

SANTA FE SPRINGS FIRE DEPT.

SANTA FE SPRINGS, California

Breathing Air Support Unit SVI #1064 Production Specifications

Contract Administrator: Jackie Sipes
Sales Administrator: Blair Schrock



ROCK SOLID QUALITY

Santa Fe Springs Fire Department

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LIABILITY INSURANCE

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

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

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

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

Excess Umbrella Liability coverage of \$4,000,000.00 each occurrence, Aggregate of \$4,000,000.00. Garage Keepers Liability coverage of \$4,000,000.00 combined limit.

All insurance policies must be;

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

INTERNET IN-PROCESS SITE

The manufacturer shall post and maintain a website where the Santa Fe Springs 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.

RESPONSIBILITY OF PURCHASER

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

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

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

PERSONNEL PROTECTION

Guards, shields, or other protection shall be provided where necessary in order to prevent injury of personnel by hot, moving, or rotating parts during non maintenance operations.

Electrical insulation or isolation shall be provided where necessary in order to prevent electrical shock from onboard electrical systems.

Vehicular workmanship shall ensure an operating environment free of accessible sharp projections and edges.

Safety signs with text shall conform to the general principles of ANSI/NEMA Z535.4, *Product Safety Signs and Labels*. Safety signs without text shall conform to the general principles for two-panel safety signs of ISO 9244, *Earth-moving machinery — Machine safety labels — General principles*.

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Apparatus built for sale in the United States shall employ safety signage that complies with ANSI/NEMA Z535.4.

Apparatus built for sale outside the United States shall employ safety signage that complies with either ANSI/NEMA Z535.4 or ISO 9244.

Safety signs referenced in this standard beginning with the letters FAMA shall conform to the text and graphics of the referenced safety sign number found in FAMA TC010, *Standard Product Safety Sign Catalog for Automotive Fire Apparatus*.

CONTROLS AND INSTRUCTIONS

Illumination shall be provided for controls, switches, instruction plates, labels, gauges, and instruments necessary for the operation of the apparatus and the equipment provided on it.

If external illumination is provided, it shall be a minimum of 5 fc (50 lx) on the face of the device.

If internal illumination is provided, it shall be a minimum of 4 foot lamberts (14 cd/m²).

All required signs, instruction plates and labels shall be permanent in nature and securely attached and shall meet the requirements of NFPA and UL 969, *Standard for Marking and Labeling Systems*.

The signs, instruction plates, and labels shall have resistance to damage from temperatures between –30°F and 176°F (–35°C and 80°C) and exposure to oil, fuel, water, hydraulic fluids or other fluids used on the apparatus.

The exterior mounted labels relating to safety or critical operational instructions shall be reflective or illuminated as required by NFPA.

The centerline of any gauge or visual display required by this standard shall be no more than 84 in. (2130 mm) above the level where the operator stands to read the instrument.

The central midpoint or centerline of any control shall be no more than 72 in. (1830 mm) vertically above the ground or platform that is designed to serve as the operator's standing position.

COMPONENT PROTECTION

Hydraulic hose lines, air system tubing, control cords and electrical harnesses shall be mechanically attached to the frame or body structure of the apparatus with protective looms, grommets or other devices at each point where they pass through body panels or structural members or wherever they lie against a sharp metal edge.

A through-the-frame connector shall be permitted to be used in place of protective looms or grommets.

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.

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FIRE APPARATUS PERFORMANCE

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

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

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

HIGHWAY PERFORMANCE

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

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

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

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

SERVICEABILITY

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

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

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

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FIRE APPARATUS DOCUMENTATION

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

- 1) The manufacturers record of apparatus construction details, including the following documents:
 - a) Owner's name and address
 - b) Apparatus manufacturer, model, and serial number
 - c) Chassis make, model, and serial number
 - d) GAWR of front and rear axles and GVWR
 - e) Front tire size and total rated capacity in pounds (kilograms)
 - f) Rear tire size and total rated capacity in pounds (kilograms)
 - g) Chassis weight distribution in pounds (kilograms) with water and manufacturer-mounted equipment (front and rear)
 - h) Engine make, model, serial number, rated horsepower and related speed, and governed speed; and if so equipped, engine transmission PTO(s) make, model, and gear ratio
 - i) Type of fuel and fuel tank capacity
 - j) Electrical system voltage and alternator output in amps
 - k) Battery make, model, and capacity in cold cranking amps (CCA)
 - l) Chassis transmission make, model, and serial number; and if so equipped, chassis transmission PTO(s) make, model, and gear ratio
 - m) Ratios of all driving axles
 - n) Maximum governed road speed
 - o) Pump make, model, rated capacity in gallons per minute (liters per minute where applicable), maximum discharge pressure capability rating, and serial number
 - p) Pump transmission make, model, serial number, and gear ratio
 - q) Auxiliary pump make, model, rated capacity in gallons per minute (liters per minute where applicable), and serial number
 - r) Water tank certified capacity in gallons or liters
 - s) Foam tank (if provided) certified capacity in gallons (liters)
 - t) Aerial device type, rated vertical height in feet (meters), rated horizontal reach in feet (meters), and rated capacity in pounds (kilograms)
 - u) Paint manufacturer and paint number(s)
 - v) Company name and signature of responsible company representative
 - w) Weight documents from a certified scale showing actual loading on the front axle, rear axle(s), and overall fire apparatus (with the water tank full but without personnel, equipment, and hose)
- 2) Certification of compliance of the optical warning system (*see 13.8.16*)
- 3) Siren manufacturer's certification of the siren (*see 13.9.1.1*)
- 4) Written load analysis and results of the electrical system performance tests (*see 13.14.1 and Section 13.15*)
- 5) Certification of slip resistance of all stepping, standing, and walking surfaces (*see 15.7.4.5*)
- 6) If the apparatus has a fire pump, the pump manufacturer's certification of suction capability (*see 16.2.4.1*)
- 7) If the apparatus is equipped with a fire pump and special conditions are specified by the purchaser, the pump manufacturer's certification of suction capacity under the special conditions (*see 16.2.4.2*)
- 8) If the apparatus has a fire pump, a copy of the apparatus manufacturer's approval for stationary pumping applications (*see 16.3.1*)
- 9) If the apparatus has a fire pump, the engine manufacturer's certified brake horsepower curve for the engine furnished, showing the maximum governed speed (*see 16.3.2.2*)
- 10) If the apparatus has a fire pump, the pump manufacturer's certification of the hydrostatic test (*see 16.5.2.2*)
- 11) If the apparatus has a fire pump with a maximum discharge pressure capability rating that exceeds the hydrostatic test pressure of 16.5.2.1, the pump manufacturer's certification of the hydrodynamic test
- 12) If the apparatus has a fire pump, the certification of inspection and test for the fire pump (*see 16.13.1.1.5 or 16.13.1.2.4 as applicable*)

