REAR BRAKE SLACK ADJUSTERS**

The rear brakes shall include Meritor automatic slack adjusters installed on the axle which features a simple, durable design offering reduced weight. The automatic slack adjusters shall feature a manual adjusting nut which cannot inadvertently be backed off and threaded grease fittings for easy serviceability.

## **AIR DRYER**

The brake system shall include a Wabco System Saver 1200 air dryer with an integral heater with a Metri-Pack sealed connector. The air dryer incorporates an internal turbo cutoff valve that closes the path between the air compressor and air dryer purge valve during the compressor "unload" cycle. The turbo cutoff valve allows purging of moisture and contaminants without the loss of turbo boost pressure. The air dryer shall be mounted behind the battery box on the left hand side.

## **FRONT BRAKE CHAMBERS**

The front brakes shall be provided with MGM type 24 long stroke brake chambers.

## **REAR BRAKE CHAMBERS**

The rear axle shall include TSE 30/30 H.O.T. (High Output Technology) brake chambers shall convert the energy of compressed air into mechanical force and motion. This shall actuate the brake camshaft, which in turn shall operate the foundational brake mechanism forcing the brake shoes against the brake drum. The TSE 30/30 H.O.T. chambers are designed to provide the same performance as 30/36 chambers in a smaller package.

## **AIR COMPRESSOR**

The air compressor provided for the engine shall be a Wabco® SS318 single cylinder pass-through drive type compressor which shall be capable of producing 18.7 CFM at 1200 engine RPMs. The air compressor shall feature a higher delivery efficiency translating to more air delivery per horsepower absorbed. The compressor shall include an aluminum cylinder head which shall improve cooling, reduce weight and decrease carbon formation. Superior piston and bore finishing technology shall reduce oil consumption and significantly increasing the system component life.

## **AIR GOVERNOR**

An air governor shall be provided to control the cut-in and cut-out pressures of the engine mounted air compressor. The governor shall be calibrated to meet FMVSS requirements. The air governor shall be located on the air dryer bracket on the left frame rail behind the battery box.

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## **AUXILIARY AIR RESERVOIR**

One (1) auxiliary air reservoir with a 2084 cubic inch capacity shall be installed on the chassis to act as an additional reserve supply to the air system for air horn, air tool, or other non-service brake use. The reservoir shall be isolated with a 90 PSI pressure protection valve on the reservoir supply side to prevent depletion of the air to the air brake system.

## **MOISTURE EJECTORS**

Automatic moisture ejectors with a manual drain provision shall be installed on all reservoirs of the air supply system. The manual drain provision shall include an actuation pull cable coiled and tied at each drain valve. The supplied cables when extended shall be sufficient in length to allow each drain to be activated from the side of the apparatus.

## **AIR SUPPLY LINES**

The air system on the chassis shall be plumbed with black textile braid covered high tensile steel reinforced wire braided hose with steel reusable fittings. All drop hoses shall be fiber reinforced neoprene covered hose.

## **AIR INLET CONNECTION**

A Kussmaul air automatic eject connection for the shoreline air inlet shall be supplied.

## **AIR INLET/ AUTO EJECT CONNECTION COVER**

The air auto eject connection shall be red in color.

## **AIR INLET LOCATION**

The air inlet shall be installed on the left hand side of the cab above the wheel well in the forward position.

## **PLUMBING AIR INLET CONNECTION**

The air inlet connector shall be plumbed to the air system with a check valve to prevent air from escaping through the inlet connector.

## **AIR INLET/ OUTLET FITTING TYPE**

The air connector supplied shall be a 0.25 inch size Tru-Flate Interchange style manual connection which is compatible with Milton 'T' style, Myers 0.25 inch Automotive style and Parker 0.25 inch 10 Series connectors.

## **AIR TANK SPACERS**

There shall be spacers included with the air tank mounting. The spacers shall move the air tanks 1.50 inches inward towards the center of the chassis. This shall provide clearance between the air tanks and the frame for body U-bolt clearance.

## **REAR AIR TANK MOUNTING**

If a combination of wheel base, air tank quantity, or other requirements necessitate the location of one or more air tanks to be mounted rear of the fuel tank, these tank(s) will be mounted perpendicular to frame.

## **WHEELBASE**

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The chassis wheelbase shall be 224.5 inches.

## **REAR OVERHANG**

The chassis rear overhang shall be 86.00 inches.

## **FRAME**

The frame shall consist of single rails running parallel to each other with cross members forming a ladder style frame. The frame rails shall be formed in the shape of a "C" channel, 10.25 inch web X 3.50 inches deep upper and lower flanges X 0.38 inches thick. Each rail shall be constructed of 110,000 psi minimum yield high strength low alloy steel. Each single rail shall be rated by a Resistance Bending Moment (RBM) minimum of 1,830,400 inch pounds and have a minimum section modulus of 16.64 cubic inches calculated by the radius method. The frame shall measure 35.00 inches in width.

Proposals calculating the frame strength using the "box method" shall not be considered.

Proposals including heat treated rails shall not be considered. Heat treating frame rails produces rails that are not uniform in their mechanical properties throughout the length of the rail. Rails made of high strength, low alloy steel are already at the required yield strength prior to forming the rail.

A minimum of seven (7) fully gusseted 0.25 inch thick cross members shall be installed. The inclusion of the body mounting, or bumper mounting shall not be considered as a cross member. The cross members and front and rear spring hangers shall be attached using Huck spin round collar fasteners where space permits. Grade 8 flanged head bolts and distorted thread flanged lock nuts shall be used on those components that must be removed for general maintenance or normal repair. Each cross member shall be mounted to the frame rails utilizing a minimum of 0.25 inch thick gusset reinforcement plates at all corners balancing the area of force throughout the entire frame.

Any proposals not including additional reinforcement for each cross member shall not be considered.

All relief areas shall be cut in with a minimum 2.00 inch radius at intersection points with the edges ground to a smooth finish to prevent a stress concentration point.

The frame and cross members shall carry a lifetime warranty to the original purchaser. A copy of the frame warranty shall accompany the bid.

Proposals offering warranties for frames not including cross members shall not be considered.

## **FRAME WARRANTY**

Summary of Warranty Terms:

THE FOLLOWING IS SUMMARY OF WARRANTY TERMS FOR INFORMATION ONLY. THE ACTUAL LIMITED WARRANTY DOCUMENT, WHICH IS ATTACHED TO THIS OPTION, CONTAINS THE COMPLETE STATEMENT OF THE SPARTAN CHASSIS, INC. LIMITED WARRANTY. SPARTAN'S RESPONSIBILITY IS TO BE ACCORDING TO THE TERMS OF THE COMPLETE LIMITED WARRANTY DOCUMENT.

The frame and cross members shall carry a limited lifetime warranty to the original purchaser. The warranty period shall commence on the date the vehicle is delivered to the first end user.

## **FRAME CLEAR AREA**

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The chassis frame shall be left clear of chassis mounted components inside or outside the frame rails within the first 30.00 inches behind the cab to allow space for OEM installed components. Cross members may be installed in the clear area if required for proper frame or driveline configuration.

## **FRAME PAINT**

The frame shall be powder coated black prior to any attachment of components.

All powder coatings, primers and paint shall be compatible with all metals, pretreatments and primers used. The cross hatch adhesion test per ASTM D3359 shall not have a fail of more than ten (10) squares. The pencil hardness test per ASTM D3363 shall have a final post-cured pencil hardness of H-2H. The direct impact resistance test per ASTM D2794 shall have an impact resistance of 120.00 inches per pound at 2 mils.

Any proposals offering painted frame with variations from the above process shall not be accepted. The film thickness of vendor supplied parts shall also be sufficient to meet the performance standards as stated above.

## **FRONT BUMPER**

The chassis shall include a special approach style steel front bumper. The bumper shall be constructed of 0.19 inch thick ASTM A-36 formed steel which shall be painted. The bumper shall be 98.63 inches in width with angled corners. The bottom flange of the bumper shall be designed with a 20-degree angle to allow for an increased angle of approach for the vehicle.

## **FRONT BUMPER EXTENSION LENGTH**

The front bumper shall be extended approximately 21.00 inches ahead of the cab.

## **FRONT BUMPER EXTENSION FRAME WIDTH**

The front bumper extension frame shall feature an overall width of 48.25 inches.

## **FRONT BUMPER PAINT**

The front bumper shall be painted the same as the lower cab color.

## **FRONT BUMPER APRON**

The 21.00 inch extended front bumper shall include an apron constructed of 0.19 inch thick embossed aluminum tread plate.

The apron shall be installed between the bumper and the front face of the cab affixed using stainless steel bolts attaching the apron to the top bumper flange.

## **MECHANICAL SIREN**

The front bumper shall include an electro mechanical Federal Q2B™ siren, which shall be streamlined, chrome-plated and shall produce 123 decibels of sound at 10.00 feet. The Q2B™ siren produces a distinctive warning sound that is recognizable at long distances. A unique clutch design provides a longer coast down sound while reducing the amp draw to 100 amps. The siren shall measure 10.50 inches wide X 10.00 inches high X 14.00 inches deep. The siren shall include mounting hardware designed to recess or flush mount.

## **MECHANICAL SIREN LOCATION**

The siren shall be recess mounted on the driver side of the front fascia of the bumper, in the outboard position.

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## **AIR HORN**

The chassis shall include two (2) Grover brand Stutter Tone air horns which shall measure 24.50 inches long with a 6.00 inch round flare. The air horns shall be trumpet style with a chrome finish.

## **AIR HORN LOCATION**

The air horns shall be recess mounted in the front bumper face, one (1) on the right side of the bumper in the inboard position relative to the right hand frame rail and one (1) on the left side of the bumper in the inboard position relative to the left hand frame rail.

## **AIR HORN RESERVOIR**

One (1) air reservoir, with a 2084 cubic inch capacity, shall be installed on the chassis to act as a supply tank for operating air horns. The reservoir shall be isolated with a 90 PSI pressure protection valve on the reservoir supply side to prevent depletion of the air to the air brake system.

## **ELECTRONIC SIREN SPEAKER**

There shall be one (1) Federal Signal model BP200-EF, 200 watt speaker provided. The speaker shall measure 5.50 inches tall X 7.70 inches wide X 7.80 inches deep. The speaker shall include a Federal Signal "Electric F" style grille which shall measure 6.61 inches tall X 6.78 inches wide.

## **ELECTRONIC SIREN SPEAKER LOCATION**

The electronic siren speaker shall be located on the front bumper face on the right side outboard of the frame rail in the far outboard position.

## **FRONT BUMPER TOW EYES**

The bumper shall include two (2) painted tow eyes shall be installed through the front bumper. The tow eyes shall be fabricated from 0.75 inch thick #1020 ASTM-36 hot rolled steel. The inside diameter of the tow eye shall be 2.00 inch and have a chamfered edge. The tow eyes shall be painted the same as the lower cab color.

## **CAB TILT SYSTEM**

The entire cab shall be capable of tilting approximately 45-degrees to allow for easy maintenance of the engine and transmission. The cab tilt pump assembly shall be located on the right side of the chassis above the battery box.

The electric-over-hydraulic lift system shall include an ignition interlock and red cab lock down indicator lamp on the tilt control which shall illuminate when holding the "Down" button to indicate safe road operation.

It shall be necessary to activate the master battery switch and set the parking brake in order to tilt the cab. As a third precaution the ignition switch must be turned off to complete the cab tilt interlock safety circuit.

Two (2) spring-loaded hydraulic hold down hooks located outboard of the frame shall be installed to hold the cab securely to the frame. Once the hold-down hooks are set in place, it shall take the application of pressure from the hydraulic cab tilt lift pump to release the hooks.

Two (2) cab tilt cylinders shall be provided with velocity fuses in each cylinder port. The cab tilt pivots shall be 1.90 inch ball and be anchored to frame brackets with 1.25 inch diameter studs.

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A steel safety channel assembly, painted safety yellow shall be installed on the right side cab lift cylinder to prevent accidental cab lowering. The safety channel assembly shall fall over the lift cylinder when the cab is in the fully tilted position. A cable release system shall also be provided to retract the safety channel assembly from the lift cylinder to allow the lowering of the cab.

## **CAB TILT AUXILIARY PUMP**

A manual cab tilt pump module shall be attached to the cab tilt pump housing.

## **CAB TILT CONTROL RECEPTACLE**

The cab tilt control cable shall include a receptacle which shall be temporarily located on the right hand chassis rail rear of the cab to provide a place to plug in the cab tilt remote control pendant. The tilt pump shall include 8.00 feet of cable with a six (6) pin Deutsch receptacle with a cap.

The remote control pendant shall include 20.00 feet of cable with a mating Deutsch connector. The remote control pendant shall be shipped loose with the chassis.

## **CAB WINDSHIELD**

The cab windshield shall have a surface area of 2825.00 square inches and be of a two (2) piece wraparound design for maximum visibility.

The glass utilized for the windshield shall include standard automotive tint. The left and right windshield shall be fully interchangeable thereby minimizing stocking and replacement costs.

Each windshield shall be installed using black self locking window rubber.

## **GLASS FRONT DOOR**

The front cab doors shall include a window which is 27.00 inches in width X 26.00 inches in height. These windows shall have the capability to roll down completely into the door housing. This shall be accomplished using electric actuation. The left and right front door windows shall be controlled using a switch on each respective side inner door panel. The driver's door shall include a switch for each powered door window in the cab.

There shall be an irregular shaped fixed window which shall measure 2.50 inches wide at the top, 8.00 inches wide at the bottom X 26.00 inches in height, more commonly known as "cozy glass" ahead of the front door roll down windows.

The windows shall be mounted within the frame of the front doors trimmed with a black anodized ring on the exterior.

## **GLASS TINT FRONT DOOR**

The windows located in the left and right front doors shall include a dark gray automotive tint which shall allow forty-five percent (45%) light transmittance. The dark tint shall aid in cab cooling and help protect passengers from radiant solar energy.

## **GLASS REAR DOOR RH**

The rear right hand side crew door shall include a window which is 27.00 inches in width X 26.00 inches in height. The window shall be a powered type and shall be controlled by a switch on the inner door panel and on the driver's control panel.

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## **GLASS TINT REAR DOOR RIGHT HAND**

The window located in the right hand side rear window shall include a dark gray automotive tint which shall allow forty-five percent (45%) light transmittance. The dark tint shall aid in cab cooling and help protect passengers from radiant solar energy.

## **GLASS REAR DOOR LH**

The rear left hand side crew door shall include a window which is 27.00 inches in width X 26.00 inches in height. The window shall be a powered type and shall be controlled by a switch on the inner door panel and on the driver's control panel.

## **GLASS TINT REAR DOOR LEFT HAND**

The window located in the left hand side rear door shall include a dark gray automotive tint which shall allow forty-five percent (45%) light transmittance. The dark tint shall aid in cab cooling and help protect passengers from radiant solar energy.

## **CLIMATE CONTROL**

The cab shall include a 57,500 BTU @ 425 CFM front overhead heater/defroster which shall be provided and installed above the windshield between the sun visors.

The cab shall also include a combination heater air-conditioning unit mounted on the engine tunnel. This unit shall offer eight (8) adjustable louvers, four (4) forward facing and four (4) rearward facing, a temperature control valve and two (2) blowers offering three (3) speeds which shall be capable of circulating 550 cubic feet of air per minute. The unit shall be rated for 42,500 BTU/Hr of cooling and 36,000 BTU/Hr of heating. The temperature and blower controls shall be located on the heater/air conditioning unit.

All defrost/heating systems shall be plumbed with one (1) seasonal shut-off valve at the front corner on the right side of the cab.

The air conditioner lines shall be a mixture of custom bend zinc coated steel fittings and Aero-quip GH 134 flexible hose with Aero-quip EZ clip fittings.

The air conditioner will be mounted to a riser that raises the unit 4", similar to SO#78517 (except only 4" in lieu of 6").

## **CLIMATE CONTROL DRAIN**

The climate control system shall include a gravity drain for water management. The gravity drain shall remove condensation from the air conditioning system without additional mechanical assistance.

## **CLIMATE CONTROL ACTIVATION**

The heating and defrosting controls shall be located on the front overhead climate control unit. There shall be additional heating and air conditioning controls located on the engine tunnel mounted climate control unit.

## **A/C CONDENSER LOCATION**

A roof mounted A/C condenser shall be installed centered on the cab forward of the raised roof against the slope rise.

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## **A/C COMPRESSOR**

The air-conditioning compressor shall be a belt driven, engine mounted, open type compressor that shall be capable of producing a minimum of 32,000 BTU at 1500 engine RPMs. The compressor shall utilize R-134A refrigerant and PAG oil.

## **CAB CIRCULATION FANS MID**

The cab shall be provided with four (4) individually switched all metal construction 6.00 inch fans. The fans shall be installed in the crew area just behind the front doors approximately 9.00 inches inboard. The multi-purpose fans can be used for air circulation or to help defog windows.

The fans will be mounted to match SO#78517.

## **UNDER CAB INSULATION**

The underside of the cab tunnel surrounding the engine and the underside of the entire cab floor shall be lined with multi-layer insulation, engineered for application inside diesel engine compartments. In addition, the insulation on the underside of the cab floor shall have an expanded metal overlay to assist in retaining the insulation tight against the cab and the insulation inside the tunnel shall have a removable aluminum overlay installed to protect the insulation and assist in retaining the insulation tight against the engine tunnel surfaces.

The insulation shall act as a noise barrier, absorbing noise thus keeping the decibel level in the cab well within NFPA recommendations. As an additional benefit, the insulation shall assist in sustaining the desired temperature within the cab interior.

The engine tunnel insulation shall measure approximately 0.75 inch thick including a vertically lapped polyester fiber layer, a 1.0 lb/ft<sup>2</sup> PVC barrier layer, an open cell foam layer, and a moisture and heat reflective foil facing reinforced with a woven fiberglass layer. The foil surface acts as protection against moisture and other contaminants. The insulation shall meet or exceed FMVSS 302 flammability test.

The cab floor insulation shall measure 0.56 inch thick including a 1.0#/sf PVC barrier and a moisture and heat reflective foil facing, reinforced with fiberglass strands. The foil surface acts as protection against moisture and other contaminants. The insulation shall meet or exceed FMVSS 302 flammability test.

The insulation shall be cut precisely to fit each section and sealed for additional heat and sound deflection. The insulation shall be held in place by 3 mils of acrylic pressure sensitive adhesive and aluminum pins with hard hat, hold in place fastening heads.

## **INTERIOR TRIM FLOOR**

The floor of the cab shall be covered with a multi-layer mat consisting of 0.25 inch thick sound absorbing closed cell foam with a 0.06 inch thick non-slip vinyl surface with a pebble grain finish. The covering shall be held in place by a pressure sensitive adhesive and embossed treadplate trim that shall wrap 2" horizontally and vertically. All exposed seams shall be sealed with silicone caulk matching the color of the floor mat to reduce the chance of moisture and debris retention.

The floor shall have an overlay of 3003-H22 aluminum embossed tread plate which is 0.08 inches thick. The tread plate shall be held down with screws and embossed treadplate trim molding.

## **INTERIOR TRIM**



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The cab interior shall include trim on the front ceiling, rear crew ceiling, and the cab walls. It shall be easily removable to assist in maintenance. The trim shall be constructed of insulated vinyl over a hard board backing.

## **REAR WALL INTERIOR TRIM**

The rear wall of the cab shall be trimmed with vinyl.

## **HEADER TRIM**

The cab interior shall feature header trim over the driver and officer dash constructed of 5052-H32 Marine Grade, 0.13 inch thick aluminum.

## **TRIM CENTER DASH**

The main center dash area shall be constructed of 5052-H32 Marine Grade, 0.13 inch thick aluminum plate. There shall be four (4) holes located on the top of the dash near each outer edge of the electrical access cover for ventilation.

## **TRIM LH DASH**

The left hand dash shall be constructed of 5052-H32 Marine Grade, 0.13 inch thick aluminum plate for a perfect fit around the instrument panel. For increased occupant protection the extreme duty left hand dash utilizes patent pending break away technology to reduce rigidity in the event of a frontal crash. The left hand dash shall offer lower vertical surface area to the left and right of the steering column to accommodate control panels.