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

OPERATIONS AND SERVICE DOCUMENTATION

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

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

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

- 1) Manufacturer's name and address
- 2) Country of manufacture
- 3) Source for service and technical information
- 4) Parts replacement information
- 5) Descriptions, specifications, and ratings of the chassis, pump (if applicable), and aerial device (if applicable)
- 6) Wiring diagrams for low voltage and line voltage systems to include the following information:
 - a) Pictorial representations of circuit logic for all electrical components and wiring
 - b) Circuit identification
 - c) Connector pin identification
 - d) Zone location of electrical components
 - e) Safety interlocks
 - f) Alternator-battery power distribution circuits
 - g) Input/output assignment sheets or equivalent circuit logic implemented in multiplexing systems
- 7) Lubrication charts
- 8) Operating instructions for the chassis, any major components such as a pump or aerial device, and any auxiliary systems
- 9) Precautions related to multiple configurations of aerial devices, if applicable
- 10) Instructions regarding the frequency and procedure for recommended maintenance
- 11) Overall apparatus operating instructions
- 12) Safety considerations
- 13) Limitations of use
- 14) Inspection procedures
- 15) Recommended service procedures
- 16) Troubleshooting guide
- 17) Apparatus body, chassis and other component manufacturer's warranties
- 18) Special data required by this standard
- 19) A material safety data sheet (MSDS) for any fluid that is specified for use on the apparatus

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20) One copy of the latest edition of FAMA's *Fire Apparatus Safety Guide*

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

NFPA REQUIRED DOCUMENTATION FORMAT - USB FLASH DRIVE

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

FIRE APPARATUS SAFETY GUIDE

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

STATEMENT OF EXCEPTIONS

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

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

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

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

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CARRYING CAPACITY

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

The estimated in-service weight shall include the following:

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

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

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

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

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

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

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).

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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.

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.

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3. LOW VOLTAGE ALARM TEST

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

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

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

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

LOW VOLTAGE - ELECTRICAL SYSTEM PERFORMANCE TEST

DOCUMENTATION

The manufacturer shall deliver the following with the fire apparatus:

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

UL 120/240 VAC CERTIFICATION

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

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

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

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

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

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

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

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

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

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

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

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

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

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

DOCUMENTATION

The 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:

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

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

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

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

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

RAIN TEST

A rain test shall be conducted on the completed apparatus prior to the final inspection to check for water intrusion into the body and cab resulting from the production process.

WARRANTY

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

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

The Body Manufacturer shall warrant all materials and accessories used on the vehicle(s), whether fabricated by manufacturer or purchased from an outside source and will deal directly with the Santa Fe Springs 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 ninety (90) days after the original invoice date.

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

SHOP NOTES

Changed in service to be 90 days from invoice.

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 ninety (90) days after the original invoice date.

SHOP NOTES

Changed in service to be 90 days from invoice.

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 ninety (90) days after the original invoice date.

SHOP NOTES

Changed in service to be 90 days from invoice.

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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 ninety (90) days after the original invoice date. **Pro-rated warranties will not be acceptable.**

SHOP NOTES

Changed in service to be 90 days from invoice.

GRAPHICS LIMITED WARRANTY

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

CONSTRUCTION PERIOD

The completed vehicle shall be delivered within three hundred ninety (390) 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 Santa Fe Springs 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 maximum overall height (OAH) of the vehicle shall be approximately 127-1/2" (10' - 7.5") 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 348" (29' -00").

OVERALL WIDTH

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

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ANGLE OF APPROACH

The angle of approach for this vehicle shall be approximately (26) 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 be approximately (10) degrees when it is loaded to the estimated in-service weight as specified by the current edition of NFPA 1901.

PRE-PAINT CONFERENCE

A pre-paint conference shall be required at the Contractor's factory for three (3) personnel from the Santa Fe Springs Fire Department to inspect the vehicle and construction details prior to the painting process.

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

FINAL INSPECTION CONFERENCE

A final inspection conference shall be required at the Contractor's factory for three (3) personnel from the Santa Fe Springs 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 Santa Fe Springs 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 Santa Fe Springs Fire Department regarding the operation, care and maintenance of the apparatus and equipment supplied at Santa Fe Springs Fire Department location.

The Delivery Engineer shall set delivery and instruction schedule with the person appointed by Santa Fe Springs Fire Department.

After delivery of the apparatus, the Santa Fe Springs 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.

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CAB/CHASSIS SPECIFICATION

Vehicle Configuration

M2 106 CONVENTIONAL CHASSIS
2018 MODEL YEAR SPECIFIED
SET BACK AXLE - TRUCK

General Service

RESCUE/EMERGENCY FIRE SERVICE
FREIGHTLINER WARRANTY
EXPECTED FRONT AXLE LOAD: 14000 lbs
EXPECTED REAR DRIVE AXLE LOAD: 23000 lbs
EXPECTED GROSS VEHICLE CAPACITY: 37000 lbs

Engine

CUM L9 350EV HP @ 2000 RPM, 2200 GOV RPM , 1000 LB/FT @ 1400 RPM FIRE/EMERGENCY

Engine Equipment

2016 ONBOARD DIAGNOSTICS/2010 EPA/CARB/GHG17
NFPA COMPLIANT EMBER SCREEN AND FIRE RETARDANT
DONALDSON AIR CLEANER
DR 12V 300 AMP 40-SI BRUSHLESS PAD ALTERNATOR WITH REMOTE BATTERY VOLTAGE SENSE
(2) ALLIANCE MODEL 1231, GROUP 31, 12 VOLT MAINTENANCE FREE 2250 CCA THREADED STUD BATTERIES WITH POSITIVE JUMP START POST
BATTERY BOX FRAME MOUNTED
WIRE GROUND RETURN FOR BATTERY CABLES WITH ADDITIONAL FRAME GROUND RETURN
POSITIVE LOAD DISCONNECT WITH CAB MOUNTED CONTROL SWITCH MOUNTED OUTBOARD DRIVER
CUMMINS TURBOCHARGED 18.7 CFM AIR COMPRESSOR WITH INTERNAL SAFETY VALVE
C-BRAKE BY JACOBS WITH LOW/OFF/HIGH BRAKING DASH SWITCH
RH MTD HORIZONTAL AFTERTREATMENT WITH RH MOUNTED BRIGHT VERTICAL CURVED TAILPIPE
HORTON DRIVEMASTER ADVANTAGE ON/OFF FAN DRIVE
AUTOMATIC FAN CONTROL WITHOUT DASH SWITCH
CUMMINS SPIN ON FUEL FILTER
COMBINATION FULL FLOW/BYPASS OIL FILTER
1100 SQUARE INCH ALUMINUM RADIATOR
ANTIFREEZE TO -34F, OAT (NITRITE AND SILICATE FREE) EXTENDED LIFE COOLANT
GATES BLUE STRIPE COOLANT HOSES OR EQUIVALENT
CONSTANT TENSION HOSE CLAMPS FOR COOLANT HOSES
RADIATOR DRAIN VALVE
ELECTRIC GRID AIR INTAKE WARMER
DELCO 12V 38MT HD STARTER WITH INTEGRATED MAGNETIC SWITCH

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Transmission

ALLISON 3000 EVS 6 SPD AUTOMATIC TRANSMISSION

Transmission Equipment

MAGNETIC PLUGS, ENGINE DRAIN, TRANSMISSION DRAIN, AXLE(S)
FILL AND DRAIN
PUSH BUTTON ELECTRONIC SHIFT CONTROL, DASH MOUNTED
TRANSMISSION PROGNOSTICS - ENABLED
WATER TO OIL TRANSMISSION COOLER
TRANSMISSION OIL CHECK AND FILL WITH ELECTRONIC OIL LEVEL
CHECK
SYNTHETIC TRANSMISSION FLUID (TES-295 COMPLIANT)

Front Axle and Equipment

DETROIT DA-F-14.7-3 14,700# FF1 71.5 KPI/3.74 DROP SINGLE FRONT
AXLE
BENDIX ADB22X-V AIR DISC FRONT BRAKES
FIRE AND EMERGENCY SEVERE SERVICE, NON-ASBESTOS FRONT
LINING
TRW TAS-85 POWER STEERING
2 QUART SEE THROUGH POWER STEERING RESERVOIR

Front Suspension

14,600# TAPERLEAF FRONT SUSPENSION
MAINTENANCE FREE RUBBER BUSHINGS
FRONT SHOCK ABSORBERS

Rear Axle and Equipment

RS-23-161 23,000 LB FIRE/EMERGENCY SERVICE SINGLE REAR AXLE
IRON REAR AXLE CARRIER WITH STANDARD AXLE HOUSING
MXL 17T MERITOR EXTENDED LUBE MAIN DRIVELINE WITH HALF
ROUND YOKES
BENDIX ADB22X-V AIR DISC REAR BRAKES
FIRE AND EMERGENCY SEVERE SERVICE NON-ASBESTOS REAR
BRAKE LINING
AIR DISC LONGSTROKE 1-DRIVE AXLE SPRING PARKING CHAMBERS
REAR AIR DISC BRAKE INTERNAL ADJUSTERS

Rear Suspension

AIRLINER 23,000# FIRE/EMERGENCY REAR AIR SUSPENSION
DUAL AIR REAR SUSPENSION LEVELING VALVES
TRANSVERSE CONTROL RODS
REAR SHOCK ABSORBERS - ONE AXLE (AIR RIDE SUSPENSION)

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Brake System

WABCO 4S/4M ABS WITH TRACTION CONTROL & ESC
STANDARD AIR SYSTEM PRESSURE PROTECTION
BW AD-9 BRAKE LINE AIR DRYER WITH HEATER
CUSTOM STEEL AIR BRAKE RESERVOIRS
BW DV-2 AUTO DRAIN VALVE WITH HEATER - WET TANK
UPGRADED CHASSIS MULTIPLEXING UNIT

Wheelbase & Frame

11/32X3-1/2X10-15/16 INCH STEEL FRAME 120KSI
(63 INCH) REAR FRAME OVERHANG

Chassis Equipment

THREE-PIECE 14 INCH CHROMED STEEL BUMPER WITH COLLAPSIBLE ENDS
FRONT TOW HOOKS - FRAME MOUNTED
GRADE 8 THREADED HEX HEADED FRAME FASTENERS

Fuel Tanks

50 GALLON POLISHED RECTANGULAR ALUMINUM FUEL TANK & STEPS
6 GALLON DIESEL EXHAUST FLUID TANK
ALLIANCE FUEL FILTER/WATER SEPARATOR
EQUIFLO INBOARD FUEL SYSTEM

Tires

MICHELIN XZE 12R22.5 16 PLY RADIAL FRONT TIRES
MICHELIN XDN2 12R22.5 16 PLY RADIAL REAR TIRES

Hubs

CONMET PRESET PLUS IRON FRONT HUBS
CONMET PRESET PLUS IRON REAR HUBS

Wheels

22.5X8.25 10-HUB PILOT POLISHED ALUMINUM DISC FRONT WHEELS
22.5X8.25 10-HUB PILOT POLISHED ALUMINUM DISC REAR WHEELS

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Cab Exterior

106 INCH BBC FLAT ROOF ALUMINUM CONVENTIONAL AIR RIDE CAB
NFPA COMPLIANT EXTERIOR GRAB HANDLES
HOOD MOUNTED CHROMED PLASTIC GRILLES
CHROME HOOD MOUNTED AIR INTAKE GRILLE
FIBERGLASS HOOD WITH FIREWALL INSULATION
VALVE AND PLUMBING FOR CUSTOMER FURNISHED AIR HORNS,
WITH ACTIVATION CONTROLS INCLUDED
DUAL ELECTRIC HORNS
HALOGEN COMPOSITE HEADLAMPS WITH BRIGHT BEZELS AND
DAYTIME RUNNING LIGHTS
LED AERODYNAMIC MARKER LIGHTS
DUAL 102" WEST COAST BRIGHT FINISH HEATED MIRRORS WITH LH
AND RH REMOTE
LH AND RH 8 INCH BRIGHT FINISH CONVEX MIRRORS MOUNTED
UNDER PRIMARY MIRRORS
REAR WINDOW DELETE
TINTED DOOR GLASS LH AND RH WITH TINTED NON-OPERATING
WING WINDOWS
RH/LH ELECTRIC PWRED WINDOWS & DOOR LOCKS
TINTED WINDSHIELD
8 LITER WINDSHIELD WASHER RESERVOIR, CAB MOUNTED, WITHOUT
FLUID LEVEL INDICATOR