## **TRIM RH DASH**

The right hand dash shall be constructed of 5052-H32 Marine Grade, 0.13 of an inch thick aluminum plate and shall include a glove compartment with a hinged door and a Mobile Data Terminal (MDT) provision. The glove compartment size will measure 14.00 inches wide X 6.38 inches high X 5.88 inches deep. The MDT provision shall be provided above the glove compartment.

## **ENGINE TUNNEL TRIM**

The cab engine tunnel shall be covered with a multi-layer mat consisting of 0.25 inch closed cell foam with a 0.06 inch thick non-slip vinyl surface with a pebble grain finish. The mat shall be held in place by pressure sensitive adhesive. The engine tunnel mat shall be trimmed with anodized aluminum stair nosing trim for an aesthetically pleasing appearance.

## **POWER POINT DASH MOUNT**

The cab shall include one (1) 12 volt cigarette lighter type receptacle in the cab dash to provide a power source for 12 volt electrical equipment. The cab shall also include two (2) universal serial bus (USB) charging receptacles in the cab dash to provide a power source for USB chargeable electrical equipment. Each USB port shall be capable of a 5 Volt-500 milliampere output. The receptacles shall be wired battery direct.

## **STEP TRIM**

Each cab entry door shall include a three step entry. The first step closest to the ground shall be constructed of polished 5032 H32 aluminum Grip Strut® grating with angled outer corners. The grating shall allow water and other debris to flow through rather than becoming trapped within the stepping surface. The lower step shall be mounted to a frame which is integral with the construction of the cab for rigidity and strength. The middle step shall be integral with the cab construction and shall be trimmed in 0.13 inch thick aluminum with a Mebac® grit surface.

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## **STEP TRIM KICKPLATE**

The cab steps shall include a kick plate in the rise of each step. The risers shall be trimmed in 3003-H22 bright aluminum tread-plate which is 0.07 inch thick.

## **UNDER CAB ACCESS DOOR**

The cab shall include an access door in the left crew step riser constructed of aluminum tread plate with a push and turn latch. The under cab access door shall provide access to the diesel exhaust fluid fill.

## **INTERIOR DOOR TRIM**

The interior trim on the doors of the cab shall consist of an aluminum panel constructed of Marine Grade 5052-H32 0.13 of an inch thick aluminum plate. The door panels shall include a painted finish.

## **CAB DOOR TRIM REFLECTIVE**

In accordance with the current standards of NFPA, the body builder shall provide 96.00 square inches of reflective material on the interior of each cab door.

## **INTERIOR GRAB HANDLE "A" PILLAR**

There shall be two (2) rubber covered 11.00 inch grab handles installed inside the cab, one on each "A" post at the left and right door openings. The left handle shall be located 7.88 inches above the bottom of the door window opening and the right handle shall be located 2.88 inches above the bottom of the door window opening. The handles shall assist personnel in entering and exiting the cab.

## **INTERIOR GRAB HANDLE FRONT DOOR**

Each front door shall include one (1) ergonomically contoured 9.00 inch cast aluminum vertical grab handle which shall be located outboard of the paddle latch at the center of the door panel. The handle shall feature a textured, black powder coated finish to assist personnel entering and exiting the cab.

## **INTERIOR GRAB HANDLE REAR DOOR**

A black powder coated cast aluminum assist handle shall be provided on the inside of each rear crew door. A 30.00 inch long handle shall extend horizontally the width of the window just above the window sill. The handle shall assist personnel in exiting and entering the cab.

## **ADDITIONAL INTERIOR GRAB HANDLE REAR DOOR**

Each interior rear door shall include an additional grab handle. The handle shall be an ergonomically contoured 9.00 inch long cast aluminum grab handle. Each handle shall be mounted vertically in the upper forward most portion of the interior door trim panel. Each handle shall be textured and feature a black powder coat finish and shall assist personnel entering and exiting the cab.

## **INTERIOR SOFT TRIM COLOR**

The cab interior soft trim surfaces shall be gray in color.

## **INTERIOR TRIM SUN VISOR**

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The header shall include two (2) sun visors, one (1) on each side forward of the driver and officer seating positions above the windshield. The sun visors shall be constructed of impact resistant, transparent acrylic polycarbonate sun visors with a smoke gray tint.

The see thru visors are designed for maximum flexibility of positioning utilizing an arm with virtually unlimited adjustability with lateral travel of the tinted visor at the end of the arm which can be locked in place by a thumbscrew.

The visors are easily adjusted and can be placed into a chosen position with one hand. The sun visors will help protect vehicle occupants from solar glare without obscuring their vision.

## **INTERIOR FLOOR MAT COLOR**

The cab interior floor mat shall be gray in color.

## **CAB PAINT INTERIOR**

The inner door panel surfaces shall be coated with Spar-Liner medium gray pebble-grain texture finish.

## **HEADER TRIM INTERIOR PAINT**

The metal surfaces in the header area shall be coated with medium gray Spar-Liner.

## **TRIM CENTER DASH INTERIOR PAINT**

The entire center dash shall be coated with medium gray Spar-Liner. Any accessory pods attached to the dash shall also be coated with this material.

## **TRIM LEFT HAND DASH INTERIOR PAINT**

The left hand dash shall be coated with medium gray Spar-Liner.

## **TRIM RIGHT HAND DASH INTERIOR PAINT**

The right hand dash shall be coated with medium gray Spar-Liner.

## **DASH PANEL GROUP**

The main center dash area shall include three (3) removable panels located one (1) to the right of the driver position, one (1) in the center of the dash and one (1) to the left of the officer position. The center panel shall be a textured aluminum panel within comfortable reach of both the driver and officer.

## **SWITCHES CENTER PANEL**

The center dash panel shall include no rocker switches or legends.

## **SWITCHES LEFT PANEL**

The left dash panel shall include one (1) windshield wiper/washer control switch located in the left hand side of the panel. The switch shall have backlighting provided.

## **SWITCHES RIGHT PANEL**

The right dash panel shall six (6) rocker switch positions in a three (3) over three (3) switch configuration.

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A rocker switch with a blank legend installed directly above shall be provided for any position without a switch and legend designated by a specific option. The non-specified switches shall be two-position, black switches with a green indicator light. Each blank switch legend can be custom engraved by the body manufacturer. All switch legends shall have backlighting provided.

## **SEAT BELT WARNING**

A Weldon seat belt warning system, integrated with the Vehicle Data Recorder system, shall be installed for each seat within the cab. The system shall provide a visual warning indicator in the Vista display and control screen(s), an indicator light in the instrument panel, and an audible alarm.

The warning system shall activate when any seat is occupied with a minimum of 60 pounds, the corresponding seat belt remains unfastened, and the park brake is released. The warning system shall also activate when any seat is occupied, the corresponding seat belt was fastened in an incorrect sequence, and the park brake is released. Once activated, the visual indicators and audible alarm shall remain active until all occupied seats have the seat belts fastened.

## **SEAT MATERIAL**

The seats shall include a covering of high strength, wear resistant fabric made of durable ballistic polyester. A PVC coating shall be bonded to the back side of the material to help protect the seats from UV rays and from being saturated or contaminated by fluids. Common trade names for this material are Imperial 1200 and Durawear.

## **SEAT COLOR**

All seats supplied with the chassis shall be gray in color. All seats shall include red seat belts.

## **SEAT BACK LOGO**

The seat backs shall include the logo for the San Marcos Fire Department. The logo shall be centered on the standard headrest of the seat back and on the left side of a split headrest.

## **SEAT DRIVER**

The driver's seat shall be an H.O. Bostrom Sierra model seat with air suspension. The four-way seat shall feature 3.00 inch vertical travel air suspension and manual fore and aft adjustment with 5.00 inches of travel. The suspension control shall be located on the seat below the left front corner of the bottom cushion. The seat shall also feature integral springs to isolate shock.

The seat position shall include a three-point shoulder harness with lap belt and an automatic retractor attached to the cab. The buckle portion of the seat belt shall be mounted on a semi-rigid stalk extending from the seat base within easy reach of the occupant.

The minimum vertical dimension from the seat H-point to the ceiling for this belted seating position shall be 37.00 inches measured with the seat suspension height adjusted to the upper limit of its travel.

This model of seat shall have successfully completed the static load tests set forth by FMVSS 207, 209, and 210 in effect at the time of manufacture. This testing shall include a simultaneous forward load of 3000 pounds each on the lap and shoulder belts and twenty (20) times the weight through the center of gravity.

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The materials used in construction of the seat shall also have successfully completed testing with regard to the flammability of materials used in the occupant compartments of motor vehicles as outlined in FMVSS 302, of which dictates the allowable burning rate of materials in the occupant compartments of motor vehicles.

## **SEAT BACK DRIVER**

The driver's seat shall feature a two (2) way adjustable lumbar support and offer an infinite fully reclining adjustable titling seat back. The seat back shall also feature a contoured head rest.

## **SEAT MOUNTING DRIVER**

The driver's seat shall be installed in an ergonomic position in relation to the cab dash.

## **OCCUPANT PROTECTION DRIVER**

The driver's position shall be equipped with the Advanced Protection System™ (APS). The APS shall selectively deploy integrated systems to protect against injuries in qualifying frontal impact, side impact, and rollover events. The increase in survivable space and security of the APS shall also provide ejection mitigation protection.

The driver's seating area APS shall include:

- Advanced seat belt system - retractor pre-tensioner tightens the seat belt around the driver, securing the occupant in the seat and the load limiter plays out some of the seat belt webbing to reduce seat belt to chest and torso force upon impact as well as mitigate head and neck injuries.
- Large side curtain airbag - protects the driver's head, neck, and upper body from dangerous cab side surfaces and contact points with intrusive surfaces as a result of a collision as well as provides ejection mitigation protection to the driver in a qualifying event by covering the window and the upper portion of the door.
- Dual knee airbags (patent pending) with energy management mounting (patent pending) - protects the driver's lower body from dangerous surface contact injuries, acceleration injuries, and from intrusion as well as locks the lower body in place so the upper body shall be slowed by the load limiting seat belt.

Steering wheel airbag - protects the driver's head, neck, and upper torso from contact injuries, acceleration injuries, and contact points with intrusive surfaces as a result of a collision.

## **SEAT OFFICER**

The officer's seat shall be an H.O. Bostrom Sierra model seat with air suspension. The four-way seat shall feature 3.00 inch vertical travel air suspension and manual fore and aft adjustment with 5.00 inches of travel. The suspension control shall be located on the seat below the left front corner of the bottom cushion. The seat shall also feature integral springs to isolate shock.

The seat position shall include a three-point shoulder harness with lap belt and an automatic retractor attached to the cab. The buckle portion of the seat belt shall be mounted on a semi-rigid stalk extending from the seat base within easy reach of the occupant.

The minimum vertical dimension from the seat H-point to the ceiling for this belted seating position shall be 37.00 inches measured with the seat suspension height adjusted to the upper limit of its travel.

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This model of seat shall have successfully completed the static load tests set forth by FMVSS 207, 209, and 210 in effect at the time of manufacture. This testing shall include a simultaneous forward load of 3000 pounds each on the lap and shoulder belts and twenty (20) times the weight through the center of gravity.

The materials used in construction of the seat shall also have successfully completed testing with regard to the flammability of materials used in the occupant compartments of motor vehicles as outlined in FMVSS 302, of which dictates the allowable burning rate of materials in the occupant compartments of motor vehicles.

## **SEAT BACK OFFICER**

The officer's seat back shall include an IMMI brand SmartDock® Gen 2 hands-free self contained breathing apparatus (SCBA) holder. The hands-free holder shall meet NFPA 1901-03 9G dynamic requirements for cylinder restraint systems for use in crew compartments of emergency response vehicles. The bracket shall accommodate and secure most types of self-contained breathing apparatus cylinders.

The hands-free holder shall consist of a back plate, bottom cradle, non-marring top claws, and claw height adjustment knob. The height adjustment knob shall allow for easy adjustment of the claws to the SCBA. The hands-free holder's claws shall lock from inertial forces to prevent the SCBA from becoming a projectile in the event of a crash to meet the NFPA 1901-03 standard for SCBA retention. The SCBA holder shall offer single-motion insertion into the claws and hands-free release when the SCBA fitted seat occupant rises.

The seat back shall include a removable padded cover which shall be provided over the SCBA cavity.

## **SEAT MOUNTING OFFICER**

The officer's seat shall offer a special mounting position which is 2.00 inches rearward of the standard location offering increased leg room for the occupant.

## **OCCUPANT PROTECTION OFFICER**

The officer's position shall be equipped with the Advanced Protection System™ (APS). The APS shall selectively deploy integrated systems to protect against injuries in qualifying frontal impact, side impact, and rollover events. The increase in survivable space and security of the APS shall also provide ejection mitigation protection.

The officer's seating area APS shall include:

- Advanced seat belt system - retractor pre-tensioner tightens the seat belt around the officer, securing the occupant in the seat and the load limiter plays out some of the seat belt webbing to reduce seat belt to chest and torso force upon impact as well as mitigate head and neck injuries.
- Large side curtain airbag - protects the officer's head, neck, and upper body from dangerous cab side surfaces and contact points with intrusive surfaces as a result of a collision as well as provides ejection mitigation protection to the officer in a qualifying event by covering the window and the upper portion of the door.

Knee airbags - protects the officer's lower body from dangerous surface contact injuries, acceleration injuries, and from contact points with intrusive surfaces as a result of a collision as well as locks the lower body in place so the upper body shall be slowed by the load limiting seat belt.

## **SEAT BELT ORIENTATION CREW**

The crew position seat belts shall follow the standard orientation which extends from the outboard shoulder extending to the inboard hip.

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## **SEAT FORWARD FACING OUTER LOCATION**

The crew area shall include two (2) forward facing outboard seats, which include one (1) located next to the outer wall of the cab on the left side of the cab and one (1) located next to the outer wall on the right side of the cab.

## **SEAT CREW FORWARD FACING OUTER**

The crew area shall include a seat in the forward facing outer position which shall be a H.O. Bostrom Firefighter series. The seat shall feature a tapered and padded seat back and cushion.

The seat shall feature an all belts to seat (ABTS) style of safety restraint. The ABTS feature shall include a three-point shoulder harness with the lap belt and automatic retractor as an integral part of the seat assembly. The buckle portion of the seat belt shall extend from the seat base towards the driver position within easy reach of the occupant.

The minimum vertical dimension from the seat H-point to the ceiling for each belted seating position shall be 35.00 inches.

This model of seat shall have successfully completed the static load tests by FMVSS 207/210. This testing shall include a simultaneous forward load of 3000 pounds each on the lap and shoulder belts and twenty (20) times the weight through the center of gravity. This model of seat installed in the cab model, as specified, shall have successfully completed the dynamic sled testing using FMVSS 208 as a guide with the following accommodations. In order to reflect the larger size outfitted firefighters, the test dummy used shall be a 95th percentile hybrid III male weighing 225 pounds rather than the 50th percentile male dummy weighing 165 pounds as referenced in FMVSS 208. The model of seats shall also have successfully completed the flammability of materials used in the occupant compartments of motor vehicles as outlined in FMVSS 302, of which decides the burning rate of materials in the occupant compartments of motor vehicles.

## **SEAT BACK FORWARD FACING OUTER**

The crew area seat backs shall include an IMMI brand SmartDock® Gen 2 hands-free self contained breathing apparatus (SCBA) holder. The hands-free holder shall meet NFPA 1901-03 9G dynamic requirements for cylinder restraint systems for use in crew compartments of emergency response vehicles. The bracket shall accommodate and secure most types of self-contained breathing apparatus cylinders.

The hands-free holder shall consist of a back plate, bottom cradle, non-marring top claws, and claw height adjustment knob. The height adjustment knob shall allow for easy adjustment of the claws to the SCBA. The hands-free holder's claws shall lock from inertial forces to prevent the SCBA from becoming a projectile in the event of a crash to meet the NFPA 1901-03 standard for SCBA retention. The SCBA holder shall offer single-motion insertion into the claws and hands-free release when the SCBA fitted seat occupant rises.

The seat back shall include a removable padded cover which shall be provided over the SCBA cavity.

## **SEAT MOUNTING FORWARD FACING OUTER**

The forward facing outer seat shall be mounted in the furthest outboard position facing the front of the cab.

## **OCCUPANT PROTECTION FFO**

The forward facing outer seat position(s) shall be equipped with the Advanced Protection System™ (APS). The APS shall selectively deploy integrated systems to protect against injuries in qualifying frontal impact, side impact, and rollover events. The increase in survivable space and security of the APS shall also provide ejection mitigation protection.

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Each forward facing outer seating position APS shall include:

- APS advanced seatbelt system - retractor pre-tensioners tighten the seat belts around each occupant, securing the occupants in seats and load limiters play out some of the seat belt webbing to reduce seat belt to chest and torso force upon impact as well as mitigate head and neck injuries.

Side curtain airbag - protects each occupant's head, neck, and upper body from dangerous cab side surfaces and contact points with intrusive surfaces as a result of a collision as well as provides ejection mitigation protection to each occupant in a qualifying event by covering the windows and walls adjacent to each seating position with an airbag custom designed for each cab configuration.

## **SEAT FRAME FORWARD FACING**

The forward facing center seating positions shall include a full width seat frame located and installed at the rear wall. The seat frame shall span the available space on the rear wall. The seat frame shall be 12.38 inches high X 22.00 inches deep. The seat frame shall be constructed of Marine Grade 5052-H32 0.19 inch thick aluminum plate. The seat box shall be painted with the same color as the remaining interior.

## **SEAT FRAME FORWARD FACING STORAGE ACCESS**

There shall be one (1) access point to this storage area centered on the front of the seat frame.

## **SEAT MOUNTING FORWARD FACING CENTER**

The forward facing center seats shall be installed facing the front of the cab.

## **CAB FRONT UNDERSEAT STORAGE ACCESS**

The left and right under seat storage areas shall have a solid aluminum hinged door with non-locking latch.

## **SEAT COMPARTMENT DOOR FINISH**

All underseat storage compartment access doors shall have a protective coating of medium gray Spar-Liner.

## **WINDSHIELD WIPER SYSTEM**

The cab shall include a dual arm wiper system which shall clear the windshield of water, ice and debris. There shall be two (2) windshield wipers which shall be affixed to a radial wet arm. The system shall include a single motor which shall initiate the arm in which both the left hand and right hand windshield wipers are attached, initiating a back and forth motion for each wiper. The wiper motor shall be activated by an intermittent wiper control located within easy reach of the driver's position.

## **ELECTRONIC WINDSHIELD FLUID LEVEL INDICATOR**

The windshield washer fluid level shall be monitored electronically. When the washer fluid level becomes low the yellow "Check Message Center" indicator light on the instrument panel shall illuminate and the message center in the dual air pressure gauge shall display a "Check Washer Fluid Level" message.

## **CAB DOOR HARDWARE**

The cab entry doors shall be equipped with exterior pull handles, suitable for use while wearing firefighter gloves. The handles shall be made of aluminum with a chrome plated finish.



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The interior exit door handles shall be flush paddle type with a black finish, which are incorporated into the upper door panel.

All cab entry doors shall include locks which are keyed alike. The door locks shall be designed to prevent accidental lockout.

The exterior pull handles shall include a scuff plate behind the handle constructed of polished stainless steel to help protect the cab finish.

## **DOOR LOCKS**

The cab entry doors shall include a Controller Area Network (CAN) based electronic door lock system which shall include two (2) external keypads, one (1) located on the left side next to the front grab handle and one (1) on the right side next to the front grab handle. There shall be one (1) red rocker switch provided on the inside of each front cab entry door to actuate the cab door locks. Each door lock may also be manually actuated from the inside of the cab by means of a red knob located on the paddle handle of the respective door. The electronic door lock system shall include four (4) key fobs for actuation with buttons for cab entry door locks and for compartment door locks.

When the doors are unlocked using the external keypad or the key fobs the interior dome lights shall illuminate and remain on for a period of twenty (20) seconds. When the doors are locked from the external keypad or key fobs the DOT horn will sound.

Wiring shall also be provided for up to four (4) exterior cab compartments and up to four (4) body compartments.

## **DOOR LOCK LH REAR CAB COMPARTMENT**

The left hand side rear compartment door locks shall be omitted.

## **DOOR LOCK RH REAR CAB COMPARTMENT**

The right hand side rear compartment door locks shall be omitted.

## **POWER DOOR LOCK COMPARTMENT ACTIVATION**

The power door lock feature shall include activation for exterior compartment door locks through the key fob and keypads.