Cab Interior

OPAL GRAY VINYL INTERIOR
MOLDED PLASTIC DOOR PANELS WITH ALUMINUM KICKPLATES
LOWER DOORS
BLACK MATS WITH PREMIUM INSULATION
GRAY INSTRUMENT PANELS
IN DASH STORAGE BIN
AM/FM/WB DASH MTD RADIO WITH CD PLAYER, BLUETOOTH AND
MICROPHONE, USB, AUXILIARY INPUTS AND J1939
(2) CUP HOLDERS LH AND RH DASH
HEATER, DEFROSTER AND AIR CONDITIONER
MAIN HVAC CONTROLS W/ RECIRCULATION SWITCH
SOLID-STATE CIRCUIT PROTECTION AND FUSES
12V NEGATIVE GROUND ELECTRICAL SYSTEM
DOME LIGHT WITH 3-WAY SWITCH ACTIVATED BY LH AND RH DOORS
SEATS INC 911 UNIVERSAL SERIES HIGH BACK AIR SUSPENSION
DRIVER SEAT NFPA COMPLIANT
SEATS INC 911 UNIVERSAL SERIES HIGH BACK AIR SUSPENSION
PASSENGER SEAT NFPA COMPLIANT
DUAL DRIVER SEAT ARMRESTS AND INBOARD PASSENGER SEAT
ARMREST
LH AND RH INTEGRAL DOOR PANEL ARMRESTS
GRAY VINYL SEAT COVERS WITH GRAY CORDURA CLOTH BOLSTERS
AND HEADRESTS
NFPA 1901-2009 HIGH VISIBILITY ORANGE SEAT BELTS

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ADJUSTABLE TILT AND TELESCOPING STEERING COLUMN
4-SPOKE 18 INCH STEERING WHEEL
DRIVER AND PASSENGER INTERIOR SUN VISORS

Instruments & Controls

BLACK GAUGE BEZELS
LOW AIR PRESSURE INDICATOR LIGHT AND AUDIBLE ALARM
2 INCH PRIMARY AND SECONDARY AIR PRESSURE GAUGES
ENGINE COMPARTMENT MOUNTED AIR RESTRICTION INDICATOR WITH GRADUATIONS
CUSTOM 97 DB BACKUP ALARM
ELECTRONIC CRUISE CONTROL WITH SWITCHES IN LH SWITCH PANEL
ICU3S, 132X48 DISPLAY WITH DIAGNOSTICS, 28 LED WARNING LAMPS AND DATA LINKED
FIRE AND EMERGENCY SERVICE VEHICLES ENGINE WARNING
2 INCH ELECTRIC FUEL GAUGE
ELECTRICAL ENGINE COOLANT TEMPERATURE GAUGE
2 INCH TRANSMISSION OIL TEMPERATURE GAUGE
ENGINE AND TRIP HOUR METERS INTEGRAL WITHIN DRIVER DISPLAY
ELECTRIC ENGINE OIL PRESSURE GAUGE
ELECTRONIC MPH SPEEDOMETER WITH SECONDARY KPH SCALE
ELECTRONIC 3000 RPM TACHOMETER
IGNITION SWITCH CONTROLLED ENGINE STOP
DIGITAL VOLTAGE DISPLAY INTEGRAL WITH DRIVER DISPLAY
SINGLE ELECTRIC WINDSHIELD WIPER MOTOR WITH DELAY
MARKER LIGHT SWITCH INTEGRAL WITH HEADLIGHT SWITCH
ONE VALVE PARKING BRAKE SYSTEM WITH DASH VALVE
SELF CANCELING TURN SIGNAL SWITCH WITH DIMMER, WASHER/WIPER AND HAZARD IN HANDLE
INTEGRAL ELECTRONIC TURN SIGNAL FLASHER WITH HAZARD LAMPS OVERRIDING STOP LAMPS

Paint Design

TWO COLOR CUSTOM BASE/CLEAR COAT COLORS
BLACK, HIGH SOLIDS POLYURETHANE CHASSIS PAINT

CAB TO AXLE DIMESION

Cab to axle will be 109.5".

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CHASSIS MODIFICATIONS

LUBRICATION AND TIRE DATA PLATE

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

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

VEHICLE DATA PLATE

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

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

OVERALL HEIGHT, LENGTH DATA PLATE (US)

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

The label shall show the height of the completed 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.

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PERSONNEL CAPACITY

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

SEAT BELT WARNING - FAMA06/07

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

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

EQUIPMENT MOUNTING FAMA10

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

FIRE SERVICE TIRES - FAMA12

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

HELMET WARNING - FAMA15

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

CLIMBING METHOD - FAMA23

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

REAR STEP CROSSWALK WARNING - FAMA24

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

FINAL STAGE MANUFACTURER VEHICLE CERTIFICATION

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

FRONT BUMPER EXTENSION

The front bumper of the chassis shall be extended approximately 16" ahead of the cab using Junior I-beams.

The bumper mounting plate shall be welded to the Junior I-beam for mounting of the chassis bumper. After fabrication of the bumper extension, the panels shall be removed and the unit shall be primed and painted black.

BUMPER GRAVEL SHIELD

The front bumper extension shall have a 3/16" NFPA compliant aluminum tread plate gravel shield. The gravel shield shall cover the full width of the front bumper to the front of the cab and the full height of the bumper on each end.

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AIR HORNS

Two (2) Grover 24" Stuttertone chrome plated air horns shall be recess mounted in the front bumper, one (1) on each side outboard of the frame rails. An emergency air shut off valve shall be provided in the cab.

AIR HORN ACTIVATION

The air horn(s) shall be operated by the steering wheel horn button and a foot switch on the cab floor at the officer's position.

AIR HORN / ELECTRIC HORN SWITCH

There shall be a switch which allows the driver to select the steering column horn ring operation. This switch shall allow the driver to select either the air horn or electric horn activation.

MOTOR DRIVEN SIREN

There shall be a Santa Fe Springs Fire Department supplied B & M Super Chief motor driven rotary siren with chrome plated grill and housing, recess in the extended front bumper. The siren shall be wired through the master warning light switch, and properly wired with heavy copper cable for minimum voltage drop.

The siren shall be located at the center of the front bumper.

There shall be a siren brake installed in the rocker switch control panel to activate the siren brake.

SIREN ACTIVATION

There shall be two (2) foot switches provided to activate the siren; one (1) for the driver, and one (1) for the officer. The switches shall be mounted on the floor in a location to prevent accidental activation.

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 by the commercial cab/chassis manufacturer. Air inlet restrictions shall not exceed the engine manufacturer's recommendations.

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

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

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

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EXHAUST

The existing exhaust tailpipe shall be extended to ahead of the rear axle on the streetside.

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

Exhaust pipe discharge shall be directed away from any operator's position.

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

EXHAUST DIVERTER

An exhaust diverter valve shall be located in-line of exhaust tubing and controlled from driver's position to re-route exhaust discharge. Exhaust diverter valve shall be constructed from 14 gauge stainless steel material with air actuated control.

As a default, the exhaust shall always discharge to streetside just ahead of rear wheels and when ever the park brake is release. The exhaust will automatically divert to the vertical pipe when the generator is engaged. The operator will also have the ability to manually select the exhaust location from the Vista Screen with the park brake engaged.

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

Exhaust pipe discharge shall be directed away from any operator's position.

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

RAIN CAP ON EXHAUST

There shall be a rain cap furnished and installed on the chassis exhaust system.

PLYMOVENT EXHAUST SYSTEM

A Plymovent exhaust system shall be utilized by Santa Fe Springs Fire Department mounted to the streetside horizontal exhaust discharge.

RADIO/ANTENNA INSTALLATION

There shall be one (1) Santa Fe Springs 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 Santa Fe Springs Fire Department at the pre-construction meeting. All required radio programming shall be responsibility of Santa Fe Springs Fire Department. Radio(s) may not be fully tested if no radio program is provided with radio and will be responsibility of Santa Fe Springs Fire Department after delivery.

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

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12 VDC USB, DUAL PORT PLUG

There shall be two (2) 12 volt dual port USB plug(s) provided and installed in the cab console, wired battery direct. The location of the USB plugs shall be determined by the Santa Fe Springs Fire Department at the pre-construction meeting.

MOBILE DATA CONSOLE INSTALLATION

There shall be one (1) Santa Fe Springs Fire Department supplied MDC with antenna(s) installed in the cab in the forward portion of the center console. The location of the MDC shall be determined by the Santa Fe Springs Fire Department at the pre-construction meeting. All required MDC programming shall be responsibility of Santa Fe Springs Fire Department. MDC(s) may not be fully tested if no programming is provided with radio and will be responsibility of Santa Fe Springs Fire Department after delivery.

MDC shall be installed per Manufacturer's requirements and wired for proper 12 volt power and ground and **wired battery direct.**

SHOP NOTES

Added customer supplied MDC installation. Wire battery direct

RADIO CHARGER INSTALLATION

There will be two (2) Santa Fe Springs Fire Department supplied handheld radio chargers installed on the center console. The exact layout will be provided for approval prior to fabrication.

SEAT BELT COLOR

Section 14.1.3.4 of the NFPA 1901 Standards, requires all seat belt webbing in cab to be bright red or bright orange in color, and the buckle portion of the seat belt shall be mounted on a rigid or semi rigid stalk such that the buckle remains positioned in an accessible location.

SEAT BELT WEB LENGTH - COMMERCIAL CAB

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

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

SEAT BELT MONITORING AND VEHICLE DATA RECORDER (VDR) SYSTEMS

SEAT BELT MONITORING

A Weldon 6204 series system with Vista IV display shall be provided and installed to allow the driver to know if all persons seated in the vehicle are secured with seat belts before moving the vehicle. Built-in smart seating logic shall detect if the correct sit and buckle sequence is not followed for all seats. System shall also provide an output for an external alarm. Weldon diagnostic port will be located under dash on driver side. System shall include the following features;

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VEHICLE DATA RECORDER (VDR)

The vehicle data recorder shall have the following features;

- Recorded Data Includes: Vehicle Speed, Acceleration, Deceleration, Engine Speed, Engine Throttle Position, ABS Event, Seat Occupied Status, Seat Belt Status, Master Optical Warning Switch, Park Brake, Service Brake, Time, Date and Engine Hours.
- Password Protected by the customer
- Six (6) seat position inputs for occupied and belts buckled. Additional six (6) seat expansion module available.
- Easily interfaces with V-MUX™ or other multiplexing systems
- Data is extracted by a standard, mini USB cable

OCCUPANT RESTRAINT INDICATOR

The occupant restraint indicator shall have the following features;

- Will be displayed on Vista IV panel.
- Supports commercial and custom cab seating layouts; up to 12 seats
- Built-in audible alarm
- Use in conjunction with Vehicle Data Recorder (VDR)

IGNITION KEY

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

Four (4) spare keys shall be supplied with the completed apparatus.

SIX (6) – LED TIRE PRESSURE VISUAL INDICATORS

Each tire shall be equipped with a VECSAFE heavy duty valve cap (or equal) LED indicator that indicates proper tire pressure. The VECSAFE valve cap is self-calibrating. When the cap is mounted on the valve stem the first time, it will memorize that tire pressure, and can be set to recognize a drop in pressure as little as 4 psi. It can be checked for functionality and battery condition by simply unscrewing the cap. If it is in working condition, it will immediately start blinking.

HELMET STORAGE

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.

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

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

RE-PAINT CAB - TWO COLORS

The cab exterior (door jambs not painted unless specified otherwise) shall be re-painted with PPG Delfleet Evolution paint.

Exterior Upper Color: WHITE

Exterior Upper Paint Number: PPG 911647 (FLNA 4041)

Exterior Lower Color: RED

Exterior Lower Paint Number: PPG 77723 (FLNA 3225)

CHASSIS PAINT WARRANTY

The portion of the cab re-painted shall be provided with a ten (10) year, non-prorated paint warranty to the original owner. The warranty shall be provided by PPG Inc. A warranty sheet with all conditions and maintenance procedures shall be provided with the delivered vehicle.

CAB STEP COVER AND BATTERY COMPARTMENT

The stock cab upper and lower entry steps shall be overlaid with 1/8" NFPA compliant aluminum treadplate. There will be a removable panel to access and replace the chassis batteries and a hinged fuel fill access door.

The maximum stepping height shall not exceed 18", with the exception of the ground to first step, which shall not exceed 24" when the vehicle is loaded to its estimated in-service weight. All steps shall have a minimum area of 35 sq in and shall be of such a shape that a 5" diameter disk does not overlap any side when placed on the step, and shall be arranged to provide a t least 8" of clearance between the leading edge of the step and any obstruction. All platforms shall have a minimum depth of 8" from the leading edge of the platform to any obstruction.

The following options will be cut into the step cover:

BATTERY JUMPER STUDS

Two (2) battery jumper studs, one (1) positive with a red weather cover, and one (1) negative with a black weather cover shall be provided in the lower front portion of the driver step area. Jumper studs shall be identified with color coded label.

These studs shall allow this vehicle to be jump started due to a battery failure, or to allow easy access to assist another vehicle.

HUB AND NUT COVERS

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

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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.

ELECTRIC DOOR LOCK INTERFACE

Electric door locks shall be provided and interfaced as follows;

The electric cab door locks shall be provided by the cab/chassis manufacturer.

The cab door electric lock system shall not be interfaced with the body doors.