## **GRAB HANDLES**

The cab shall include one (1) 18.00 inch three-piece knurled aluminum, anti-slip exterior assist handle, installed behind each cab door. The assist handle shall be made of extruded aluminum with a knurled finish to enable non-slip assistance with a gloved hand.

## **AUXILIARY GRAB HANDLE**

There shall be an 18.00 inch knurled, anti-slip, one-piece polished stainless steel assist handle attached to the front fascia of the cab in the center below the windshield. The handle installation shall include a stainless steel scuff plate behind the grab handle to protect the painted surface and a steel reinforcement behind the front cab fascia.

## **REARVIEW MIRRORS**

# SAN MARCOS FIRE DEPARTMENT

Retrac Aerodynamic West Coast style dual vision mirror heads model 613305 shall be provided and installed on each of the front cab doors.

The mirrors shall be mounted via 1.00 inch diameter tubular stainless steel arms to provide a rigid mounting to reduce mirror vibration.

The mirrors shall measure 8.00 inches wide X 19.00 inches high and shall include an integral convex mirrors installed in the mirror head below the flat glass to provide a wider field of vision. The flat and convex mirrors shall be motorized with remote horizontal and vertical adjustment. The control switches shall be mounted within easy reach of the driver. The flat and convex mirrors shall be heated for defrosting in severe cold weather conditions.

The mirrors shall be constructed of a vacuum formed chrome plated ABS plastic housing that is corrosion resistant and shall include the finest quality non-glare glass.

## **REARVIEW MIRROR HEAT SWITCH**

The heat for the rearview mirrors shall be controlled through a virtual button on the Vista display and control screen.

## **TRIM LOWER SIDE**

A stainless steel trim band, 10.00 inches high, with upper and lower black and chrome trim moldings, shall be installed on the lower exterior sides of the cab and doors. The trim shall be installed so that the top edge approximately 1.00 inch below the top of the front bumper, and shall be affixed without holes and fasteners.

## **TRIM LOWER SIDE FRONT**

A stainless steel trim band, 10.00 inches high, with upper and lower black and chrome trim moldings, shall be installed on the lower exterior sides of the cab between the front bumper and the front doors. The trim shall be installed so that the top edge is approximately 1.00 inch below the top of the front bumper, and shall be affixed without holes and fasteners.

## **EXTERIOR TRIM REAR CORNER**

There shall be mirror finish stainless steel scuff plates on the outside corners at the back of the cab. The stainless steel plate shall be affixed to the cab using two sided adhesive tape.

## **CAB FENDER**

Full width wheel well liners shall be installed on the extruded cab to limit road splash and enable easier cleaning. Each two-piece liner shall consist of an inner liner 16.00 inches wide made of vacuum formed ABS composite and an outer fenderette 3.50 inches wide made of 14 gauge 304 polished stainless steel.

## **MUD FLAPS FRONT**

The front wheel wells shall have mud flaps installed on them.

## **CAB EXTERIOR FRONT & SIDE EMBLEMS**

The cab shall include three (3) Spartan Chassis emblems. There shall be one (1) for the front air intake grille and two (2) emblems with integrated model nameplates for the exterior sides of the cab shipped loose for installation by the body manufacturer.

## **CAB EXTERIOR MODEL NAMEPLATE**

# SAN MARCOS FIRE DEPARTMENT

The cab shall include custom "Metro Star Advanced Protection System" nameplates integrated into the side emblem.

## **IGNITION**

A master battery system with a keyless start ignition system shall be provided. Each system shall be controlled by a one-quarter turn Cole Hersee switch, both of which shall be mounted to the left of the steering wheel on the dash. A chrome push type starter button shall be provided adjacent to the master battery and ignition switches.

Each switch shall illuminate a green LED indicator light on the dash when the respective switch is placed in the "ON" position.

The starter button shall only operate when both the master battery and ignition switches are in the "ON" position.

## **BATTERY**

The single start electrical system shall include six (6) Harris BCI 31 950 CCA batteries with a 210 minute reserve capacity and 4/0 welding type dual path starter cables per SAE J541.

## **BATTERY TRAY**

The batteries shall be installed within two (2) steel battery trays located on the left side and right side of the chassis, securely bolted to the frame rails. The battery trays shall be coated with the same material as the frame.

The battery trays shall include drain holes in the bottom for sufficient drainage of water. A durable, non-conducting, interlocking mat made by Dri-Dek shall be installed in the bottom of the trays to allow for air flow and help prevent moisture build up. The batteries shall be held in place by non-conducting phenolic resin hold down boards.

## **BATTERY BOX COVER**

Each battery box shall include a hinged steel cover which protects the top of the batteries. Each cover shall include flush latches which shall keep the cover secure as well as a black powder coated handle for convenience when opening.

## **BATTERY CABLE**

The starting system shall include cables which shall be protected by 275 degree F. minimum high temperature flame retardant loom, sealed at the ends with heat shrink and sealant.

## **BATTERY JUMPER STUD**

The starting system shall include battery jumper studs. These studs shall be located in the forward most portion of the driver's side lower step. The studs shall allow the vehicle to be jump started, charged, or the cab to be raised in an emergency in the event of battery failure.

## **ALTERNATOR**

The charging system shall include a 320 amp Leece-Neville 12 volt alternator. The alternator shall include a self-exciting integral regulator.

## **BATTERY CONDITIONER**

# SAN MARCOS FIRE DEPARTMENT

A Kussmaul 35/10 battery conditioner shall be supplied. The battery conditioner shall provide a 35 amp output for the chassis batteries and a 10 amp battery saver output. The battery conditioner shall be mounted in the cab in the area between the driver seat and the LH rear facing outer seat position.

## **BATTERY CONDITIONER DISPLAY**

A Kussmaul battery conditioner display shall be supplied. The battery conditioner display shall be mounted in the driver under seat storage area to the rear of the access panel or door.

## **ELECTRICAL INLET**

A Kussmaul 20 amp super auto-eject electrical receptacle shall be supplied. It shall automatically eject the plug when the starter button is depressed.

A single item or an addition of multiple items must not exceed the rating of the electric inlet that it's connected to.

### **Amp Draw Reference List:**

*Kussmaul 1000 Charger - 3.5 Amps*

*Kussmaul 1200 Charger - 10 Amps*

*Kussmaul 35/10 Charger - 10 Amps*

*1000W Engine Heater - 8.33 Amps*

*1500W Engine Heater - 12.5 Amps*

*120V Air Compressor - 4.2 Amps*

## **ELECTRICAL INLET LOCATION**

An electrical inlet shall be installed on the left hand side of cab over the wheel well in the rearward position.

## **ELECTRICAL INLET CONNECTION**

The electrical inlet shall be connected to the battery conditioner.

## **ELECTRICAL INLET COLOR**

The electrical inlet connection shall include a red cover.

## **HEADLIGHTS**

The cab front shall include four (4) rectangular LED headlamps with separate high and low beams mounted in bright chrome bezels.

## **FRONT TURN SIGNALS**

The front fascia shall include two (2) Whelen model M6 4.00 inch X 6.00 inch amber LED turn signals which shall be installed in a chrome housing above and outboard of the front warning and head lamps.

## **HEADLIGHT LOCATION**

The headlights shall be located on the front fascia of the cab directly below the front warning lights.

## **SIDE TURN/MARKER LIGHTS**

# SAN MARCOS FIRE DEPARTMENT

The sides of the cab shall include two (2) LED round side marker lights which shall be provided just behind the front cab radius corners.

## **MARKER AND ICC LIGHTS**

In accordance with FMVSS, there shall be five (5) LED cab marker lamps designating identification, center and clearance provided. These lights shall be installed on the face of the cab within full view of other vehicles from ground level.

## **HEADLIGHT AND MARKER LIGHT ACTIVATION**

The headlights and marker lights shall be controlled via a virtual button on the Vista display and control screen. The headlights and marker lights shall also be activated when the engine is running. There shall be a virtual dimmer control on the Vista display and control screen to adjust the brightness of the dash lights.

## **CORNERING LIGHTS**

The bumper tail shall include two (2) Whelen model M6 Super LED steady-on cornering lamps with clear lenses, one (1) each side. The lights shall be mounted to the bumper face and be located behind the intersection lights. The light heads shall illuminate with respective side turn signal, when the hazard lights are activated, and when the vehicle is placed in reverse,

## **GROUND LIGHTS**

Each door shall include one (1) On-Scene brand Night Axe LED strip model ground light mounted to the underside of the cab step below each door. The ground light shall be mounted in a polished aluminum bezel. The ground lighting shall be activated by the opening of the respective side door, when the parking brake is set, as well as being activated through a virtual button on the Vista display and control screen.

## **LOWER CAB STEP LIGHTS**

The middle step located at each door shall include one (1) On-Scene brand Night Axe LED strip light which shall activate with the opening of the respective door. The step light shall be mounted in a polished aluminum bezel.

## **ENGINE COMPARTMENT LIGHT**

There shall be an LED NFPA compliant light mounted under the engine tunnel for area work lighting on the engine. The light shall include a polycarbonate lens, a housing which is vibration welded and a bulb which shall be shock mounted for extended life. The light shall activate automatically when the cab is tilted.

## **FRONT SCENE LIGHTS**

The front of the cab shall include two (2) Whelen Pioneer model PCP2 contour roof mount scene lights installed on the brow of the cab.

Each lamp head shall have two (2) 12 volt high intensity LED panels. One side of each lamp head shall include a flood light and the other side shall include an 8-degree spotlight. The spotlight portion of each lamp shall be mounted in the outboard position. Each lamp head shall draw 12.0 amps and generate 14,000 lumens total. Each lamp head shall measure 4.25 inches in height X 14.00 inches in width. The lamp heads shall be powder coated white.

# SAN MARCOS FIRE DEPARTMENT

## **FRONT SCENE LIGHTS ACTIVATION**

The front scene lighting shall be activated by a virtual button on the Vista display and control screen and a lighted momentary rocker switch on the dash.

## **FRONT SCENE LIGHT LOCATION**

There shall be two (2) scene lights mounted to the front brow of the cab inboard of the outer front marker lights.

## **SIDE SCENE LIGHTS**

The cab shall include two (2) Whelen model Pioneer PCP2 semi-recess mount lights installed one (1) on each side of the cab.

Each lamp head shall have two (2) 12 volt high intensity LED panels. One side of each lamp head shall include a flood light and the other side shall include a 8-degree spotlight. Each lamp head shall draw 12.0 amps and generate 14,000 lumens total. Each lamp head shall be no more than 4.25 inches in height X 14.00 inches in width. Each lamp head shall be mounted within a semi-recess 0-degree housing featuring a chrome flange which shall measure 7.92 inches in height X 17.15 inches in width. The lamp heads shall be powder coated white.

## **SIDE SCENE LIGHT LOCATION**

The scene lighting located on the left and right sides of the cab shall be mounted rearward of the cab "B" pillar in the 10.00 inch raised roof portion of the cab between the front and rear crew doors.

## **ISIDE SCENE ACTIVATION**

The scene lights shall be activated by two (2) lighted momentary rocker switches located in the switch panel, one (1) for each light, by two (2) virtual buttons on the Vista display and control screen(s), one (1) for each light, and by opening the respective side cab doors.

## **INTERIOR OVERHEAD LIGHTS**

The cab shall include a two-section, red and clear Weldon LED dome lamp located over each door. The dome lamps shall be rectangular in shape and shall measure approximately 7.00 inches in length X 3.00 inches in width with a black colored bezel. The clear portion of each lamp shall be activated by opening the respective door and both the red and clear portion can be activated by individual push lenses on each lamp.

An additional incandescent three (3) light module with dual map lights shall be located over the engine tunnel which can be activated by individual switches on the lamp.

## **AUXILIARY DOME LIGHT RH**

The cab shall include one (1) red/clear Whelen LED dome lamp located to the left of the right hand front seating position. The dome lamp shall be rectangular in shape and shall measure approximately 7.00 inches in length X 3.00 inches in width with a black colored bezel. The individual red or clear function can be activated dependently by switches on the lamp.

## **AUXILIARY DOME LIGHT REAR CREW**

The cab shall include two (2) Weldon brand LED auxiliary dome lights within the headliner within the middle of the crew area inboard of the outer seating positions. The lights shall include a red and clear split lens. Both the red and white portion of the lights shall be activated by individual switches located on the side of each light.

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## **DO NOT MOVE APPARATUS LIGHT**

The front headliner of the cab shall include a flashing red Whelen 500 Series 5mm LED light clearly labeled "Do Not Move Apparatus". In addition to the flashing red light, an audible alarm shall be included which shall sound while the light is activated.

The flashing red light shall be 5.40 inches long X 1.70 inches wide X 0.90 inches high and shall be located centered left to right for greatest visibility.

The light and alarm shall be interlocked for activation when either a cab door is not firmly closed or an apparatus compartment door is not closed, and the parking brake is released.

## **MASTER WARNING SWITCH**

A master switch shall be included, as a virtual button on the Vista display and control screen which shall be labeled "E Master" for identification. The button shall feature control over all devices wired through it. Any warning device switches left in the "ON" position when the master switch is activated shall automatically power up.

## **INBOARD FRONT WARNING LIGHTS**

The cab front fascia shall include two (2) Whelen M6 Super LED front warning lights in the left and right inboard positions. The lights shall feature multiple flash patterns including steady burn. The lights shall be mounted to the front fascia of the cab within a chrome bezel. The lights shall be programmed to emit the "PinWheel Variable" non-flashing pattern.

## **INBOARD FRONT WARNING LIGHTS COLOR**

The warning lights mounted on the cab front fascia in the inboard positions shall be blue on the left and green on the right, both with clear lenses.

## **OUTBOARD FRONT WARNING LIGHTS**

The cab front fascia shall include two (2) Whelen M6 Super LED front warning lights in the left and right outboard positions. The lights shall feature multiple flash patterns including steady burn. The lights shall be mounted to the front fascia of the cab within a chrome bezel. The lights shall be programmed to emit the "PinWheel Variable" non-flashing pattern.

## **OUTBOARD FRONT WARNING LIGHTS COLOR**

The warning lights mounted on the cab front fascia in the outboard position shall be red with a clear lens.

## **BUMPER FACE WARNING LIGHT**

The front bumper face shall include two (2) Whelen M6 series 4.31 inch tall X 6.75 inch wide Super LED® warning lights located between the frame rails in the right and left side outboard positions. The lights shall be programmed to emit the "Pin Wheel Variable" flash pattern. The lights shall be surface mounted within a chrome bezel.

## **BUMPER FACE WARNING LIGHT COLOR**

The warning lights in the bumper shall be red with a clear lenses.

## **FRONT WARNING SWITCH**

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The front warning lights shall be controlled through a virtual control on the Vista display and control screen. This switch shall be clearly labeled for identification.

## **INTERSECTION WARNING LIGHTS**

The chassis shall include two (2) Whelen M6 series Super LED intersection warning lights, one (1) each side. The lights shall feature multiple flash patterns including steady burn. The lights shall be set to flash "DoubleFlash 150" in/out flash pattern.

## **INTERSECTION WARNING LIGHTS COLOR**

The intersection lights shall be red with a clear lens.

## **INTERSECTION WARNING LIGHTS LOCATION**

The intersection lights shall be mounted in the forward position on the side of the bumper.

## **SIDE WARNING LIGHTS**

The cab sides shall include two (2) Whelen M6 Super LED warning lights, one (1) on each side. The lights shall feature multiple flash patterns including steady burn for solid colors and multiple flash patterns for split colors. The lights shall be mounted to the sides of the cab within a chrome bezel. The light shall be programmed to emit the "DoubleFlash 150" in/out flash pattern.

## **SIDE WARNING LIGHTS COLOR**

The warning lights located on the side of the cab shall be green with a clear lens.

## **SIDE WARNING LIGHTS LOCATION**

The warning lights on the side of the cab shall be mounted over the front wheel well directly over the center of the front axle.

## **AUXILIARY SIDE WARNING LIGHTS**

The cab sides shall include two (2) Whelen series M6 Super LED 4.00 inch X 6.00 inch warning lights, one (1) each side, which shall feature multiple flash patterns including steady burn. The warning lights shall be set to flash "DoubleFlash 150" in/out flash pattern.

## **AUXILIARY SIDE WARNING LIGHTS COLOR**

The auxiliary warning lights located on the side of the cab shall be red with clear lens.

## **AUXILIARY SIDE WARNING LIGHTS LOCATION**

The auxiliary warning lights on the side of the cab shall be mounted above the front doors.

## **SIDE AND INTERSECTION WARNING SWITCH**

The side warning lights shall be controlled through a virtual button on the Vista display and control screen. This button shall be clearly labeled for identification.

## **INTERIOR DOOR OPEN WARNING LIGHTS**



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The interior of each door shall include one (1) red 4.00 inch diameter Truck-Lite LED warning light located on the door panel. Each light shall activate with a flashing pattern when the door is in the open position to serve as a warning to oncoming traffic.

## **SIREN CONTROL HEAD**

A Whelen 295HFSC9 electronic siren control head shall be provided. The siren head shall feature a 200-watt output, wail, yelp, manual siren, and hands free operation which shall allow the operator to turn the siren on and off from the horn ring if a horn/siren selector switch option is also selected. The siren shall be mounted to protrude through the center panel of the cab dash in the lower section centered from left to right in the panel.

## **HORN BUTTON SELECTOR SWITCH**

A virtual button on the Vista display and control screen shall be provided to allow control of the electric horn or the air horn from the steering wheel horn button. The horn button selection shall default to the air horn each time the Vista screen power is cycled off and on. The electric horn shall sound when the selector switch is in either position to meet FMCSA requirements.

## **AIR HORN ACTIVATION**

The air horn activation shall be accomplished by the steering wheel horn button for the driver and a momentary rocker switch on the switch panel. An air horn activation circuit shall be provided to the chassis harness pump panel harness connector.

## **MECHANICAL SIREN ACTIVATION**

The mechanical siren shall be actuated by a Linemaster model SP491-S81 foot switch mounted in the front section of the cab for use by the driver and a momentary rocker switch in the switch panel on the dash. A red momentary siren brake rocker switch shall be provided in the switch panel on the dash. A virtual button for the siren brake shall be provided on the Vista display.

The siren activation shall be interlocked with the park brake and shall only be active when master warning switch is on to prevent accidental engagement.

## **BACK-UP ALARM**

An ECCO model 575 backup alarm shall be installed at the rear of the chassis with an output level of 107 dB. The alarm shall automatically activate when the transmission is placed in reverse.

## **INSTRUMENTATION**

An ergonomically designed instrument panel shall be provided. Each gauge shall be backlit with LED lamps. Stepper motor movements shall drive all gauges. The instrumentation system shall be multiplexed and shall receive ABS, engine, and transmission information over the J1939 data bus to reduce redundant sensors and wiring.

The instrument panel shall contain the following gauges:

One (1) electronic speedometer shall be included. The primary scale on the speedometer shall read from 0 to 100 MPH, and the secondary scale on the speedometer shall read from 0 to 160 KM/H.

One (1) electronic tachometer shall be included. The scale on the tachometer shall read from 0 to 3000 RPM.

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One (1) two-movement gauge displaying primary system, and secondary system air volumes and integral LCD odometer/trip odometer shall be included on the lower portion of the LCD. The scale on the air pressure gauges shall read from 0 to 150 pounds per square inch (PSI). The air pressure scales shall be linear to operate with an accuracy of 1 degree of the measured data with a red indication zone on the gauge showing critical levels of air pressure. A red indicator light in the gauge shall indicate a low air pressure, as well as a message on the LCD screen. The odometer shall display up to 9,999,999.9 miles. The trip odometer shall display 9,999.9 miles. The LCD shall display Transmission Temperature in degrees Fahrenheit on the upper portion of the LCD. The LCD screen shall also be capable of displaying certain diagnostic functions.