There will be a hidden lock control switch located behind the grill on the drivers side. It will be a momentary push button style button.

ROAD EMERGENCY SAFETY KIT

The DOT required reflective triangles, warning flares, and fire extinguisher shall be provided by cab and chassis supplier.

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 Santa Fe Springs 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 Santa Fe Springs 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.

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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.

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.

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ROOF CONSTRUCTION

The roof structure shall be integral with the body sheet metal construction and shall be an all welded assembly. The body roof structure shall be overlaid with not less than 3/16" aluminum 3003H-14 alloy tread plate and welded to roof structure and body sheet metal. All seams in roof material shall be fully and continuously welded to prevent entry of moisture.

There shall be a total of four (4) 2" x 2" x 1/4" 6061-T6 alloy aluminum "C" channels running the length of body, two (2) on each outboard side. These "C" channels shall be used for roof support and in addition shall be used for mounting of any specified reels. This open "C" channel design along with special reel mounting clips allows for a universal location of any specified reels within each compartment.

In between the two (2) center "C" channels running the length of body shall be 2" x 2" x 1/4" 6061-T6 alloy aluminum tubing running in between and welded in place on approximate 16" centers to support roof and/or walkway structure if specified.

A 2" formed radius shall be provided along the body sides and utilized as a wiring trough. The use of aluminum extrusions in this area shall not be acceptable, .

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 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.

SHOP NOTES

No side warning light housing on tailboard

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REAR TOW EYES

There shall be two (2) heavy duty rear mounted tow eyes securely attached to the body subframe, below body. The tow eyes shall be fabricated from 3/4" thick steel plate with a 3" diameter opening. Tow eyes shall have a black powder coat finish.

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.

DIEFORMED BEADED EDGE BODY FENDERS

A die formed beaded edge shall be provided along the radius of the wheel well opening for a finished appearance.

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.

BODY PAINT SPECIFICATIONS

BODY PAINT PREPARATION

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

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

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

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PAINT PROCESS

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

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

PAINT - ENVIRONMENTAL IMPACT

The contractor shall meet or exceed 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, a Mylar isolation tape, or gasket shall be used to prevent damage to the finish painted surface. These components shall be fastened to body using either a plastic insert into body metal with stainless steel screws or zinc coated nut-surts into body surface using stainless steel bolts to prevent corrosion from dissimilar metals.

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ELECTROLYSIS CORROSION CONTROL

The vehicle shall be assembled using ECK brand or similar corrosion control compound 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 per Santa Fe Springs Fire Department approved paint spray out provided.

A small touch-up bottle of paint shall be provided with completed vehicle.

- Paint Color: RED
- Paint Number: 77723 (Sikkens LV-FLNA3225)

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 compartment interior paintable surfaces shall be prepared and DA sanded using 80-120 grit dry paper and cleaned with a wax and grease remover. A PPG Delfleet® primer topcoat of either a solids epoxy primer or an etch primer shall be applied.

A PPG Delfleet® color primer with proper hardener and thinner mix shall then be sprayed using a pressure pot spray gun and applying 2 wet coats achieving full hiding on entire compartment surface and allow to air dry for 30 minutes @ 70°F before applying texture coat.

A PPG Delfleet® F3985 White/F3986 Gray top coat/texture coat with proper hardener and dry additive shall then be sprayed using a pressure pot and reducing the atomizing air pressure and turn fan pattern all the way in on the gun. Apply the first color texture coat as needed and allow to air dry @ 70°F over night before assembly and 7 days before putting into full service.

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REFLECTIVE STRIPE 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 retro-reflection of 10 with observation angle of 0.2 degrees and entrance angle of -4 degrees.

Any printed or processed retroreflective film construction used shall conform to the standards required of an integral colored film as specified in ASTM D 4956, Section 6.1.1.

Minimum Requirements

A retroreflective stripe(s) shall be affixed to at least 50 percent of the cab and body length on each side, excluding the pump panel areas, and at least 25 percent of the width of the front of the 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 layout shall be provided for approval by Santa Fe Springs Fire Department prior to installation. The graphics proof shall be submitted to Santa Fe Springs 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.

REFLECTIVE STRIPE - CAB SIDE

The reflective stripe material shall be 6" wide, 3M Scotchcal 680 series.

- This reflective stripe shall be white in color.

There shall be a 1/4" Scotchcal reflective pinstripe located directly above and a second 1/4" Scotchcal reflective stripe located directly below the main stripe.

- This reflective stripe shall be black in color.

REFLECTIVE STRIPE - CAB FRONT

The reflective stripe material shall be 6" wide, 3M Scotchcal 680 series.

- This reflective stripe shall be white in color.

There shall be a 1/4" Scotchcal reflective pinstripe located directly above and a second 1/4" Scotchcal reflective stripe located directly below the main stripe.

- This reflective stripe shall be black in color.

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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.

REFLECTIVE STRIPE - BODY SIDES

The reflective stripe material shall be 6" wide, 3M Scotchcal 680 series.

- This reflective stripe shall be white in color.

There shall be a 1/4" Scotchcal reflective pinstripe located directly above and a second 1/4" Scotchcal reflective stripe located directly below the main stripe.

- This reflective stripe shall be black in color.

The stripe shall extend from the front of cab in a straight line, then just ahead of the rear wheels the stripe shall angle up and extend straight back to the rear of the body.

CHEVRON REFLECTIVE STRIPE - REAR SIDES PANELS

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

The rear side panels of the body on each side of a rear stairway or compartment shall have a chevron style reflective stripe, extending from bumper height up to side compartment drip rail height. Each chevron panel shall be a full sheet and shall have a 3M UV over laminate to protect from UV rays, scene damage, and everyday use. Chevron panel shall have a minimum 10 year warranty for material failure, and colorfastness.

The stripe material shall be 3M Diamond Grade.

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

LETTERING

GRAPHICS PROOF

A color graphics proof of the lettering layout shall be provided for approval by Santa Fe Springs Fire Department prior to installation. The graphics proof shall be submitted to Santa Fe Springs 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.

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

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SIDE CAB DOOR LETTERING

There shall be fifty (50) 3" high SuperGold letters furnished and installed on the vehicle. Lettering shall have a clear 3M UV Protective Over Laminate applied before installation.

Final design and layout shall be determined prior to construction.

"SANTA FE SPRINGS"
"FIRE RESCUE"

UPPER BODY SIDE LETTERING

There shall be seventy eight (78) 5" high reflective letters furnished and installed on the vehicle.

"SANTA FE SPRINGS FIRE DEPARTMENT"
"FIRE-RESCUE"

- This reflective lettering color shall be white with black shadow.