One (1) four-movement gauge displaying engine oil pressure, coolant temperature, fuel level, voltmeter, and an \*indicator bar displaying Diesel Exhaust Fluid (DEF) LED bar shall be included. The scale on the engine oil pressure gauge shall read from 0 to 120 pounds per square inch (PSI). The engine oil pressure scale shall be linear to operate with an accuracy of 1 degree of the measured. A red indicator light in the gauge shall indicate a low engine oil pressure, as well as a message on the LCD screen. The scale on the coolant temperature gauge shall read from 100 to 250 degrees Fahrenheit (F). The coolant temperature scale shall be linear to operate with an accuracy of 1 degree of the measured data with a red indication zone on the gauge showing critical levels of air pressure. A red indicator light in the gauge shall indicate high coolant temperature, as well as a message on the LCD screen. The scale on the fuel level gauge shall read from empty to full as a percentage of fuel remaining. An amber indicator light shall indicate low fuel at 25% tank level. The scale on the voltmeter shall read from 10 to 16 volts with a red indication zone on the gauge showing critical levels of battery voltage. A red indicator light shall indicate high or low system voltage, as well as a message on the LCD screen. The scale on the DEF LED bar will consist of four (4) LEDs displaying levels in increments of 25% of useable DEF in green. Upon decreasing levels, the indicator bar will change colors to notify the driver of decreasing levels of DEF and action will be required. An amber indicator light shall indicate low levels of DEF, as well as a message on the LCD screen and an audible alarm.

The instrument panel shall include a light bar that contains the following LED indicator lights and produce the following audible alarms in applicable configurations:

## **RED LAMPS**

Stop Engine-indicates critical engine fault

Air Filter Restricted-indicates excessive engine air intake restriction

Park Brake-indicates parking brake is set

Seat Belt Indicator-indicates when a seat is occupied and corresponding seat belt remains unfastened

Low Coolant-indicates engine coolant is required

## **AMBER LAMPS**

MIL-indicates an engine emission control system fault

Check Engine-indicates engine fault

Check Trans-indicates transmission fault

High Transmission Temperature-indicates excessive transmission oil temperature

ABS-indicates anti-lock brake system fault

HEST-indicates a high exhaust system temperature

Water in Fuel-indicates presence of water in fuel filter

\*DPF-indicates a restriction of the diesel particulate filter

\*Regen Inhibit-indicates regeneration has been postponed due to user interaction

Range Inhibit-indicates a transmission operation is prevented and requested shift request may not occur.

\*SRS-indicates a problem in the supplemental restraint system

Check Message-Turn Signal On

Check Message-Door Ajar

Check Message-Cab Ajar

\*Check Message-ESC Active

\*Check Message-DPF Regen Active

Check Message-No Engine Data

Check Message-No Transmission Data

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Check Message-No ABS Data  
Check Message-No Data All Communication With The Vehicle Systems Has Been Lost  
Check Message-Check Engine Oil Level  
Check Message-Check Washer Fluid Level  
Check Message-Check Power Steering Fluid Level  
Check Message-Low Transmission Fluid Level  
Check Message-Check Coolant Level

## **GREEN LAMPS**

Left and Right turn signal indicators

\*ATC-indicates low wheel traction for automatic traction control equipped vehicles, also indicates mud/snow mode is active for ATC system

High Idle-indicates engine high idle is active.

Cruise Control-indicates cruise control is active

OK to Pump-indicates the pump engage conditions have been met

Pump Engaged-indicates the pump is currently in use

Auxiliary Brake-indicates secondary braking device is active

## **BLUE LAMP**

High Beam Indicator

## **WHITE LAMP**

Wait to Start-indicates active engine air preheat cycle

## **AUDIBLE ALARMS FROM GAUGE PACKAGE**

High Trans Temp

High or Low Voltage

Check Engine

Check Transmission

Stop Engine

Low Air Pressure

Fuel Low

Water in Fuel

\*ESC

High Coolant Temperature

Low Engine Oil Pressure

Low Coolant Level

\*Low DEF Level

Air Filter Restricted

Extended Left and Right Turn Remaining On

Cab Ajar

Door Ajar

ABS System Fault

Seatbelt Indicator

## **EXTERNAL AUDIBLE ALARM**

Air Filter

Cab Ajar

Door Ajar

Check Engine

Stop Engine

Low Air Pressure

Low Engine Oil Pressure

Water in Fuel

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\*Low DEF

ABS System Fault

Seatbelt Indicator

\*Items marked with an asterisk are provided only in applicable configurations.

## **LCD MESSAGES**

Transmission Temperature

Battery Voltage

Engine Hours

Vehicle Speed

Engine RPMs

Fuel Level

DEF Level

Engine Oil Pressure

Ammeter (If quipped)

Auxiliary Ammeter (If quipped)

Engine Coolant Temp

Primary System Air Pressure

Secondary System Air Pressure

Turbo Boost Pressure

Exhaust Temperature

Engine Load

Engine Torque

Instant Fuel Economy

Average Fuel Economy

## **BACKLIGHTING COLOR**

The instrumentation gauges and the switch panel legends shall be backlit using blue LED backlighting.

## **CAMERA**

An Audiovox Voyager heavy duty rearview camera system shall be supplied. The system shall include one (1) box shaped camera which shall be shipped loose for OEM installation in the body to afford the driver a clear view to the rear of the vehicle as well as one (1) teardrop shaped camera which shall be mounted on the officer side of the cab below windshield ahead of the front door at approximately the same level as the cab door handle.

The rear view camera shall be wired to a flip down monitor above the driver and the right side camera shall be wired to a single Weldon Vista display which shall be located on the driver side of the dash.

The camera system shall include a one- way communication device that shall be an integral part of the rear camera for the use of voice commands directly to the driver.

## **CAB EXTERIOR PROTECTION**

The cab face shall have a removable plastic film installed over the painted surfaces to protect the paint finish during transport to the body manufacturer.

## **FIRE EXTINGUISHER**

A 2.50 pound D.O.T approved fire extinguisher with BC rating shall be shipped loose with the cab.

## **DOOR KEYS**

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The cab and chassis shall include a total of four (4) door keys for the manual door locks.

## **DIAGNOSTIC SOFTWARE OCCUPANT PROTECTION**

Diagnostic software for the Spartan Advanced Protection System shall be available for free download from the Spartan Chassis website to Spartan authorized OEMs, dealers and service centers, as well as the vehicle owner.

The software has been validated to be compatible with the following RP1210 interface adapters:

- Dearborn Group DPA4 Plus
- Noregon Systems JPRO® DLA+
- Cummins INLINE5
- Cummins INLINE6
- NexIQ™ USB-Link™

The software and adapter utilize the SAE J1939-13 heavy duty nine (9) pin connector which is located below the driver's side dash to the left of the steering column.

## **WARRANTY**

Summary of Warranty Terms:

THE FOLLOWING IS SUMMARY OF WARRANTY TERMS FOR INFORMATION ONLY. THE ACTUAL LIMITED WARRANTY DOCUMENT, WHICH IS ATTACHED TO THIS OPTION, CONTAINS THE COMPLETE STATEMENT OF THE SPARTAN CHASSIS, INC. LIMITED WARRANTY. SPARTAN'S RESPONSIBILITY IS TO BE ACCORDING TO THE TERMS OF THE COMPLETE LIMITED WARRANTY DOCUMENT.

The chassis manufacturer shall provide a limited parts and labor warranty to the original purchaser of the custom built cab and chassis for a period of twenty-four (24) months, or the first 36,000 miles, whichever occurs first. The warranty period shall commence on the date the vehicle is delivered to the first end user.

## **CAB AND CHASSIS LABELING LANGUAGE**

The cab and chassis shall include the applicable caution, warning, and safety notice labels with text to be written in English.

## **CHASSIS OPERATION MANUAL**

There shall be two (2) digital copies of the chassis operation manual provided with the chassis. The digital data shall include a parts list specific to the chassis model.

## **ENGINE AND TRANSMISSION OPERATION MANUALS**

The following manuals specific to the engine and transmission models ordered will be included with the chassis in the ship loose items:

- (1) Hard copy of the Engine Operation and Maintenance manual with CD
- (1) Digital copy of the Transmission Operator's manual
- (1) Digital copy of the Engine Owner's manual

## **CAB/CHASSIS AS BUILT WIRING DIAGRAMS**

# SAN MARCOS FIRE DEPARTMENT

The cab and chassis shall include two (2) digital copies of wiring schematics and option wiring diagrams.

## **SALES TERMS**

The sale of the Spartan Chassis shall be governed by the terms contained on the Sales Terms – Acceptance of Purchase Order document, a copy of which is attached to this option.

## **CAB TO AXLE DIMENSION**

Cab to axle will be 150 - 1/2".

## **APPARATUS CUSTOM WARRANTY PLATE**

A custom designed, apparatus warranty plate will be provided in the interior of the cab's driver's area. Noted on the warranty plate will be stated time lengths of warranties for the major components of the chassis, body and major accessories provided on the apparatus.

## **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

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- 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 fire apparatus in feet and inches, the length of the completed fire apparatus in feet and inches, and the GVWR in pounds.

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.

## **ACCIDENT PREVENTION**

There shall be a placard in the cab seating area which reads, "**ALL OCCUPANTS MUST BE SEATED AND BELTED WHEN THE APPARATUS IS IN MOTION**".

## **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.

## **ACCIDENT PREVENTION**

If the rear bumper is 8" deep or more, there shall be a placard on the rear face of the body, in clear sight from the ground, which reads, "**WARNING - DO NOT RIDE ON STEPS OR DECK AREAS WHILE THE APPARATUS IS IN MOTION. DEATH OR SERIOUS INJURY MAY RESULT**".

## **WEARING HELMET WARNING**

A label stating "**DO NOT WEAR HELMET WHILE SEATED**" shall be visible from each seating location.

## **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 as provided by the cab/chassis manufacturer. No other alteration or modifications are required.

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## **BUMPER GRAVELSHIELD**

The bumper extension gravel shield shall be provided by the cab/chassis manufacturer.

## **BUMPER COMPARTMENT**

The bumper extension shall have one (1) tool compartment in center of bumper extension. The compartment shall be as large as room allows. Compartment door shall be 1/8" NFPA compliant aluminum tread plate with stainless steel hinge wrapped with vinyl and chrome push release type latches. The compartment door shall have a gas shock type hold open device. This compartment shall not be watertight but shall include a compartment drain.

If the bumper compartment is greater than 4 cu.ft. in volume and has an opening greater than 144 sq.in. it shall have sufficient compartment lighting to provide a minimum of 2 fc (20 lx) at any location on the floor of the compartment without any equipment in the compartment. If light is required, light shall be an OnScene LED type light.

A flashing warning light signal shall be provided indicating when a compartment door is not in a closed position as required by NFPA 1901.

## **AIR HORN(S)**

The air horn(s) shall be supplied and installed by the cab/chassis manufacturer.

## **FRONT TOW PROVISIONS**

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

## **AIR INTAKE SYSTEM**

An air filter shall be provided in the engine's air intake system.

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:

9. 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.
10. 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. The tailpipe may require some modifications for proper ground clearances and fit with body.

The exhaust piping and discharge outlet shall be located or shielded so as not to expose any portion of the vehicle or equipment to excessive heating.

Exhaust pipe discharge shall be directed away from any operator's position or entry doors on body.



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Where parts of the exhaust system are exposed so that they are likely to cause injury to operating personnel, protective guards shall be provided.

## **RADIO/ANTENNA INSTALLATION**

There shall be one (1) SAN MARCOS FIRE DEPARTMENT supplied radio(s) with antenna installed in the cab within easy reach of driver. The location of radio shall be determined by the SAN MARCOS FIRE DEPARTMENT at the pre-construction meeting. All required radio programming shall be responsibility of SAN MARCOS FIRE DEPARTMENT. Radio(s) may not be fully tested if no radio program is provided with radio and will be responsibility of SAN MARCOS FIRE DEPARTMENT after delivery.

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

## **SEAT BELT COLOR**

Section 14.1.3.4 of the NFPA 1901 Standards, 2009 edition, 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 - CUSTOM CAB**

Sections 14.1.3.2 and 14.1.3.3 of the NFPA 1901 standards, 2009 edition, 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".

The chassis seat belt web length as supplied by the custom chassis manufacturer shall be compliant to NFPA Standards 14.1.3.2 and 14.1.3.3.

## **SEAT BELT / VDR SYSTEM - CUSTOM CAB**

The seat belt warning and vehicle data recorder systems shall be provided by the cab/chassis manufacturer.

## **HELMET STORAGE**

No helmet storage is required in the cab driving area.

## **HELMET STORAGE**

No helmet storage is required in the cab crew area.

## **CAB CRASH TEST CERTIFICATION**

A cab crash test certification from the fire apparatus manufacturer shall be provided with the equipment. A copy of this certification shall be included with the bid.

NOTE: There shall be no exception to any portion of the cab integrity certification requirements. Nonconformance shall lead to immediate rejection of bid.

The certification shall state that the cab does meet or exceed the requirements below:

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

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## **CHASSIS CAB AM/FM RADIO (CONTRACTOR SUPPLIED)**

An AM/FM radio will be supplied and installed in the chassis cab by the Contractor per the SAN MARCOS FIRE DEPARTMENT's instructions.

## **CAB MIRRORS, DRIVER ADJUSTABLE**

Section 14.3.5 of the NFPA 1901 Standards, 2009 edition, requires all primary rear view mirrors used by the driver to be adjustable from the driver's position.

## **SEAT CUSHION FOR CHASSIS CENTER FORWARD FACING SEAT FRAME**

A full width seat cushion shall be provided by the Body Manufacturer covering the full width of the forward center facing, full width seat frame furnished with the chassis. The seat cushion shall be fabricated of 3/4" exterior grade plywood with 3" thick foam and gray colored Duraware heavy duty fabric covering. No seat shoulder/seat belt will be provided at this seating position.

## **HUB AND NUT COVERS**

Front and rear wheels shall be provided with stainless steel hub caps and wheel nut covers.

## **MUDFLAPS**

There shall be 1/4" rubber mudflaps provided and installed behind each set of tires to prevent throwing road debris and lower road spray.

## **AIR BRAKE SYSTEM QUICK BUILD-UP**

The air brake quick build-up system shall be supplied from the cab/chassis manufacturer.

The quick buildup system shall provide sufficient air pressure so that the apparatus has no brake drag and is able to stop under the intended operating conditions following the 60-second buildup time.

## **ROAD EMERGENCY SAFETY KIT**

One (1) set of three (3) dual faced triangular warning flares with fold away base complete with storage case per DOT requirements shall be provided with the completed apparatus.

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

## **CAB INTERIOR CABINET - CURBSIDE REAR WALL**

There shall be one (1) storage cabinet with open front located in rear cab area. The cabinet shall be fabricated from 1/8" smooth aluminum and finished with a dark gray hammer tone powder coat paint for a hard and durable finish. The cabinet shall be approximately 28" wide x 45" high x 16" deep.

There will be a netting assembly over the front opening for retention of stored equipment. The net will secure at the top. It will drop down when unlatched from the secure position.

- Cabinet shall be provided with vertically mounted shallow aluminum Shelf-Trac for specified component installation.

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- There shall be one (1) adjustable shelf/shelves in the above cabinet(s). Each shelf shall have a 1.25" vertical lip at front to contain items while vehicle is in motion.

## **CAB CABINET WITH UPPER SLIDING COMMAND DESK**

The rear crew area of cab directly behind engine tunnel shall be provided with a lower cabinet with cargo netting for securing equipment. A command desk with lift-up slanted surface with storage area below shall be provided on top of lower cabinet. Cabinet shall be approximately 38" wide x 25" high x 20" deep.

The lift-up slanted surface desk top shall have a stainless steel hinged top to gain access to the storage area below. Cabinet shall be approximately 38" wide x 6" high at back and 4" high at front x 20" deep and slide-out toward rear cab seating approx. 20".

Both the cabinet and desk shall be fabricated of .125" smooth aluminum. A 1" vertical lip shall be provided at the lower edge of the writing surface to prevent items from sliding off. The cabinet and desk top shall be painted with a gray hammer tone powder coat paint finish for a hard and durable surface.

- Cabinet shall be provided with vertically mounted shallow aluminum Shelf-Trac for specified component installation.
- There shall be one (1) adjustable shelf/shelves in the above cabinet(s). Each shelf shall have a 1.25" vertical lip at front to contain items while vehicle is in motion.
- There shall be one (1) 120 VAC outlet(s) located under desk against the back edge.
  - The outlet receptacle(s) shall be 20 amp, straight-blade (NEMA 5-20R).
  - Outlet(s) shall be powered through the on-board generator system.

## **CAB INTERIOR CABINET - STREETSIDE REAR WALL**

There shall be one (1) storage cabinet with open front located in rear cab area. The cabinet shall be fabricated from 1/8" smooth aluminum and finished with a dark gray hammer tone powder coat paint for a hard and durable finish. The cabinet shall be approximately 28" wide x 38" high x 16" deep.

There will be a netting assembly over the front opening for retention of stored equipment. The net will secure at the top. It will drop down when unlatched from the secure position.

- Cabinet shall be provided with vertically mounted shallow aluminum Shelf-Trac for specified component installation.
- There shall be one (1) adjustable shelf/shelves in the above cabinet(s). Each shelf shall have a 1.25" vertical lip at front to contain items while vehicle is in motion.

## **FUEL FILL**

There shall be one (1) fuel fill door located in the streetside exterior wheel well panel, behind the rear axle. The fill door shall be fabricated from brushed stainless steel. There shall be a permanent label with the text "DIESEL FUEL ONLY" located adjacent to the fuel fill access.

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## **FUEL FILL**

There shall be one (1) fuel fill door located in the curbside exterior wheel well panel, behind the rear axle. The fill door shall be fabricated from brushed stainless steel. There shall be a permanent label with the text "DIESEL FUEL ONLY" located adjacent to the fuel fill access.

## **CAB LFD COMPARTMENT SHELVES**

There will be one (1) bolted shelf in each of the cab LFD compartments. The exact location of the shelves will be determined at the pre-construction meeting.

## **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 SAN MARCOS FIRE DEPARTMENT 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 SAN MARCOS FIRE DEPARTMENT from such repair and shall NOT be used.

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 3/16" (.187) 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, No Exceptions.

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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 prevent 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 shall be constructed from 3/16" (.188) aluminum 3003H-14 alloy treadplate and supported with 2" x 2" x 1/4" tubing running the full width of the body. The supports shall be welded in place on approximate 16" centers.

All seams in the roof area shall be welded to the radius and supports prior to paint to prevent entry of moisture. All roof seams shall be continuously welded.

A 2" formed radius shall be provided along the body sides. The use of extrusions 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 6" x 1/4" aluminum tubes, the same width as the chassis frame rails, NO EXCEPTION. Welded to this tubing

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shall be cross members of 2" x 6" x 1/4" aluminum. 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 on 16" centers, or 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 a minimum of six (6) 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 prevent any corrosion. Each mounting assembly shall utilize two (2) 3/4" diameter x 6" long grade 8 bolts and two (2) heavy duty springs. 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 1/4" aluminum tubing frame and covered with 3/16" NFPA compliant aluminum tread plate. 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 chassis frame and mounted above the rear bumper. The tow eyes shall be fabricated from 1" thick steel plate and be chrome plated.

## **TRAILER HITCH**

A Class 5, 14,000 lbs. weight carrying capacity (gross trailer weight) rear hitch receiver shall be provided below the rear bumper. The receiver shall be attached to chassis frame with heavy duty steel frame work.

The hitch shall be complete with a 2-1/2" square receiver. Without the use of a "weight distribution" ball hitch the Class 5 receiver shall have a capacity of 10,000 lbs. gross trailer weight and a maximum tongue weight of 1000 lbs.

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.

## **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.

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## **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.

## **TRAILER BRAKE CONTROLLER**

A trailer brake controller shall be supplied and installed in the cab. The controller shall apply power to the trailer brakes in proportion to vehicle's deceleration. The controller shall provide a continuous diagnostic check for proper connection and shorted magnet conditions.

## **GROUND LIGHTS**

There shall be two (2) OnScene 8" Access 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 3/16" smooth aluminum panels.

## **STAINLESS STEEL BODY FENDERS**

The body wheel well openings shall be provided with round radius, polished stainless steel fenderettes. The fenderettes shall be bolted and easily replaceable if damaged. The fenderettes shall be installed using a rubber gasket to reduce buildup of moisture and/or debris.

## **WHEEL WELL LINERS**

The wheel wells shall be provided with an easily removable polymer, circular inner fender liner. The inner liner shall be bolted to the wheel well with stainless steel bolts and spaced away from the wheel well so the liner will not accumulate dirt or water.

## **FIRE EXTINGUISHER FENDER COMPARTMENTS**

There shall be two (2) fire extinguisher storage compartments located, one (1) on each side of body in the rear wheel well area. Each compartment shall be capable of storing one (1) fire extinguisher. Each compartment shall have a vertically hinged door with a positive catch latch installed and painted primary lower body color. The door shall activate the "Hazard Warning Light" in the cab when not in the closed position.