REAR BODY LETTERING

There shall be six (6) 6" high reflective letters furnished and installed on the vehicle.

Lower RC1 roll-up door "SFS 828"

- This reflective lettering shall be white in color.

There shall be twenty five (25) 3" high SuperGold letters with black shadow furnished and installed on the vehicle. Lettering shall have a clear 3M UV Protective Over Laminate applied before installation.

Final design and layout shall be determined prior to construction.

CAB ROOF LETTERING

There shall be three (3) 22" high reflective letters furnished and installed on the vehicle.

"828"

- This reflective lettering shall be white in color.

SUPPLIED DECALS

The bidder shall install two (2) Santa Fe Springs Fire Department supplied decal(s) on the vehicle, located on the.

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EXTERIOR COMPARTMENT DOORS

ROLL-UP DOOR CONSTRUCTION - ROBINSON (ROM)

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

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

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

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

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

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	84.0"
B	Bottom of Subframe to Bottom of Body	22.5"
C	Vertical Door Opening	
	-with roll-up door	67.5"
	-with hinged door	71.5"

ABOVE REAR AXLE

	<u>Description</u>	<u>Dimension</u>
D	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>
E	Bottom of Subframe to Bottom of Body	20.0"
F	Vertical Door Opening	
	-with roll-up door	62.0"
	-with hinged door	66.0"

GENERAL

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

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

BODY WIDTH DIMENSIONS

The body shall be 100.0" wide, and 102.0" wide at drip rails. Interior compartment depth dimensions shall be approximately:

<u>Area</u>	<u>Description</u>	<u>Dimension</u>
	Transverse above subframe	95.0"
	Compartment depth below subframe	24.5"

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STREETSIDE COMPARTMENT - FRONT (S1)

The interior useable compartment space shall be approximately 70.0" wide.

The compartment door opening shall be approximately 63.0" wide.

This compartment shall have a R•O•M series IV roll-up door.

- The roll-up door slats and the door track components shall be painted to match the single tone exterior color.
- 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 on bottom rail of the roll-up door. The lock will be keyed to 1250.
- One (1) 1" wide nylon strap shall be provided to assist in closing the compartment door. The strap shall be fastened to the lower left inside door sill with a nickel plated Footman loop secured to back of door. The strap shall extend from door to a nickel plated Footman loop secured to wall or vertical slot of Shelf-Trac on left side of the door opening.
- 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 30" deep. Each shelf shall be fabricated from 3/16" 3003 aluminum sheet with a 2" vertical flange along the front and rear edges.

Adjustable shelf located aft section of compartment.

– The above component(s) shall have a smooth un-painted finish.

- 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".

Transverse tray located forward section of compartment.

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- There shall be one (1) transverse table and chair storage module for the following equipment;

Module located in forward transverse slide-tray.

- Four (4) Santa Fe Springs Fire Department supplied 5 foot folding table(s).
 - Twenty Four (24) Santa Fe Springs Fire Department supplied folding chair(s). Manufacturer, model number and dimensions of the folding chair(s) shall be provided during the pre-construction meeting.
 - There shall be four (4) OnScene Solutions Velcro cargo straps provided to secure the stored equipment.
 - The above component(s) shall have a smooth un-painted finish.
- 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".

Transverse tray located aft section of compartment.

- The above component(s) shall have a smooth un-painted finish.
- 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.

Locate between specified transverse slide-out trays.

- 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.
- There shall be one (1) Blue Sea Systems 100 amp ST Series blade type fuse block with screw type terminals for both positive and negative buss with cover provided for distribution of up to six (6) 30 amp, 12 VDC circuits. Fuse block shall be located per required circuits and be protected from damage. Shall be located in upper front corner of compartment.
- The controls for the specified awning(s).
- There shall be one (1) underbody slide-out step. Platform shall be constructed from 9" deep DiamondBack non-slip vented aluminum stair treads mounted to underbody using Delron plastic slides for corrosion resistance. Step slide shall be securely held in both out and stored position, utilizing a heavy duty pneumatic cylinder designed to have an over center location which will assist the step in both extension and retraction. Each step shall be designed to hold 500 lbs.
- 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 lower compartment.

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STREETSIDE COMPARTMENT - ABOVE REAR WHEELS (S2)

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 R•O•M series IV roll-up door.

- The roll-up door slats and the door track components shall be painted to match the single tone exterior color.
- 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 on bottom rail of the roll-up door. The lock will be keyed to 1250.
- One (1) 1" wide nylon strap shall be provided to assist in closing the compartment door. The strap shall be fastened to the lower left inside door sill with a nickel plated Footman loop secured to back of door. The strap shall extend from door to a nickel plated Footman loop secured to wall or vertical slot of Shelf-Trac on left side of the door opening.
- 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 28" Access LED compartment lights, vertically mounted.
- Specified breathing air compressor and air storage system in center of compartment.

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STREETSIDE COMPARTMENT - REAR (S3)

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 R•O•M series IV roll-up door.

- The roll-up door slats and the door track components shall be painted to match the single tone exterior color.
- 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 on bottom rail of the roll-up door. Lock will be keyed 1250
- One (1) 1" wide nylon strap shall be provided to assist in closing the compartment door. The strap shall be fastened to the lower left inside door sill with a nickel plated Footman loop secured to back of door. The strap shall extend from door to a nickel plated Footman loop secured to wall or vertical slot of Shelf-Trac on left side of the door opening.
- 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 two (2) adjustable shelf/shelves approximately 70" deep. Each shelf shall be fabricated from 3/16" 3003 aluminum sheet with a 2" vertical flange along the front and rear edges.
 - The above component(s) shall have a smooth un-painted finish.
- 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 above component(s) shall have a smooth un-painted finish.
- There shall be one (1) SCBA cylinder storage module for 8" OD (maximum) SCBA bottles. The maximum length of the SCBA cylinder shall be 24.75". The module shall have an exterior shell fabricated from 1/8" (.125) 3003H-14 aluminum alloy sheet. The module shall have a 2" slope, front to back to prevent cylinders from sliding out. The SCBA cylinder storage tubing shall be fabricated from PVC pipe to prevent damage or abrasion to cylinders. In addition there shall be rubber matting provided in the base of each storage tube for bottle protection and to prevent slipping.

SHOP NOTES

Brand: _____ Diameter: _____" (Must be less than 7.625") Length: _____" (with valve)

- The SCBA cylinder module shall be capable of storing eight (8) SCBA cylinders up to 7.5" diameter.

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- There shall be one (1) OnScene Solutions 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.

SHOP NOTES

Partial, forward of partition.