## **BODY PAINT SPECIFICATIONS**

### **BODY PAINT PREPARATION**

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

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The exterior 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. If the compartment interior is to be painted the interior shall be acid etched as described above then primed with an epoxy primer and all seams caulked.

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 an eight-stage paint process;

- 13) Clean bare metal using a solvent base wax & grease remover.
- 14) Finish all exterior body seams as necessary, followed by a thorough sanding of all bare metal to be painted.
- 15) Re-clean bare metal using a solvent base wax & grease remover.
- 16) Bare Metal Epoxy Primer Coat - PPG Delfleet® Evolution corrosion resistance epoxy primer to be applied at 1.0-2.0 mills DFT over clean abraded bare metal.
- 17) Primer Filler Coat - PPG Delfleet® Evolution urethane build primer to achieve total thickness of 3.0-6.0 mills DFT after sanding.
- 18) Base coat (Color) - PPG Delfleet® Evolution High Solids Polyurethane Base coat. Apply 1.0-3.0 mills DFT of base coat color to achieve full hiding.
- 19) Clear coat PPG Delfleet® Evolution polyurethane premium quality clear coat with improved mar resistant finish. The clear coat shall be applied to achieve a total dry film thickness of 2.0-3.0 mills.
- 20) Curing process of the painted body shall go through a force dry/bake cycle process. The painted components shall be baked 180 degrees for 2 hours to achieve a complete coating cure on the finished product.

## **MACHINE POLISHED**

After the force dry/bake cycle and ample cool down time, the coated surface shall be sanded using 1,000, 1,500, and or 3,000 grit sandpaper to remove surface defects. In the final step, the surface shall be buffed then polished to an extra high gloss smooth finish. Total dry film thickness of paint will average between 8.0-12.0 mills.

## **PAINT - ENVIRONMENTAL IMPACT**

The contractor shall meet or exceed all current State (his) regulations concerning paint operations. Pollution control 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 prevent corrosion from dissimilar metals.

## **ELECTROLYSIS CORROSION CONTROL**



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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 sprayout.

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 prevent corrosion under the vehicle.

## **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 WARRANTY**

The vehicle shall be provided with a ten (10) year non-prorated warranty to the original owner. Warranty is provided by PPG Inc. A warranty sheet with all conditions and maintenance procedures shall be provided with the delivered vehicle. **Pro-rated warranties will not be acceptable.**

## **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 AND LETTERING REQUIREMENTS**

### **Material**

All retroreflective materials 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.

All retroreflective materials used that are colors not listed in ASTM D 4956, Section 6.1.1, shall have a minimum coefficient of retroreflection 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 D 4956, Section 6.1.1.

### **Minimum Requirements**

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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 apparatus.

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.

## **GRAPHICS PROOF**

A color graphics proof of the reflective striping and lettering layout shall be provided for approval by SAN MARCOS FIRE DEPARTMENT prior to installation. The graphics proof shall be submitted to SAN MARCOS FIRE DEPARTMENT 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.

## **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 - 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 stripe material shall be 3M Scotchlite 680.

- This reflective stripe shall be white in color.

## **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. Chevron panel shall have a minimum 10 year warranty for material failure, and colorfastness.

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The stripe material shall be 3M Diamond Grade.

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

## **BODY MANUFACTURER TRUCK LOGOS**

The Body Manufacturer's company logos will not be installed on the apparatus and shipped loose with the completed unit.

## **EXTERIOR COMPARTMENT DOORS**

### **ROLL-UP DOOR CONSTRUCTION - ROBINSON (ROM)**

The apparatus shall be equipped with Robinson ROM Series III roll-up exterior compartment doors. Robinson roll-up doors shall be complete with the following features;

- Doors shall be front roll with drum positioned at upper front portion of compartment to afford maximum clearances and head room for mounting equipment to ceiling of compartment
- There shall be a non-abrasive side brush seals
- Every slat must have interlocking end shoes to prevent slat from moving side-to-side and binding the door
- Between each slat must be a co-extruded PVC inner seal to prevent metal-to-metal contact and to repel moisture. This inner seal is not visible to detract from appearance of door
- Slat are to have interlocking joints with a folding locking flange to provide security and prevent penetration by sharp objects
- Slat to be double-wall extrusion 1.366" high by .315" thick. Exterior surface to be flat and interior surface to be concave to prevent loose equipment from interfering with door operation
- Latch system to be a full width one piece lift bar operable by one hand
- A 2" wide finger pull integrated into bottom rail extrusion for easy one hand opening and closing
- Clip system that connects the curtain slats to the operator drum which allows for easy tension adjustment without tools
- Each roll-up door shall have a 4" diameter counterbalance operator drum to assist in lifting the door.
- Track shall be one-piece aluminum that has an attaching flange and finishing flange incorporated into its design
- Drip rail will have specially designed seal that prevents the seal from scratching the door
- Bottom rail extrusion must have smooth back to prevent loose equipment from jamming the door
- Bottom rail to have "V" shaped double seal to prevent water and debris from entering the compartment
- Standard replacement parts to be shipped from the United States and available in as little as 48 hours
- Will be free from manufacturing defects for a period of up to 7 years from date of purchase provided that the Product is used under conditions of normal use, that regular periodic maintenance and service is performed and that the product was installed in accordance with R•O•M's instructions.

Each roll-up door framework shall decrease the compartment door opening by approximately 2.25" and 4.5" in height for standard bottom rail and 6.0" in height for tall bottom rail option.

### **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.

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## **BODY HEIGHT MEASUREMENTS**

The vertical body dimensions shall be as follows:

### **AHEAD OF REAR AXLE**

	<u>Description</u>	<u>Dimension</u>
A	Bottom of Subframe to Top of Body	83.7"
B	Bottom of Subframe to Bottom of Body	22.5"
C	Total Body Height	106.2"
D	Compartment Height Above Frame	48.0"
E	Compartment Height Below Frame	25.0"
F	Vertical Door Opening:	
	-with roll-up door	65.0"
	-with hinged door	68.0"

### **ABOVE REAR AXLE**

	<u>Description</u>	<u>Dimension</u>
G	Vertical Door Opening - Above Rear Wheel	
	-with roll-up door	34.0"
	-with hinged door	37.0"

### **BEHIND REAR AXLE**

	<u>Description</u>	<u>Dimension</u>
H	Bottom of Subframe to Bottom of Body	20.0"
I	Compartment Height Above Frame	48.0"
J	Compartment Height Below Frame	22.5"
K	Vertical Door Opening:	
	-with roll-up door	62.0"
	-with hinged door	65.0"

### **GENERAL**

	<u>Description</u>	<u>Dimension</u>
L	Top of Body to Bottom of Drip Rail	33.5"

(Dimensions are general and subject to change during the actual design process)

## **FIVE (5) UPPER BODY COMPARTMENTS (OPEN)**

The forward transverse compartment shall be 90.0" long x 27.0" wide x 28.5" deep. There shall be four (4) compartments parallel to the sides of the body, two (2) on each side. Each of these compartments shall be 74.0" long x 28.0" wide x 28.5" deep. The side compartments shall be open under each door sill to allow for long equipment. Each compartment shall be integral with the body construction, and will not be bolted or add-on modules. The outside walls of each compartment will be double walled to prevent equipment from denting the outside painted surface.

Each compartment shall have a lift-up type compartment door hinged on the outboard side. Each door shall be fabricated from 3/16" aluminum tread plate. Each door shall have two (2) pneumatic type cylinders, one (1) at each end, attached to cast aluminum brackets mounted to the interior surface of the door to hold the door in both the opened and closed positions. Each door shall be mounted using multiple 16" long, equally spaced, 14 gauge stainless steel hinges, with 1/4" stainless steel pin. A polyester barrier film gasket shall be placed between stainless steel hinge and the body mounting surface as necessary to prevent corrosion caused by dissimilar metals.

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Each compartment door shall overlap a 2" vertical lip on the body roof to prevent entry of moisture and sealed with automotive type rubber molding to provide a weather resistant seal.

Each roof compartment door shall have a chrome 7" handle bolted to center of each door.

Each compartment shall have a 13/16" drain hole located in floor of compartment with a 1" flexible drain tube that terminates below body.

Each compartment shall have a horizontally mounted OnScene Solutions LED light on the underside of the door. The light and NFPA door ajar system shall be automatically activated by an individual switch per compartment.

## **TRANSVERSE ROOF COMPARTMENT - SHELF TRAC**

There front transverse roof compartments shall be provided with four rows of horizontally mounted aluminum shelf trac welded to the walls for vertical partition installation and adjustability.

## **ROOF COMPARTMENT - VERTICAL PARTITION**

There shall be one (1) vertical partition(s) provided in the roof compartment(s). The partitions shall be designed for holding equipment in place during travel. Each partition shall be fabricated from 3/16" smooth aluminum and bolted to specified Shelf Trac for ease of adjustment.

## **SIDE ROOF COMPARTMENT - SHELF TRAC**

There shall be four rows of horizontally mounted aluminum shelf track welded to the walls of the side upper body compartments for vertical partition installation and adjustability.

## **ROOF COMPARTMENT - VERTICAL PARTITION**

There shall be five (5) vertical partition(s) provided in the roof compartment(s). The partitions shall be designed for holding equipment in place during travel. Each partition shall be fabricated from 3/16" smooth aluminum and bolted to specified Shelf Trac for ease of adjustment.

## **UPPER BODY WALKWAY**

A 34" wide, upper body walkway shall be provided at the center of body and recessed into the roof structure. The walkway shall be fabricated from NFPA compliant 3/16" aluminum tread plate with continuously welded cross seams to prevent moisture penetration into apparatus body, No Exceptions. The walkway shall be supported with 2" x 2" tubing on 14" - 22" centers.

13/16" drains shall be installed at front of walkway connected to 1" flexible drain tubes that will terminate below the body.

## **WALKWAY/STEP LIGHTS**

There shall be three (3) OnScene Solutions 9" LED lights provided to illuminate the walkway or step area. The lights shall be activated when the parking brake is set.

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

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Lighting shall provide illumination at a minimum level of 2 fc (20 lx) on all work surfaces, steps, and walkways. Lighting shall be switchable but activated automatically when the vehicle park brake is set.

## **ROOF ACCESS STAIRWAY**

The rear of the body shall be provided with a minimum 34" wide roof access stairway recessed into the side rear compartments. Stairs treads shall be 9 1/2" minimum depth and formed from 3/16" NFPA compliant aluminum tread plate with uniformed riser height design. Stair treads will be continuously welded into side walls. Bolt-in tread design will not be acceptable.

Roll-out ladder design requiring set-up time and 8 plus feet behind apparatus or vertical ladders that do not allow firefighter to safely ascend or descend with equipment will not be acceptable.

## **STAIRWAY HANDRAILS**

There shall be two (2) handrails provided, one (1) on each side wall of recessed center stairway providing three-points of contact at all times for safer access to roof compartments. The handrails shall be angled for optimum use during ingress or egress of the upper walkway area.

Handrails shall be NFPA compliant 1-1/4" knurled 304 stainless steel with welded end stanchions.

## **WALKWAY/STEP LIGHTS**

There shall be two (2) OnScene Solutions 9" LED lights provided to illuminate the walkway or step area. The lights shall be activated when the parking brake is set.

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

Lighting shall provide illumination at a minimum level of 2 fc (20 lx) on all work surfaces, steps, and walkways. Lighting shall be switchable but activated automatically when the vehicle park brake is set.

## **STEP COMPARTMENT(S) - LOWER**

There shall be two (2) compartment(s) located in the roof access stairway area below frame level. Each compartment shall have a horizontally hinged brushed stainless steel door with a D-ring handle. Each compartment shall be manufactured to prevent road debris, dirt and moisture from entering the enclosure. Each compartment(s) shall be 33" wide x 12" high x maximum depth based on chassis mounted components and requirements for structural integrity of the body.

Each compartment shall have an OnScene LED light that shall automatically activate when the door is opened and wired to the NFPA required hazard warning light provided in the cab.

- The hinged door(s) shall have a stainless steel 6" offset bent D-ring locking handle. A gasket shall be placed between handle and door. Door latch shall be a single point latch flush mounted to exterior door panel.

## **STEP COMPARTMENT(S) - INTERMEDIATE**

There shall be one (1) compartment(s) located in the roof access stairway area above frame level. Each compartment shall have a horizontally hinged brushed stainless steel door with a D-ring handle. Each compartment shall be manufactured to prevent road debris, dirt and moisture from entering the enclosure. The compartment(s) shall be 33" wide x 12" high x depth up to the front wall of the rear transverse compartment.

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Each compartment shall have an OnScene LED light that shall automatically activate when the door is opened and wired to the NFPA required hazard warning light provided in the cab.

- The hinged door(s) shall have a stainless steel 6" offset bent D-ring locking handle. A gasket shall be placed between handle and door. Door latch shall be a single point latch flush mounted to exterior door panel.

## **STEP COMPARTMENT - UPPER**

There shall be one (1) upper compartment located directly below walkway area. The compartment shall have a horizontally hinged brushed stainless steel door with a D-ring handle. The compartment shall be manufactured to prevent road debris, dirt and moisture from entering the enclosure. The compartment shall be approximately 26" wide x 8" high x maximum depth available

Each Compartment shall have an OnScene LED light that shall be automatically activated when the door is opened and wired to the NFPA required hazard warning light provided in the cab.

Devices to secure equipment, compartment dividers, or UHMW plastic angles, or sheeting will be used for storage of specified equipment as required to prevent damage to equipment.

- The hinged door(s) shall have a stainless steel 6" offset bent D-ring locking handle. A gasket shall be placed between handle and door. Door latch shall be a single point latch flush mounted to exterior door panel.
- Under walkway step compartment will be open storage with a full, solid compartment floor.

## **FOLD-DOWN STEP**

There shall be one (1) fold-down step located at the bottom of the roof access stairway mounted on top of bumper to reduce the distance from the ground to the first step. The step surface shall be NFPA compliant aluminum treadplate and shall manually fold up into the stairway with an over-center gas shock to hold step in position during travel. The step shall activate the "Hazard Warning Light" in the cab when not in the stowed position.

## **REAR BODY HANDRAILS**

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

## **BODY WIDTH DIMENSIONS**

The body shall be 100.0" wide, not including drip rail or non-permanent fixtures. Interior compartment depth dimensions shall be approximately:

<u>Area Description</u>	<u>Dimension</u>
Transverse Area above Subframe	95.0"
Compartment Depth below Subframe	24.5"

## **STREETSIDE COMPARTMENT - FRONT (S1)**

The interior useable compartment width shall be approximately 56.0" wide.

The compartment door opening shall be approximately 49.0" wide.

This compartment shall have a ROM roll-up door.

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- 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 lower door track.
- A keyed cylinder lock shall be provided in the bottom portion of the roll-up door.
- One (1) nylon strap shall be provided to assist in closing the door. The strap shall be fastened to the left side of the lower inside door sill. The strap shall extend from the left side of the lower inside door sill to a footman loop attached to the center of the left side of the door frame. **Note:** A footman loop will be used to attach the nylon strap to the back of the roll-up door.
- One (1) aluminum drip pan/door finish guard shall be provided with the rollup door.
- A compartment threshold protection plate shall be installed on the bottom edge of the compartment door opening. The threshold protection shall be fabricated from an aluminum extrusion with an anodized exterior finish.

## **COMPARTMENT LAYOUT**

- There shall be vertically mounted aluminum Shelf-Trac 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) 400 lbs. slide-out tray(s) approximately 24" 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.
  - 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front and side faces of the tray. The striping shall be 2" wide and red/white in color.
- 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 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 top shall be fabricated from 3/16" 3003 aluminum sheet shall have welded corners to form a box type tray surface with an internal depth of approximately 3 ½".
  - 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front and side faces of the tray. The striping shall be 2" wide and red/white in color.
- 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) SAN MARCOS FIRE DEPARTMENT supplied stokes basket(s). Manufacturer, model number and dimensions of the stokes basket(s) shall be provided during the pre-construction meeting.



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- The above module will have a solid aluminum door with a double return brake at the top for strength. The door shall have stainless steel plates with round stainless dowels welded onto them to create the latches and hinges for the door.
- 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.
- One (1) Hannay ECR1616-17-18 electric cable reel(s) capable of storing 150' of 10/3 electric cable. Reel(s) shall be designed to hold 110% of the capacity of cord length, with fully enclosed 45 amp, three (3) conductor collector rings. Reel(s) shall be mounted to channel structure that allows for side-to-side adjustment of reel position.
  - Power rewind control(s) shall be in a position where the operator can observe the rewinding operation and not be more than 72 in. (1830 mm) above the operator's standing position, and shall be marked with a label indicating its function.
  - A label shall be provided in a visible location adjacent to reel with following information: Current rating, Current type, Phase, Voltage, and Total cord length.
  - The cable reel shall equipped with 150' of 10/3 SEOW yellow cable, a molded plastic ball clamp, and a single heavy duty L5-30 twist-lock female plug at the end.
- One (1) Akron model EJB series, cast aluminum electrical power distribution box with yellow powder coat painted finish shall be provided. The power distribution box shall meet all requirements described in NFPA 1901. The power distribution box shall include the following outlets mounted on a backlit face plate;
  - The cable on the cord reel will be hard wired to the specified electrical distribution box.
  - One (1) 120 VAC, L5-20 single twist lock receptacle.
  - One (1) 120 VAC, L5-20 single twist lock receptacle.
  - One (1) 120 VAC, 5-20 duplex straight-blade receptacle
  - One (1) 120 VAC, 5-20 duplex straight-blade receptacle
- One (1) Akron formed aluminum treadplate vertical mounting bracket shall be provided for specified power distribution box.
- The fairlead roller shall be mounted directly to the reel.
- Two (2) OnScene 64" Access LED compartment lights, vertically mounted.
- The controls for the specified light tower(s).
- One (1) OnScene 8" Access LED ground light(s) shall be provided below the body.
- The 12 volt electrical distribution panel shall be located in the front compartment above the subframe.

## **STREETSIDE COMPARTMENT - AHEAD OF REAR WHEELS (S2)**

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The interior useable compartment width shall be approximately 56.0" wide.

The compartment door opening shall be approximately 49.0" wide.

This compartment shall have a ROM roll-up door.

- 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 lower door track.
- A keyed cylinder lock shall be provided in the bottom portion of the roll-up door.
- One (1) nylon strap shall be provided to assist in closing the door. The strap shall be fastened to the left side of the lower inside door sill. The strap shall extend from the left side of the lower inside door sill to a footman loop attached to the center of the left side of the door frame. **Note:** A footman loop will be used to attach the nylon strap to the back of the roll-up door.
- One (1) aluminum drip pan/door finish guard shall be provided with the rollup door.
- A compartment threshold protection plate shall be installed on the bottom edge of the compartment door opening. The threshold protection shall be fabricated from an aluminum extrusion with an anodized exterior finish.

## **COMPARTMENT LAYOUT**

- There shall be vertically mounted aluminum Shelf-Trac 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 46" deep. Each shelf shall be fabricated from 3/16" 3003 aluminum sheet with a 2" vertical flange along the front and rear edges.
  - 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front face of the shelf. The striping shall be red/white in color.
- There shall be one (1) 400 lbs. slide-out tray(s) approximately 24" 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.
  - 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front and side faces of the tray. The striping shall be 2" wide and red/white in color.
- 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 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%

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extended positions. Each tray top shall be fabricated from 3/16" 3003 aluminum sheet shall have welded corners to form a box type tray surface with an internal depth of approximately 3 ½".

- 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front and side faces of the tray. The striping shall be 2" wide and red/white in color.
- There shall be one (1) OnScene Solutions 84 series aluminum tray base with 90% extension, and rating of 150 lbs. Slide-out tray(s) base shall be approximately 46" deep and as wide as the compartment layout or door opening permits. It shall be located above the level of the chassis frame rails and shall be vertically adjustable in height. Each slide shall have a cable operated, spring loaded latch complimented by a large hand opening and red pull handle (Pull to Release) which will hold the tray in the closed position. Each tray shall be fabricated from 3/16" 3003 aluminum sheet and have welded corners to form a box type tray surface with an internal depth of approximately 3 ½".
- 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front and side faces of the tray. The striping shall be 2" wide and red/white in color.
- There shall be one (1) air bag storage module(s). The module shall be fabricated from 1/8" (.125) 3003H-14 aluminum alloy sheet. Circular notches shall be provided along the front edge to ease the access to the air bags. Each bay shall be sized to hold the air bag and a matching piece of 1/2" plywood (plywood not provided). The make, model, qty and exact dimensions of the air bags shall be provided by the department prior to or during the pre-construction meeting.
- There shall be four (4) OnScene Solutions velcro cargo straps provided to secure the stored equipment.
- 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.
- Two (2) OnScene 64" Access LED compartment lights, vertically mounted.
- One (1) OnScene 8" Access LED ground light(s) shall be provided below the body.
- Two (2) 3-1/2" x 3-1/2" black plastic louvered vents shall be provided in the lower compartment.

## **STREETSIDE COMPARTMENT - ABOVE REAR WHEELS (S3)**

The interior useable compartment width shall be approximately 59.0" wide.

The compartment door opening shall be approximately 52.0" wide.

This compartment shall have a ROM roll-up door.

- 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 lower door track.
- A keyed cylinder lock shall be provided in the bottom portion of the roll-up door.

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- One (1) nylon strap shall be provided to assist in closing the door. The strap shall be fastened to the left side of the lower inside door sill. The strap shall extend from the left side of the lower inside door sill to a footman loop attached to the center of the left side of the door frame. **Note:** A footman loop will be used to attach the nylon strap to the back of the roll-up door.
- One (1) aluminum drip pan/door finish guard shall be provided with the rollup door.
- A compartment threshold protection plate shall be installed on the bottom edge of the compartment door opening. The threshold protection shall be fabricated from an aluminum extrusion with an anodized exterior finish.

## **COMPARTMENT LAYOUT**

- Two (2) OnScene 36" Access LED compartment lights, vertically mounted.
- A Bauer model BP-13H-E3 air compressor with a recharging rate of 13.0 SCFM @ 6,000 PSI shall be provided, . Compressor skid shall include 13 HP, 3-phase soft start electric motor, P5 Securus purification system, electronic CO monitor with calibration kit, and fill station inter-connecting harness. Compressor module shall be approximately 53.5" L x 33.5" W x 37.5" H and weigh 700 pounds.
- Air storage consisting of four (4) ASME 491 SCF @ 6,000 PSI, (does not require hydrostatic testing) air storage cylinders with gauges and valves. Each cylinder shall be 9.6" dia. x 55" long and weigh 400 lbs.
  - There will be a heavy walled welded steel rack with powder coat painted hammertone gray finish to hold all DOT or ASME cylinders.
  - An Appleton inlet and base for providing shore power shall be provided for operating compressor system from in-house electrical building system. The matching Appleton plug shall be provided loose with delivered unit. Any building wiring shall be responsibility of SAN MARCOS FIRE DEPARTMENT.
- The Bauer compressor shall be free from defects in material and workmanship for a period of two (2) years. The foregoing warranty period shall be extended to five (5) years from the date of shipment from Bauer for Customers that are Municipal Fire Departments with respect to the compressor block (breathing air application), provided that such extended warranty period shall only apply to product parts with proof of proper maintenance being completed in accordance with published Bauer factory recommendations. To be eligible for this limited warranty to cover Customer's product, Customer must return a properly completed start-up/warranty registration form to Bauer within ninety (90) days from the date of start-up.
- Training and instruction shall be provided by compressor manufacturer at SAN MARCOS FIRE DEPARTMENT location on proper use of complete air compressor system.
- The NFPA required air quality test shall be completed by manufacturer prior to delivery. Complete results of test shall be provided to SAN MARCOS FIRE DEPARTMENT upon delivery.

## **STREETSIDE COMPARTMENT - REAR (S4)**

The interior useable compartment width shall be approximately 64.0" wide.

The compartment door opening shall be approximately 57.0" wide.

This compartment shall have a ROM roll-up door.

- The roll-up door shall have an unpainted satin aluminum finish on the door slats and the door trim

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components.

- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior lower door track.
- A keyed cylinder lock shall be provided in the bottom portion of the roll-up door.
- One (1) nylon strap shall be provided to assist in closing the door. The strap shall be fastened to the left side of the lower inside door sill. The strap shall extend from the left side of the lower inside door sill to a footman loop attached to the center of the left side of the door frame. **Note:** A footman loop will be used to attach the nylon strap to the back of the roll-up door.
- One (1) aluminum drip pan/door finish guard shall be provided with the rollup door.
- A compartment threshold protection plate shall be installed on the bottom edge of the compartment door opening. The threshold protection shall be fabricated from an aluminum extrusion with an anodized exterior finish.

## **COMPARTMENT LAYOUT**

- There shall be vertically mounted aluminum Shelf-Trac 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 floor of the compartment above the frame rails shall cover the area directly above the frame rails ONLY (non-extended floor).
- Two (2) OnScene 64" Access LED compartment lights, vertically mounted.
- One (1) Bauer model CFS5.5 2M, NFPA 1901 compliant containment type two (2) cylinder filling station with compressor controls rated for cylinder pressures up to 5,500 PSI shall be provided with proper reinforcement for weight of fill station and venting thru floor opening. Fill station will be approximately 35.5" wide x 50.25" high x 21" deep, and weigh approximately 863 lbs.
  - Filling operation shall be controlled with manual controls mounted on front of fill station. An air flow selector valve to fill from either compressor or storage, and manual valves and gauges for each air storage cylinder (maximum of four (4)).
  - An air storage refill port shall be provided on the fill station.
  - The fill station fill whip(s) shall terminate in a high pressure CGA-347 threaded connectors for 4,500 - 5,500 PSI air pack cylinders.
- One (1) OnScene 8" Access LED ground light(s) shall be provided below the body.
- Two (2) 3-1/2" x 3-1/2" black plastic louvered vents shall be provided in the lower compartment.

## **CURBSIDE COMPARTMENT - FRONT (C1)**

The interior useable compartment width shall be approximately 56.0" wide.

The compartment door opening shall be approximately 49.0" wide.

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This compartment shall have a ROM roll-up door.

- 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 lower door track.
- A keyed cylinder lock shall be provided in the bottom portion of the roll-up door.
- One (1) nylon strap shall be provided to assist in closing the door. The strap shall be fastened to the left side of the lower inside door sill. The strap shall extend from the left side of the lower inside door sill to a footman loop attached to the center of the left side of the door frame. **Note:** A footman loop will be used to attach the nylon strap to the back of the roll-up door.
- One (1) aluminum drip pan/door finish guard shall be provided with the rollup door.
- A compartment threshold protection plate shall be installed on the bottom edge of the compartment door opening. The threshold protection shall be fabricated from an aluminum extrusion with an anodized exterior finish.

## **COMPARTMENT LAYOUT**

- There shall be vertically mounted aluminum Shelf-Trac 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) 400 lbs. slide-out tray(s) approximately 24" 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.
  - 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front and side faces of the tray. The striping shall be 2" wide and red/white in color.
- There shall be one (1) 400 lbs. slide-out tray(s) approximately 24" deep and as wide as the compartment layout or door opening permits. Each tray shall be vertically adjustable. Each 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.
  - 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front and side faces of the tray. The striping shall be 2" wide and red/white in color.
- 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.)

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- 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front and side faces of the tray. The striping shall be 2" wide and red/white in color.
- There shall be one (1) OnScene Solutions 84 series aluminum tray base with 90% extension, and rating of 150 lbs. Slide-out tray(s) base shall be approximately 46" deep and as wide as the compartment layout or door opening permits. It shall be located above the level of the chassis frame rails and shall be vertically adjustable in height. Each slide shall have a cable operated, spring loaded latch complimented by a large hand opening and red pull handle (Pull to Release) which will hold the tray in the closed position. Each tray shall be fabricated from 3/16" 3003 aluminum sheet and have welded corners to form a box type tray surface with an internal depth of approximately 3 ½".
  - 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front and side faces of the tray. The striping shall be 2" wide and red/white in color.
- There shall be a transverse storage module which extends from the opposite side of the body (specified in opposite side compartment).
  - The above module will have a solid aluminum door with a double return brake at the top for strength. The door shall have stainless steel plates with round stainless dowels welded onto them to create the latches and hinges for the door.
- 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.
- One (1) Hannay ECR1616-17-18 electric cable reel(s) capable of storing 150' of 10/3 electric cable. Reel(s) shall be designed to hold 110% of the capacity of cord length, with fully enclosed 45 amp, three (3) conductor collector rings. Reel(s) shall be mounted to channel structure that allows for side-to-side adjustment of reel position.
  - Power rewind control(s) shall be in a position where the operator can observe the rewinding operation and not be more than 72 in. (1830 mm) above the operator's standing position, and shall be marked with a label indicating its function.
  - A label shall be provided in a visible location adjacent to reel with following information: Current rating, Current type, Phase, Voltage, and Total cord length.
  - The cable reel shall equipped with 150' of 10/3 SEOW yellow cable, a molded plastic ball clamp, and a single heavy duty L5-30 twist-lock female plug at the end.
- One (1) Akron model EJB series, cast aluminum electrical power distribution box with yellow powder coat painted finish shall be provided. The power distribution box shall meet all requirements described in NFPA 1901. The power distribution box shall include the following outlets mounted on a backlit face plate;
  - The cable on the cord reel will be hard wired to the specified electrical distribution box.
  - One (1) 120 VAC, L5-20 single twist lock receptacle.
  - One (1) 120 VAC, L5-20 single twist lock receptacle.
  - One (1) 120 VAC, 5-20 duplex straight-blade receptacle
  - One (1) 120 VAC, 5-20 duplex straight-blade receptacle

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- One (1) Akron formed aluminum treadplate vertical mounting bracket shall be provided for specified power distribution box.
- The fairlead roller shall be mounted directly to the reel.
- Two (2) OnScene 64" Access LED compartment lights, vertically mounted.
- The cab tilt control pendant.
- One (1) OnScene 8" Access LED ground light(s) shall be provided below the body.

## **CURBSIDE COMPARTMENT - AHEAD OF REAR WHEEL (C2)**

The interior useable compartment width shall be approximately 56.0" wide.

The compartment door opening shall be approximately 49.0" wide.

This compartment shall have a ROM roll-up door.

- 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 lower door track.
- A keyed cylinder lock shall be provided in the bottom portion of the roll-up door.
- One (1) nylon strap shall be provided to assist in closing the door. The strap shall be fastened to the left side of the lower inside door sill. The strap shall extend from the left side of the lower inside door sill to a footman loop attached to the center of the left side of the door frame. **Note:** A footman loop will be used to attach the nylon strap to the back of the roll-up door.
- One (1) aluminum drip pan/door finish guard shall be provided with the rollup door.
- A compartment threshold protection plate shall be installed on the bottom edge of the compartment door opening. The threshold protection shall be fabricated from an aluminum extrusion with an anodized exterior finish.

## **COMPARTMENT LAYOUT**

- There shall be vertically mounted aluminum Shelf-Trac 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 46" deep. Each shelf shall be fabricated from 3/16" 3003 aluminum sheet with a 2" vertical flange along the front and rear edges.
  - 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front face of the shelf. The striping shall be red/white in color.



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- There shall be one (1) 400 lbs. slide-out tray(s) approximately 24" 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.
  - 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front and side faces of the tray. The striping shall be 2" wide and red/white in color.
- There shall be one (1) 400 lbs. slide-out tray(s) approximately 24" deep and as wide as the compartment layout or door opening permits. Each tray shall be vertically adjustable. Each 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.
  - 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front and side faces of the tray. The striping shall be 2" wide and red/white in color.
- 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.)
- There shall be one (1) OnScene Solutions 84 series aluminum tray base with 90% extension, and rating of 150 lbs. Slide-out tray(s) base shall be approximately 46" deep and as wide as the compartment layout or door opening permits. It shall be located above the level of the chassis frame rails and shall be vertically adjustable in height. Each slide shall have a cable operated, spring loaded latch complimented by a large hand opening and red pull handle (Pull to Release) which will hold the tray in the closed position. Each tray shall be fabricated from 3/16" 3003 aluminum sheet and have welded corners to form a box type tray surface with an internal depth of approximately 3 ½".
  - 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front and side faces of the tray. The striping shall be 2" wide and red/white in color.
- There shall be one (1) air bag storage module(s). The module shall be fabricated from 1/8" (.125) 3003H-14 aluminum alloy sheet. Circular notches shall be provided along the front edge to ease the access to the air bags. Each bay shall be sized to hold the air bag and a matching piece of 1/2" plywood (plywood not provided). The make, model, qty and exact dimensions of the air bags shall be provided by the department prior to or during the pre-construction meeting.
  - There shall be four (4) OnScene Solutions velcro cargo straps provided to secure the stored equipment.
- 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.
- Two (2) OnScene 64" Access LED compartment lights, vertically mounted.
- One (1) OnScene 8" Access LED ground light(s) shall be provided below the body.
- Two (2) 3-1/2" x 3-1/2" black plastic louvered vents shall be provided in the lower compartment.

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## **CURBSIDE COMPARTMENT - ABOVE REAR WHEEL (C3)**

The interior useable compartment width shall be approximately 59.0" wide.

The compartment door opening shall be approximately 52.0" wide.

This compartment shall have a ROM roll-up door.

- 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 lower door track.
- A keyed cylinder lock shall be provided in the bottom portion of the roll-up door.
- One (1) nylon strap shall be provided to assist in closing the door. The strap shall be fastened to the left side of the lower inside door sill. The strap shall extend from the left side of the lower inside door sill to a footman loop attached to the center of the left side of the door frame. **Note:** A footman loop will be used to attach the nylon strap to the back of the roll-up door.
- One (1) aluminum drip pan/door finish guard shall be provided with the rollup door.
- A compartment threshold protection plate shall be installed on the bottom edge of the compartment door opening. The threshold protection shall be fabricated from an aluminum extrusion with an anodized exterior finish.

## **COMPARTMENT LAYOUT**

- Two (2) OnScene 36" Access LED compartment lights, vertically mounted.
- One (1) 120/240 VAC load center.
- The generator gauge panel.
- Breathing air compressor system (opposite side).

## **CURBSIDE COMPARTMENT - REAR (C4)**

The interior useable compartment width shall be approximately 64.0" wide.

The compartment door opening shall be approximately 57.0" wide.

This compartment shall have a ROM roll-up door.

- 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 lower door track.
- A keyed cylinder lock shall be provided in the bottom portion of the roll-up door.

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- One (1) nylon strap shall be provided to assist in closing the door. The strap shall be fastened to the left side of the lower inside door sill. The strap shall extend from the left side of the lower inside door sill to a footman loop attached to the center of the left side of the door frame. **Note:** A footman loop will be used to attach the nylon strap to the back of the roll-up door.
- One (1) aluminum drip pan/door finish guard shall be provided with the rollup door.
- A compartment threshold protection plate shall be installed on the bottom edge of the compartment door opening. The threshold protection shall be fabricated from an aluminum extrusion with an anodized exterior finish.

## **COMPARTMENT LAYOUT**

- There shall be vertically mounted aluminum Shelf-Trac 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) 400 lbs. slide-out tray(s) approximately 24" 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.
  - 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front and side faces of the tray. The striping shall be 2" wide and red/white in color.
- There shall be two (2) 400 lbs. slide-out tray(s) approximately 24" deep and as wide as the compartment layout or door opening permits. Each tray shall be vertically adjustable. Each 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.
  - 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front and side faces of the tray. The striping shall be 2" wide and red/white in color.
- There shall be two (2) OnScene Solutions 84 series aluminum tray base with 90% extension, and rating of 150 lbs. Slide-out tray(s) base shall be approximately 46" deep and as wide as the compartment layout or door opening permits. It shall be located above the level of the chassis frame rails and shall be vertically adjustable in height. Each slide shall have a cable operated, spring loaded latch complimented by a large hand opening and red pull handle (Pull to Release) which will hold the tray in the closed position. Each tray shall be fabricated from 3/16" 3003 aluminum sheet and have welded corners to form a box type tray surface with an internal depth of approximately 3 ½".
  - 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front and side faces of the tray. The striping shall be 2" wide and red/white in color.
- There shall be one (1) slide-out smooth aluminum vertical tool board(s) approximately 24" deep. Each tool board(s) vertical exterior edge shall have a double 90 degree formed edge to provide an easy grip handle. The top and bottom of tool board(s) shall be provided with Accuride 9300 series slide tracks. Each board shall

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be rated for a maximum 200 lbs. evenly distributed load. Each tool board shall utilize a pneumatic cylinder to hold the tool board in both the opened and closed positions.

- The vertical tool board material shall be 3/16" (.188) 3003H-14 aluminum alloy sheet.
- Each tool board shall be horizontally adjustable; mounted on aluminum shelf trac on compartment floor.
- 3M™ Diamond Grade™ Conspicuity striping shall be provided on both sides of the toolboard. The striping shall be 2" wide and red/white in color.
- There shall be one (1) bolt-in vertical compartment partition(s) provided dividing the compartment into left and right sides. The vertical partition(s) shall be 3/16" (.188) 3003H-14 alloy smooth aluminum sheet.
- 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 64" Access LED compartment lights, vertically mounted.
- 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.
- One (1) OnScene 8" Access LED ground light(s) shall be provided below the body.
- Two (2) 3-1/2" x 3-1/2" black plastic louvered vents shall be provided in the lower compartment.

## **ROOF ACCESS STAIRWAY**

The rear of the body shall be provided with a recessed center stairway with minimum 34" width. Stairs treads shall be 9.5" minimum depth and formed from 3/16" NFPA compliant aluminum tread plate with uniformed maximum riser height of 12". Roll-out ladder design requiring set-up time and 8 plus feet behind apparatus or vertical ladders that do not allow firefighter to safely ascend or descend with equipment will not be acceptable.

## **STAIRWAY HANDRAILS**

There shall be two (2) handrails provided, one (1) on each side wall of recessed center stairway providing three-points of contact at all times for safer access to roof compartments. The handrails shall be angled for optimum use during ingress or egress of the upper walkway area.

Handrails shall be NFPA compliant 1-1/4" knurled 304 stainless tubing with welded end stanchions.

## **UPPER BODY COMPARTMENT - STREETSIDE**

Above the exterior streetside compartments shall be an upper body compartment for storage of long equipment. The compartment shall be integral with the body construction, and will not be bolted or added on modules. The outside walls of compartment will be double walled to prevent equipment from denting the outside painted surface. The compartment shall be approximately (insert actual dimensions).

Access to the compartment shall be from a rear facing lift-up compartment door. Door shall be fabricated from 3/16" smooth aluminum with full length 14 gauge stainless steel hinge, with 1/4" stainless steel pin, 6" non-locking stainless steel "D" ring handle, and a gas cylinder door holder. A polyester barrier film gasket shall be placed between stainless steel hinge and any dissimilar metals as necessary to prevent corrosion. Door shall overlap

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body surface to prevent entry of moisture and sealed with automotive type rubber molding to provide a weather resistant seal.

Compartment shall have a flush mounted light near door opening that will be automatically activated when door is opened, and wired to compartment door ajar warning light provided in cab.

Devices to secure equipment, compartment dividers, or UHMW plastic angles, or sheeting will be used for storage of specified equipment as required to prevent damage to equipment.

The compartment will be designed to store the following equipment:

- One (1) pieces of wood lumber. Size of lumber to be provided during the pre-construction meeting.

## **UPPER BODY COMPARTMENT - CURBSIDE**

Above the exterior curbside compartments shall be an upper body compartment for storage of long equipment. The compartment shall be integral with the body construction, and will not be bolted or added on modules. The outside walls of compartment will be double walled to prevent equipment from denting the outside painted surface. The compartment shall be approximately (insert actual dimensions).

Access to the compartment shall be from a rear facing lift-up compartment door. Door shall be fabricated from 3/16" smooth aluminum with full length 14 gauge stainless steel hinge, with 1/4" stainless steel pin, 6" non-locking stainless steel "D" ring handle, and a gas cylinder door holder. A polyester barrier film gasket shall be placed between stainless steel hinge and any dissimilar metals as necessary to prevent corrosion. Door shall overlap body surface to prevent entry of moisture and sealed with automotive type rubber molding to provide a weather resistant seal.

Compartment shall have a flush mounted light near door opening that will be automatically activated when door is opened, and wired to compartment door ajar warning light provided in cab.

Devices to secure equipment, compartment dividers, or UHMW plastic angles, or sheeting will be used for storage of specified equipment as required to prevent damage to equipment.

The compartment will be designed to store the following equipment:

- One (1) pieces of wood lumber. Size of lumber to be provided during the pre-construction meeting.

## **PLASTIC FLOOR AND SHELF TILE**

All compartment floors, shelves, and trays shall be covered with Turtle Tile plastic interlocking grating.

- The plastic floor tile shall be black.
- The plastic edge trim shall be yellow.

## **ROPE TIE-OFF OR PORTABLE WINCH RECEIVERS**

The completed unit shall have an integrated receiver system for use with rope tie-off accessory and/or a portable electric winch component, when specified.

Each side receiver (if specified) shall have the following load rating:

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

Each front and/or rear receiver (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;

- Two (2) rope anchor point receiver(s) shall be provided and located on body roof area, one (1) per side, directly to the rear of the upper transverse roof compartment. The receiver(s) shall be manufactured using 2" x 2" x 1/4" wall steel trailer style receiver tube and 1/2" steel plate. The receiver assembly shall be powder coat painted gray. Each receiver location shall have a stainless steel scuff plate to protect paint on upper body. Reinforcements to body shall be added as necessary to increase the structural integrity and to provide a working weight rating of 600 lbs., with a 9,000 lbs. maximum load based upon using a 15:1 safety factor to match typical 1/2" rescue rope ratings.
- Six (6) rope tie-off anchor accessories shall be provided with the completed vehicle. Each anchor accessory shall include a hitch pin to lock it in place. The tie off anchor accessories shall have an eyelet for use with a rope rescue carabineer. A mounting bracket shall be provided to store each rope tie off accessory in a body compartment as close to receiver as possible.
- One (1) Ramsey model QM9000, 9,000 lb. 12 volt electric winch shall be furnished with the completed unit. It shall be capable of being stored in a compartment and mounted to the apparatus by inserting the mounting point into a properly rated receiver. A minimum of 105' of 5/16" stranded galvanized steel cable with pinned utility hook shall be installed on the drum. A 25' remote control shall be provided with the assembly that permits the operator to stand at a safe operating distance from the cable and winch.
- There shall be one (1) 2" receiver tube(s) located at the front bumper for use with rope tie-off accessory and/or a portable electric winch.
  - 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.
- There shall be two (2) 2" receiver tube(s) located on the streetside below body ahead of rear wheels (50" center-center from roof tie-off location) for use with rope tie-off accessory.
  - The receiver(s) shall have two (2) rubber cover(s) provided.
- There shall be two (2) 2" receiver tube(s) located on the curbside below body ahead of rear wheels (50" center-center from roof tie-off location) for use with rope tie-off accessory.
  - The receiver(s) shall have two (2) rubber cover(s) provided.
- The rear center mounted trailer hitch shall be compatible with a pinnable rope tie-off accessory and/or a portable electric winch.

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- 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.

## **SIDE BODY PROTECTION - RUB RAIL**

OnScene Solutions rub rails shall be provided below the compartment door openings on both the streetside and curbside.

The rub rail shall be fabricated from 6063 extruded aluminum, measuring approximately 2-3/4" high x 1-3/8" thick with tapered aluminum end caps. The rub rail shall be bolted to the body using stainless steel bolts and 1-1/2" diameter x 5/8" thick rubber mount isolators to prevent damage to the body.

The rails shall incorporate LED clearance marker lighting recessed into the rail fascia to avoid damage to the light in case of impact. The rub rail shall have an accessory mounting track integrated into the backside of the rail to allow mounting of accessories such as ground lighting.

3M™ Diamond Grade™ Conspicuity striping shall be provided in the rub rail. The striping shall be red/white in color.

## **ROLL-OUT AWNING STREETSIDE**

A Carefree Mirage, 110 Volt AC powered, Lateral Arm Acrylic Patio Awning with Direct Response Electronics shall be installed on the apparatus body. The Direct Response Electronics includes easy-to-use controls and a Motion Detection System. The awning shall have a system to detect canopy motion, the most important element to prevent wind/weather damage. The awning shall automatically retract when the canopy reaches a certain level of movement - you determine the movement level on the control panel.

The awning shall activate the door ajar warning system in the cab when not in the stowed position.

The 110V motor shall be completely sealed and UL approved. The awning pitch shall be adjusted to up to 30"

The awning shall be 20' wide with a 10' projection. (Size refers to box length; actual fabric length will be 8" shorter.)

The Mirage shall be covered by a "Two and Four" Limited Warranty - Two years 100% parts, labor, & freight on canopy, four years 100% parts, labor, and freight on motor, electronics, roller & hardware. Warranty covers manufacturer's defects only. Wind and rain damage are not covered.

- The awning fabric color shall be ivory.

The specified awning above shall be surface mounted to upper body side. The awning shall add approximately 5.75" to body width.

## **AWNING HOUSING COLOR**

The awnings standard Polar White vinyl housing color shall be re-painted to match upper body color.

## **LOW VOLTAGE ELECTRICAL SYSTEM- 12 VDC**

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## 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 overcurrent protective devices. Such devices shall be readily accessible and protected against heat in excess of the overcurrent 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.



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

- 21) SAE J156, *Fusible Links*
- 22) SAE J553, *Circuit Breakers*
- 23) SAE J554, *Electric Fuses (Cartridge Type)*
- 24) SAE J1888, *High Current Time Lag Electric Fuses*
- 25) 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

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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 MULTIPLEX CONTROL CENTER**

The apparatus shall be equipped with a Weldon V-MUX multiplexed 12 volt electrical system that will provide complete diagnostic capability, No Exception. The system shall have the capability of delivering multiple signals via a CAN bus, utilizing specifications set forth by SAE J1939. The system shall be node based to maximize stability so that failure of one node does not affect the operation of the other nodes. The system shall use shielded twisted-pair wire for transmission of system function signals. The shielded wire shall provide protection against EMI and RFI noise interruptions.

The multiplex system shall be responsible for providing power management functions as well as load shedding. The warning light system shall be controlled by the multiplex system. The system shall be capable of displaying text and/or graphic messages on a display module. The system shall be based on solid-state technology and shall include self-contained diagnostic indicators.

## **WELDON CERTIFICATION**

A letter shall be provided with bid submittal that the Contractor has successfully completed the Weldon training requirements for Level 1 of the V-MUX Certified Supplier Program and is authorized to design, build, and service V-MUX electrical systems.

The apparatus shall be equipped with a Weldon V-MUX multiplexed 12 volt electrical system that will provide complete diagnostic capability, No Exception. The system shall have the capability of delivering multiple signals via a CAN bus, utilizing specifications set forth by SAE J1939. The system shall be node based to maximize stability so that failure of one node does not affect the operation of the other nodes. The system shall use shielded twisted-pair wire for transmission of system function signals. The shielded wire shall provide protection against EMI and RFI noise interruptions.

The multiplex system shall be responsible for providing power management functions as well as load shedding. The warning light system shall be controlled by the multiplex system. The system shall be capable of displaying text and/or graphic messages on a display module. The system shall be based on solid-state technology and shall include self-contained diagnostic indicators.

## **MULTIPLEX SYSTEM COLOR DISPLAY**

The Weldon multiplex system display(s) shall be provided by the cab/chassis manufacturer. The display panel(s) shall be the point of interaction with the entire 12 volt electrical system. The display(s) shall respond with text and graphic images to provide fault and condition messages to the operator.

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## **BATTERY SYSTEM**

The battery connectors 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.

Batteries shall be of the high-cycle type. With the engine off, the battery system shall be able to provide the minimum continuous electrical load for 10 minutes without discharging more than 50 percent of the reserve capacity and then to restart the engine. The battery system cold cranking amps (CCA) rating shall meet or exceed the minimum CCA recommendations of the engine manufacturer. The batteries shall be mounted to prevent movement during fire apparatus operation and shall be protected against accumulations of road spray, snow, and road debris. The batteries shall be readily accessible for examination, testing, and maintenance.

A means shall be provided for jump-starting the engine if the batteries are not accessible without lifting the cab of a tilt-cab apparatus.

Where 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.

A master load disconnect switch shall be provided between the starter solenoid(s) and the remainder of the electrical loads on the apparatus. The starter solenoids shall be connected directly to the batteries.

Electronic control systems and similar devices shall be permitted to be otherwise connected if so specified by their manufacturer.

The alternator shall be wired directly to the batteries through the ammeter shunt(s), if one is provided, and not through the master load disconnect switch.

A green "battery on" pilot light that is visible from the driver's position shall be provided.

A sequential switching device shall be permitted to energize the optical warning devices and other high current devices required in minimum continuous electrical load, provided the switching device shall first energize the electrical devices required in minimum continuous electrical load within five (5) seconds.

## **BATTERY SWITCH**

One (1) battery "On/Off" switch in cab located within easy reach of Driver with green "BATTERY ON" pilot light that is visible from the driver's position shall be provided. The switch and pilot light shall be supplied and installed by the cab/chassis manufacturer.

## **BATTERY SOLENOID**

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

## **BATTERY CONDITIONER**

The battery conditioner shall be supplied and installed by the cab chassis manufacturer.

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## **ENGINE COMPARTMENT LIGHT**

Engine compartment light(s) shall be supplied and installed by the cab chassis manufacturer.

## **CAB HAZARD WARNING LIGHT**

A red flashing or rotating light, located in the driving compartment. The light shall be furnished by the cab/chassis manufacturer. The light shall 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 ft<sup>3</sup> (0.1 m<sup>3</sup>).
- The compartment has an opening less than or equal to 144 in.<sup>2</sup> (92,900 mm<sup>2</sup>).
- 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".

## **BACK-UP ALARM**

An electronic back-up alarm shall be supplied and installed by the cab/chassis manufacturer. The back-up alarm shall actuate automatically when the transmission gear selector is placed in reverse. **Note:** The Body Manufacturer will program the back-up alarm to be switched off by the V-Mux system

## **REAR VIEW CAMERA**

The cab chassis provided rear view camera shall be installed on the rear of the body.

## **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 M9 Series M9T amber LED turn signal lights
- Two (2) Whelen M9 Series M9BTTX red LED stop/tail lights
- Two (2) Whelen M9 Series M9BUW LED back-up lights with clear lens

Each of the lights above shall be mounted in a M9FC, chrome finish bezel.

## **MIDSHIP MARKER/TURN SIGNAL**

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Two (2) Whelen model T0A00MAR 2" round amber LED midship body clearance marker/turn signal lights shall be provided and installed, one (1) light on each side of the body, in forward wheel well of rear axle. Midship marker/turn lights shall be wired to the headlight circuit of the chassis.

## **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 Model 18 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**

The step lights and/or ground lights shall be supplied and installed by the cab/chassis manufacturer. Light(s) shall be 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 LIGHT**

One (1) Arrow #437 chrome plated LED license plate light shall be installed on the rear of the body. License plate light shall be wired to the headlight circuit of chassis. A fastener system shall be provided for license plate installation.

## **ELECTRONIC SIREN**

The siren control head shall be supplied and installed by the cab/chassis manufacturer. Siren power shall be wired through the master warning light switch.

## **SIREN SPEAKER**

The siren speaker(s) shall be supplied and installed by the cab/chassis manufacturer.

## **FRONT CAB MOUNTED SCENE LIGHT(S)**

Floodlight(s) shall be provided on the front of the cab by the cab/chassis manufacturer. Scene lights shall be provided with a lens or a means for preventing damage from water spray and shall be listed for wet location usage.

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.

One (1) switch shall be provided for front scene lights.

The lights shall be switched at the Vista display in the cab.

## **REAR SCENE LIGHTS - LED**

Two (2) Whelen Pioneer Plus PCP2 dual combination floodlight and 8 degree spotlight on the upper rear body, one (1) each side. Lights shall be 12 VDC, 12 amp, 150 watt, with 7,000/7,000 useable lumens.

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Each light shall be mounted in PBA203 mounting bracket, semi recessed into the apparatus body with chrome trim ring housing. The light mounts will provide either a straight out, 0 degree or a 15 degree downward angle.

The lights shall be switched at the Vista display in the cab.

The rear scene lights shall also be activated when the apparatus is in reverse.

## **TRAFFIC ADVISOR LIGHT**

The traffic advisor shall be comprised of eight (8) Whelen ION Series #WION-SMC-A Super LED lights, individually mounted with chrome bezels to the rear face of the vehicle and evenly distributed, if split by a hose bed, or walkway.

The lights shall be amber with a clear lens and controlled by a Whelen #TACTLP1 controller.

## **DAVID CLARK INTERCOM SYSTEM (CONTRACTOR SUPPLIED AND INSTALLED)**

A David Clark intercom system shall be provided and installed by the Contractor at their facility.

## **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

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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.

## 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

There shall be one (1) Whelen Edge FN72QLED LED 72" 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 Linear LED	Clear
2	Red Front Corner Linear LED	Clear
3	Clear Linear LED	Clear
4	Clear Linear LED	Clear
5	Blue Linear LED	Clear
6	Red Linear LED	Clear
7	Red Linear LED (Opticom if specified)	Clear
8	Red Linear LED (Opticom if specified)	Clear
9	Red Linear LED	Clear
10	Green Linear LED	Clear
11	Clear Linear LED	Clear
12	Red Linear LED	Clear
13	Red Front Corner Linear LED	Clear
14	Red Side Linear 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 shall be separately switched at the vista display in the cab.

## ZONES B AND D - SIDE WARNING LIGHTS

## UPPER REAR CORNER WARNING LIGHTS

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There shall be two (2) Whelen M9 series Red/Blue split Linear Super-LED lights (M9J) provided, one (1) each side. Each light shall have a clear lens and chrome flange.

The lights shall be switched at the 12 volt control panel in the cab.

## UPPER FORWARD CORNER WARNING LIGHTS

There shall be two (2) Whelen 900 series (9" x 7") Red/Blue split Linear Super-LED lights (90RB5FCR) provided, one (1) each side. Each light shall have a clear lens and chrome flange.

The lights shall be switched at the Vista display in the cab.

## ZONE C - REAR WARNING LIGHTS

There shall be two (2) Whelen M9 series Red Linear Super-LED lights (M9RC) provided, one (1) each side. Each light shall have a clear lens and chrome flange.

The lights shall be switched at the Vista display in the 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 1220 mm) above level ground for small apparatus.

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.

## ZONE A - FRONT WARNING LIGHTS

The warning lights shall be supplied and installed by the cab/chassis manufacturer. They shall be Whelen lights to complete an NFPA compliant lower level warning light system.

The lights shall be switched at the Vista display in the cab.

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

The warning lights shall be supplied and installed by the cab/chassis manufacturer. They shall be Whelen lights to complete an NFPA compliant lower level warning light system.

The lights shall be switched at the Vista display in the cab.

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



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There shall be four (4) Whelen 500 series (5" x 2") red Linear Super-LED lights (50R02ZCR) provided, two (2) each side. Each light shall have a clear lens and chrome flange.

The lights shall be switched at the Vista display in the cab.

## ZONES B AND D - CHRISTMAS LIGHTS (BODY RUB RAIL AREA)

There shall be ten (10) Whelen WION series (4" x 1") LED lights provided, five (5) each side in the body's rub rail. Each light shall have a clear lens and chrome flange. The lights will be evenly displaced the length of the side rub rails in order front to rear as follows:

- Two (2) WIONCR (Red)
- Two (2) WIONCB (Blue)
- Two (2) WIONCR (Red)
- Two (2) WIONCR (Red)
- Two (2) WIONCA (Amber)

The lights shall be switched at the Vista display in the cab.

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

There shall be two (2) Whelen M6 series Red Linear Super-LED lights (M6RC) provided, one (1) each side. Each light shall have a clear lens and chrome flange.

The lights shall be switched at the Vista display in the cab.

## ZONE C - REAR WARNING LIGHTS (LOWER REAR CORNERS)

There shall be two (2) Whelen M9 series Red Linear Super-LED lights (M9RC) provided, one (1) each side. Each light shall have a clear lens and chrome flange.

The lights shall be switched at the Vista display in the cab.

## LINE VOLTAGE ELECTRICAL SYSTEM

### ONAN PTO GENERATOR

The vehicle shall be equipped with an Onan Protec PTO generator system with a capacity of 40,000 watts at 120/208 VAC, three phase. Current frequency shall be stable at 60 hertz.

The transmission's PTO port and PTO, or the split shaft PTO, and all associated drive shaft components shall be rated to support the continuous duty torque requirements of the generator's continuous duty rating as stated on the power source nameplate.

Where the generator is driven by the chassis engine and transmission through a split shaft PTO, the driving compartment speedometer shall register when the generator drive system is engaged.

Where the generator is driven by the chassis engine and transmission through a split shaft PTO and a chassis transmission retarder is furnished, it shall be automatically disengaged for generator operations.

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The direct drive generator shall be mounted so that it does not change the ramp breakover angle, angle of departure, or angle of approach as defined by other components, and it shall not extend into the ground clearance area.

The direct drive generator shall be mounted away from exhaust and muffler areas or provided with a heat shield to reduce operating temperatures in the generator area.

## **GENERATOR BONDING**

A minimum of four (4) 16" x 2 gauge copper ground straps shall be bolted to body sub-frame and chassis sub-frame for proper bonding of high voltage system. The conductor shall have a minimum amperage rating, as defined in 310.15, "Ampacities for Conductors Rated 0–2000 Volts," of *NFPA 70*, of 115 percent of the rated amperage on the power source specification label.

## **GENERATOR ENGAGEMENT**

A "Generator Engaged" indicator shall be provided in the driving compartment to indicate that the generator shift has been successfully completed.

An "OK to Operate Generator" indicator shall be provided in the driving compartment to indicate that the generator is engaged (if not always engaged), the transmission is in the proper gear (if required, automatic transmissions only), and the parking brake is engaged (if applicable).

An interlock system shall be provided to prevent advancement of the engine speed in the driving compartment or at any operator's panel unless the parking brake is engaged, and the transmission is in neutral or the output of the transmission is correctly connected to a pump or generator instead of the drive wheels.

## **WARRANTY PERIOD**

Provided such goods are operated and maintained in accordance with Onan's written instructions, Onan warrants that the Protec YDCR series PTO generators shall be free from defects in material and workmanship for a period of five (5) years or one thousand (1,000) hours, whichever comes first, from the date of delivery to the first purchaser.

## **GENERATOR SPLASH GUARD**

A powder coat painted splash cover shall be installed to reduce the amount of road spray on the frame mounted PTO generator. A V-ring seal shall also be installed in the cover to provide additional protection against contaminants reaching the generator front seals.

The generator shall be engaged at the driver's Vista display in the cab.

## **GENERATOR MOUNTING**

The generator shall be mounted between the chassis frame rails. The generator mounting brackets shall be fabricated using heavy duty steel tubing, or structural channel. The generator mounting shall be bolted and removable so that the generator can be lowered from under apparatus for service, if necessary. The generator case shall not extend below the bottom edge of the apparatus body.

## **MANUALS AND SCHEMATICS**

Two (2) complete manuals on parts list, maintenance, wiring schematics, hydraulic schematics, circuit boards,

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voltage regulator board and other components shall be provided on delivery.

## **POWER-TAKE-OFF GENERATOR DRIVE**

There shall be a "Hot Shift" power-take-off (PTO) installed on the transmission PTO opening of the chassis. The "Hot Shift" PTO is provided to allow the engagement of the PTO at higher engine RPM speeds. The PTO output shall be connected to the generator through hollow tube type driveline with heavy duty universals.

The engagement of the PTO shall be in the chassis cab with a rocker switch and red pilot light to note engagement of the PTO or via the V-Mux screen if so equipped.

The power supply to the PTO engagement control shall be wired to the parking brake and a neutral position transmission switch to prevent engagement unless the vehicle is stopped and transmission has been placed in neutral.

The installation of the engine, transmission, driven accessories (power takeoffs (PTO), etc.) shall meet the engine and transmission manufacturers' installation recommendations for the service intended.

Model part number shall be Chelsea 277SGFJP-B5XV, 126% Ratio.

## **ENGINE SPEED CONTROL**

An engine speed auxiliary control device (high idle switch or throttle) shall be installed to maintain a stable cycle output from generator when the apparatus is parked.

An interlock shall prevent the operation of the engine speed auxiliary control device unless the parking brake is engaged and the transmission is in neutral or park, or the parking brake is engaged and the engine is disengaged from the drive wheels.

The engine shall be prevented from regulating its own engine speed during times when engine rpm control is critical for consistent apparatus functions such as generator, water pump, or aerial operation.

## **LOADCENTER**

The loadcenter shall be a Cutler Hammer, BR Series, specifically designed for protection and distribution of 120/208 volt AC, such as lighting and small motor branch circuits. The loadcenter enclosure shall be made of 16 gauge galvanized sheet steel. The galvanized coating provides corrosion protection and as such does not require paint. All trims used on the BR Loadcenter shall be chromate sealed and finished with electro disposition epoxy paint (ASA61) which exceeds requirements for outdoor and indoor applications. A combination surface/flush cover with integral door shall be supplied.

The loadcenter shall be UL / CSA listed, **NO EXCEPTIONS** will be allowed.

## **GENERATOR MONITORING PANEL**

To properly monitor the generator performance and load demand during operation, the generator installation shall be equipped with a full instrument monitor panel.

- Generator frequency in hertz
- Line voltage, phase to neutral or phase to phase, in volts
- Line current in amperes

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Individual line current and voltage shall be displayed at the push of a button.

The program shall support the accumulation of elapsed generator hours. Generator hours shall be displayed.

## **OUTLETS AND CIRCUITS**

The generator and or shore power shall supply the 120/240 volt electrical equipment and outlets outlined below. Proper circuit protection shall be installed as noted:

- Four (4) 120 volt exterior outlets, two (2) each side near rear wheel well area.
  - The outlet receptacle(s) shall be 20 amp, straight-blade (NEMA 5-20R). Outlets will be located behind the rear wheels.
  - The outlet receptacle(s) shall be 20 amp, twist-lock (NEMA L5-20R). Outlets will be located in front of the rear wheels.
- Four (4) 120 volt exterior outlets, two (2) each side rear of body stairway.
  - The outlet receptacle(s) shall be 20 amp, straight-blade (NEMA 5-20R). Outlets will be located above specified rear twist lock outlets.
  - The outlet receptacle(s) shall be 20 amp, twist-lock (NEMA L5-20R). Outlets will be located below specified straight blade outlets.

## **LINE VOLTAGE ELECTRICAL SYSTEM**

### **GENERAL REQUIREMENTS**

#### **Stability**

Any fixed line voltage power source producing alternating current (ac) shall produce electric power at 60 Hz,  $\pm 3$  Hz when producing power at all levels between no load and full rated power. Any fixed line voltage power source shall produce electric power at the rated voltage  $\pm 10$  percent when producing power at all levels between no load and full rated power.

The maximum voltage supplied to portable equipment shall not exceed 275 volts to ground. Higher voltage shall be permitted only when used to operate fixed wired, permanently mounted equipment on the apparatus.

#### **Conformance with National Electrical Code**

All components, equipment, and installation procedures shall conform to *NFPA 70, National Electrical Code*, except where superseded by the requirements of this chapter. Where the requirements of this chapter differ from those in *NFPA 70*, the requirements in this chapter shall apply.

Where available, line voltage electrical system equipment and materials included on the apparatus shall be listed and used only in the manner for which they have been listed. All equipment and materials shall be installed in accordance with the manufacturer's instructions.

#### **Location Ratings**

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Any equipment used in a dry location shall be listed for dry locations. Any equipment used in a wet location shall be listed for wet locations.

Any equipment, except a PTO-driven generator, used in an underbody or under chassis location that is subject to road spray shall be either listed as Type 4 or mounted in an enclosure that is listed as Type 4.

If a PTO-driven generator is located in an underbody or under chassis location, the installation shall include a shield to prevent road spray from splashing directly on the generator.

## Grounding

Grounding shall be in accordance with 250.34(A) and 250.34(B) of *NFPA 70*. Ungrounded systems shall not be used.

Only stranded or braided copper conductors shall be used for grounding and bonding.

The grounded current-carrying conductor (neutral) shall be insulated from the equipment-grounding conductors and from the equipment enclosures and other grounded parts.

The neutral conductor shall be colored white or gray in accordance with 200.6, "Means of Identifying Grounded Conductors," of *NFPA 70*.

Any bonding screws, straps, or buses in the distribution panel board or in other system components between the neutral and equipment-grounding conductor shall be removed and discarded.

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## Bonding

The neutral conductor of the power source shall be bonded to the vehicle frame. The neutral bonding connection shall occur only at the power source. In addition to the bonding required for the low voltage return current, each body and each driving or crew compartment enclosure shall be bonded to the vehicle frame by a copper conductor.

The conductor shall have a minimum ampere rating, as defined in 310.15, "Ampacities for Conductors Rated 0–2000 Volts," of *NFPA 70*, of 115 percent of the rated ampere on the power source specification label.

A single conductor that is sized to meet the low voltage and line voltage requirements shall be permitted to be used.

## Ground Fault Circuit Interrupters

In special service vehicles incorporating a lavatory, sink, toilet, shower, or tub, 120 V, 15 or 20 A receptacles within 6 ft (1.8 m) of these fixtures shall have ground fault circuit interrupter (GFCI) protection. GFCIs integrated into outlets or circuit breakers or as stand-alone devices shall be permitted to be used in situations.

## Power Source General Requirements

All power source system mechanical and electrical components shall be sized to support the continuous duty nameplate rating of the power source.

The power source shall be shielded from contamination that would prevent the power source from operating within its design specifications.

## Power Source Rating

For power sources of 8 kW or larger, the power source manufacturer shall declare the continuous duty rating that the power source can provide when installed on fire apparatus according to the manufacturer's instructions and run at 120°F (49°C) air intake temperature at 2000 ft (600 m) above sea level.

The rating on the power source specification label shall not exceed the declared rating from the power source manufacturer.

Access shall be provided to permit both routine maintenance and removal of the power source for major servicing. The power source shall be located such that neither it nor its mounting brackets interfere with the routine maintenance of the fire apparatus.

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## Instrumentation

If the power source is rated at less than 3 kW, a "Power On" indicator shall be provided. If the power source is rated at 3 kW or more but less than 8 kW, a voltmeter shall be provided.

If the power source is rated at 8 kW or more, the following instrumentation shall be provided at an operator's panel:

- 8) Voltmeter
- 9) Current meters for each ungrounded leg
- 10) Frequency (Hz) meter
- 11) Power source hour meter

The instrumentation shall be permanently mounted at an operator's panel. The instruments shall be located in a plane facing the operator. Gauges, switches, or other instruments on this panel shall each have a label to indicate their function.

The instruments and other line voltage equipment and controls shall be protected from mechanical damage and not obstructed by tool mounting or equipment storage.

An instruction plate(s) that provides the operator with the essential power source operating instructions, including the power-up and power-down sequence, shall be permanently attached to the apparatus at any point where such operations can take place.

## Operation

Provisions shall be made for placing the generator drive system in operation using controls and switches that are identified and within convenient reach of the operator.

Where the generator is driven by the chassis engine and engine compression brakes or engine exhaust brakes are furnished, they shall be automatically disengaged for generator operations.

Any control device used in the generator system power train between the engine and the generator shall be equipped with a means to prevent unintentional movement of the control device from its set position in the power generation mode.

If there is permanent wiring on the apparatus that is designed to be connected to the power source, a power source specification label that is permanently attached to the apparatus at the operator's control station shall provide the operator with the information required.

The power source, at any load, shall not produce a noise level that exceeds 90 dBA in any driving compartment, crew compartment, or onboard command area with windows and doors closed or at any operator's station on the apparatus.

## Power Supply Assembly

The conductors used in the power supply assembly between the output terminals of the power source and the main over current protection device shall not exceed 12 ft (4 m) in length.

All power supply assembly conductors, including neutral and grounding conductors, shall have an equivalent amperage rating and shall be sized to carry not less than 115 percent of the amperage of the nameplate current rating of the power source.

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If the power supply assembly connects to the vibrating part of a generator (not a connection on the base), the conductors shall be flexible cord or other fine-stranded conductors enclosed in metallic or nonmetallic liquid tight flexible conduit rated for wet locations and temperatures not less than 194°F (90°C).



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## Overcurrent Protection

Manually resettable over current devices shall be installed to protect the line voltage electrical system components.

## Power Source Protection

A main over current protection device shall be provided that is either incorporated in the power source or connected to the power source by a power supply assembly.

The size of the main over current protection device shall not exceed 100 percent of the rated amperage stated on the power source specification label or the rating of the next larger available size over current protection device, where so recommended by the power source manufacturer.

If the main over current protection device is subject to road spray, the unit shall be housed in a Type 4-rated enclosure.

## Branch Circuit Overcurrent Protection

Over current protection devices shall be provided for each individual circuit and shall be sized at not less than 15 amps in accordance with 240.4, "Protection of Conductors," of *NFPA 70*.

Any panel board shall have a main breaker where the panel has six or more individual branch circuits or the power source is rated 8 kW or larger.

Each over current protection device shall be marked with a label to identify the function of the circuit it protects.

Dedicated circuits shall be provided for any large appliance or device (air conditioning units, large motors, etc.) that requires 60 percent or more of the rated capacity of the circuit to which it is connected, and that circuit shall serve no other purpose.

## Panelboards

All fixed power sources shall be hardwired to a permanently mounted panel board unless one of the following conditions exists:

- 1) All line voltage power connections are made through receptacles on the power source and the receptacles are protected by integrated over current devices.
- 2) Only one circuit is hardwired to the power source, which is protected by an integrated over current device.

The panel shall be visible and located so that there is unimpeded access to the panel board controls. All panel boards shall be designed for use in their intended location. The panel(s) shall be protected from mechanical damage, tool mounting, and equipment storage.

Where the power source is 120/240 V and 120 V loads are connected, the apparatus manufacturer or line voltage system installer shall consider load balancing to the extent that it is possible.

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## Wiring Methods

Fixed wiring systems shall be limited to the following:

- 1) Metallic or nonmetallic liquid tight flexible conduit rated at temperatures not less than 194°F (90°C) with stranded copper wire rated for wet locations and temperatures not less than 194°F (90°C)
- 2) Type SOW, SOOW, SEOW, or SEOOW flexible cord rated at 600 V and at temperatures not less than 194°F (90°C)

Electrical cord or conduit shall not be attached to chassis suspension components, water or fuel lines, air or air brake lines, fire pump piping, hydraulic lines, exhaust system components, or low voltage wiring and shall be arranged as follows:

- 1) Separated by a minimum distance of 12 in. (300 mm) from exhaust piping or shielded from such piping
- 2) Separated from fuel lines by a minimum distance of 6 in. (150 mm)

A means shall be provided to allow “flexing” between the driving and crew compartment, the body, and other areas or equipment whose movement would stress the wiring.

Electrical cord or conduit shall be supported within 6 in. (150 mm) of any junction box and at a minimum of every 24 in. (600 mm) of run.

Supports shall be made of nonmetallic materials or of corrosion-resistant or corrosion-protected metal. All supports shall be of a design that does not cut or abrade the conduit or cord and shall be mechanically fastened to the apparatus.

Only fittings and components listed for the type of cord or conduit being installed shall be used.

Splices shall be made only in a listed junction box.

## Additional Requirements for Flexible Cord Installations

Where flexible cord is used in any location where it could be damaged, it shall be protected by installation in conduit, enclosures, or guards.

Where flexible cord penetrates a metal surface, rubber or plastic grommets or bushings shall be installed.

## Wiring Identification

Each line voltage circuit originating from the main panel board shall be identified.

The wire or circuit identification either shall reference a wiring diagram or wire list or shall indicate the final termination point of the circuit.

Where pre-wiring for future power sources or devices exists, the un-terminated ends shall be marked with a label showing their wire size and intended function.

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## Wiring System Components

Only stranded copper conductors with an insulation rated for temperatures of at least 194°F (90°C) and wet locations shall be used. Conductors in flexible cord shall be sized in accordance with Table 400.5(A) of *NFPA 70*. Conductors used in conduit shall be sized in accordance with 310.15, "Ampacities for Conductors Rated 0–2000 Volts," of *NFPA 70*. Aluminum or copper-clad aluminum conductors shall not be used.

All boxes shall conform to and be mounted in accordance with Article 314, "Outlet, Device, Pull, and Junction Boxes; Conduit Bodies; Fittings; and Manholes," of *NFPA 70*. All boxes shall be accessible using ordinary hand tools. Boxes shall not be permitted behind welded or pop-riveted panels.

The maximum number of conductors permitted in any box shall be in accordance with 314.16, "Number of Conductors in Outlet, Device, and Junction Boxes, and Conduit Bodies," of *NFPA 70*.

All wiring connections and terminations shall provide a positive mechanical and electrical connection. Connectors shall be installed in accordance with the manufacturer's instructions. Wire nuts or insulation displacement and insulation piercing connectors shall not be used.

Each switch shall indicate the position of its contact points (i.e., open or closed) and shall be rated for the continuous operation of the load being controlled. All switches shall be marked with a label indicating the function of the switch. Circuit breakers used as switches shall be "switch rated" (SWD) or better. Switches shall simultaneously open all associated line voltage conductors. Switching of the neutral conductor alone shall not be permitted.

Line voltage circuits controlled by low voltage circuits shall be wired through properly rated relays in listed enclosures that control all non-grounded current-carrying conductors.

## Receptacles and Inlet Devices

### Wet and Dry Locations

All wet location receptacle outlets and inlet devices, including those on hardwired, remote power distribution boxes, shall be of the grounding type, provided with a wet location cover, and installed in accordance with Section 406.8, "Receptacles in Damp or Wet Locations," of *NFPA 70*.

All receptacles located in a wet location shall be not less than 24 in. (600 mm) from the ground. Receptacles on off road fire apparatus shall be a minimum of 30 in. (750 mm) from the ground. All receptacles located in a dry location shall be of the grounding type and shall be at least 12 in. (300 mm) above the interior floor height. No receptacle shall be installed in a face-up position.

The face of any wet location receptacle shall be installed in a plane from vertical to not more than 45 degrees off vertical.

### Receptacle Label

Each receptacle shall be marked with a label indicating the nominal line voltage (120 volts or 240 volts) and the current rating in amps of the circuit. If the receptacle is DC or other than single phase, that information shall also be marked on the label.

All receptacles and electrical inlet devices shall be listed to UL 498, *Standard for Safety Attachment Plugs and Receptacles*, or other recognized performance standards.

Receptacles used for DC voltages shall be rated for DC service.

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## Wiring Schematics

An "As-Built" Wiring diagrams for line voltage systems shall be provided 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

## **120/240 VAC SCENE LIGHTING**

### **SIDE UPPER RECESSED SCENE LIGHTS**

Four (4) Whelen Pioneer Plus model PCP2AFS dual, floodlight left, spotlight right shall be installed. Light quantity shall be divided equally per side. Lights shall be 120AC, 1.25 amp, 150 watt, with 15,000 useable lumens.

Each light shall be mounted in PBA203 mounting bracket, semi recessed into the apparatus body with chrome trim ring housing. The light mounts will provide either a straight out, 0 degree or a 15 degree downward angle.

The lights shall be switched at the Vista display in the cab.

### **REAR TRIPOD SCENE LIGHTS**

Two (2) Whelen 3200 series folding tripod light(s) model 8728304 shall be provided. The 50" AC folding tripod pole assembly shall incorporate 50" internal aluminum alloy pole with an outer diameter of 1.125" with an inner diameter of 0.875" and 30" folding legs. The internal coil cord cable shall be UL listed and have a liquid tight strain relief that eliminates internal wire twisting. The internal coil cord cable shall be installed with a NEMA L5-20 plug.

The tripod shall have ability to be mounted by an upper body quick disconnect mounting bracket and a lower folded tripod mounting cradle. All mounting hardware shall be stainless steel.

Voltage: +120v AC

Height of Tripod Folded = 56.40"

Height of Tripod Folded Out = 104.51" Max. Length

Diameter of Tripod Legs When Folded Out = 51.12"

Each tripod assembly shall have a Whelen Pioneer Plus model PFP2AP1 provided. The 150 watt +120v AC Pioneer lighthouse shall incorporate Super-LED dual flood light installed in a die-cast white powder coated aluminum housing. The PFP2AC configuration shall consist of 72 white Super-LEDs with a clear optic collimator/reflector assembly and a clear non-optic polycarbonate lens. The Pioneer flood light shall have 15,000 usable lumens.

The tripod and light is covered by a five year factory warranty.

Voltage: +120v AC

Size: H=4.125", W=14.00", D=2.50"

Amp Draw: Spot Light = 1.20 Amps

Lens Color: Clear

A weatherproof on-off toggle switch shall be mounted in a switchbox below the lamphead.

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## LIGHT TOWER (CONTRACTOR FURNISHED)

One (1) Command Light, CL Series light tower(s) will be provided and installed on the completed unit. **NOTE:** The Contractor will furnish the specified Command Light to the Body Manufacturer for installation. A flashing warning light will be provided in cab, indicating when a light tower is not in nested position as required by NFPA 1901.

The Command Light will be covered by a five (5) year limited warranty from defects in materials and workmanship. An operation, maintenance, and parts manual will be provided with the completed unit.

The light tower will extend 131" above the mounting surface and will extend to full upright position in less than 15 seconds. The overall size of nested light tower will be approximately 42" wide x 74" long x 12" high and weigh approximately 300 pounds.

### Light Tower Construction and Design

The Command Light assembly will be of aluminum construction, with stainless steel shafts and bronze bushings for long life and low maintenance.

The electrically controlled unit will not require usage of the vehicle's air supply for operation, thereby eliminating the chance for air leaks in the vehicle braking system. Hydraulic or pneumatic type floodlights are not acceptable alternatives to the specified all electric light tower.

The light tower will be tested to in wind conditions of 90 mph (150 kph) minimum. Light towers that have not been tested to these conditions are not acceptable.

The light tower will be capable of overhanging the side or back of the vehicle to provide maximum illumination to the vicinity adjacent to the vehicle for the safety of emergency personnel in high traffic conditions. Light towers that are only capable of rotation at the top of a pole are not acceptable to the specified light tower.

### Light Tower Electrical System

The light tower will be a two-stage articulating device with a lighting bank on top of the second stage capable of continuous 360 degree rotation. The light will be elevated by electric linear actuators, one (1) actuator shall elevate the light bank and one (1) actuator shall adjust the light bank angle from 0 to 110 degrees. Power for the light bank will be supplied through power collecting rings thus allowing continuous 360 degree rotation in either direction.

The tower base will have a light that illuminates the envelope of motion during any movement of the light tower mast as required by NFPA 1901.

### Light Tower Floodlights

The Command Light model CL615-MH2 will be equipped with the following bank of floodlights:

Floodlight manufacturer:	Hubbell Quartz/ Akron Brass MH
Number of lamp heads:	Four (4) 1,500 watt Quartz Halogen Two (2) 1,000 watt Extenda-Lite Metal Halide
Voltage:	240 volts
Total watts of light tower:	8,000 watts
Total lumens of light tower:	350,000 lumens
Configuration:	The light heads will be mounted with three (3) on each side of the light tower, giving two (2) vertical lines of three (3) when the lights are in the upright position.

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## Light Tower Backlight Option

A backlight option will be provided on the light tower. The lower pair of light heads will be capable of being rotated about a horizontal axis 180 degree, providing light down on the vehicle or to the opposite side of the vehicle while allowing the fixed lights to remain pointed at the scene.

The hand-held remote control will have an additional switch supplied for the backlight rotation option.

## Light Tower Paint

The light tower will be electrostatically powder coated with a hammer tone gray color.

## Light Tower Mounting

The light tower shall be mounted to roof of the custom cab which shall be reinforced as necessary to support weight of the light tower.

## **LIGHT TOWER TREE LIMB GUARD**

A three sided tree limb guard shall be provided fabricated from 1/8" aluminum treadplate to provide protection to the specified light tower from small tree branches.

## **EQUIPMENT PAYLOAD WEIGHT ALLOWANCE**

In compliance with NFPA 1901 standards, the special service vehicle shall be designed for an equipment loading allowance of 4,000 lbs. of SAN MARCOS FIRE DEPARTMENT provided equipment based on a 30,001 - 40,000 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.

## **REMAINING NFPA MINOR EQUIPMENT BY PURCHASER**

All other minor equipment not specified above, but required by NFPA 1901 for special service vehicles, section 10.5.1 shall be supplied and mounted by SAN MARCOS FIRE DEPARTMENT before the unit is placed in emergency service.