- One (1) Hannay ECR1618-17-18 electric cable reel(s) capable of storing 200' 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 200' 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;
 - A 12" pigtail that terminates in an L5-30 configuration to match the cable on the cord reel. The outlet configuration shall include:
 - One (1) 120 VAC, L5-20 single twist lock receptacle.
 - One (1) 120 VAC, L5-20 single twist lock receptacle.
 - One (1) 120 VAC, 5-15 duplex straight-blade receptacle.
 - One (1) 120 VAC, 5-15 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.
- There shall be one (1) Blue Sea Systems 100 amp ST Series blade type fuse block with screw type terminals for both positive and negative buss with cover provided for distribution of up to six (6) 30 amp, 12 VDC circuits. Fuse block shall be located per required circuits and be protected from damage. Shall be located in the upper front corner of compartment.
- One (1) OnScene 54" Access LED compartment light, vertically mounted.

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- There shall be one (1) underbody slide-out step. Platform shall be constructed from 9" deep DiamondBack non-slip vented aluminum stair treads mounted to underbody using Delron plastic slides for corrosion resistance. Step slide shall be securely held in both out and stored position, utilizing a heavy duty pneumatic cylinder designed to have an over center location which will assist the step in both extension and retraction. Each step shall be designed to hold 500 lbs.
- 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 - FRONT (C1)

The interior useable compartment space shall be approximately 70.0" wide.

The compartment door opening shall be approximately 63.0" wide.

This compartment shall have a R•O•M series IV roll-up door.

- The roll-up door slats and the door track components shall be painted to match the single tone exterior color.
- 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 on bottom rail of the roll-up door. The lock will be keyed to 1250.
- One (1) 1" wide nylon strap shall be provided to assist in closing the compartment door. The strap shall be fastened to the lower left inside door sill with a nickel plated Footman loop secured to back of door. The strap shall extend from door to a nickel plated Footman loop secured to wall or vertical slot of Shelf-Trac on left side of the door opening.
- 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 two (2) 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) 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.
- There shall be one (1) module fabricated from 3/16" (.188) 3003H-14 aluminum alloy smooth sheet. The module will be designed for the following long tools and equipment:

Module located aft section of compartment.

- Four (4) Santa Fe Springs Fire Department supplied EZ Up tent(s).
- 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.
- The controls for the specified awning(s).

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- There shall be one (1) underbody slide-out step. Platform shall be constructed from 9" deep DiamondBack non-slip vented aluminum stair treads mounted to underbody using Delron plastic slides for corrosion resistance. Step slide shall be securely held in both out and stored position, utilizing a heavy duty pneumatic cylinder designed to have an over center location which will assist the step in both extension and retraction. Each step shall be designed to hold 500 lbs.
- One (1) OnScene 8" Access LED ground light(s) shall be provided below the body.

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CURBSIDE COMPARTMENT - ABOVE REAR WHEEL (C2)

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 R•O•M series IV roll-up door.

- The roll-up door slats and the door track components shall be painted to match the single tone exterior color.
- 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 on bottom rail of the roll-up door. The lock will be keyed to 1250.
- One (1) 1" wide nylon strap shall be provided to assist in closing the compartment door. The strap shall be fastened to the lower left inside door sill with a nickel plated Footman loop secured to back of door. The strap shall extend from door to a nickel plated Footman loop secured to wall or vertical slot of Shelf-Trac on left side of the door opening.
- 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 28" Access LED compartment lights, vertically mounted.
- One (1) 120/240 VAC load center.
- The generator gauge panel.
- A Bauer model K-18.1-20-E3 air compressor with a recharging rate of 25.2 SCFM @ 6,000 PSI shall be provided, . Compressor skid shall include 20 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 88" L x 51" W x 41" H and weigh 1,400 pounds (not inc. air storage).
 - No boost system shall be provided with compressor skid.
 - An Appleton inlet and base shall be provided in compartment near compressor. The compressor shall have a 2/00 AWG SO cord with a matching Appleton plug for operating compressor from the on-board generator system. Another matching Appleton plug shall be provided with completed vehicle for operating the compressor from an in-house electrical system. All required building wiring shall be responsibility of Santa Fe Springs Fire Department.

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- Air storage shall consist of four (4) ASME 491 SCF @ 6,000 PSI, (does not require hydrostatic testing) shall be provided on completed vehicle complete with gauges and valves. Each cylinder shall measure 9.6" diameter x 55" long, and weigh 400 lbs.

A label shall be placed on or near the operator's panel that provides the following:

- 1) The original cylinder test date stamped on the cylinders.
- 2) The recommended testing interval.
- 3) Five additional open spaces, appropriately labeled, for the user to enter actual retesting dates.

The manufacturer's test date (month and year) on each air tank shall be current within 12 months of the apparatus delivery date.

Air tanks shall be marked with a label that reads;

"High Pressure 6,000 PSI Breathing Air" or "High Pressure 41,368 kPa Breathing Air."

- 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 Santa Fe Springs 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 Santa Fe Springs Fire Department upon delivery.

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CURBSIDE COMPARTMENT - REAR (C3)

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 R•O•M series IV roll-up door.

- The roll-up door slats and the door track components shall be painted to match the single tone exterior color.
- 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 on bottom rail of the roll-up door. The lock will be keyed to 1250.
- One (1) 1" wide nylon strap shall be provided to assist in closing the compartment door. The strap shall be fastened to the lower left inside door sill with a nickel plated Footman loop secured to back of door. The strap shall extend from door to a nickel plated Footman loop secured to wall or vertical slot of Shelf-Trac on left side of the door opening.
- 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 two (2) adjustable shelf/shelves approximately 20" deep. Each shelf shall be fabricated from 3/16" 3003 aluminum sheet with a 2" vertical flange along the front and rear edge. One shelf will be forward of the divider.
 - The above component(s) shall have a smooth un-painted finish.
- 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.
 - The above component(s) shall have a smooth un-painted finish.
- 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 above component(s) shall have a smooth un-painted finish.
- Compartment C3 will have minimum 1/8" smooth aluminum walls to isolate the compartment from all other compartments as much as possible. There will be areas allow for necessary wire and airlines pass thru's.

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- 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.

SHOP NOTES

Partial, aft of slide-out tray.

- One (1) Hannay ECR1618-17-18 electric cable reel(s) capable of storing 200' 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 200' 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;
 - A 12" pigtail that terminates in an L5-30 configuration to match the cable on the cord reel. The outlet configuration shall include:
 - One (1) 120 VAC, L5-20 single twist lock receptacle.
 - One (1) 120 VAC, L5-20 single twist lock receptacle.
 - One (1) 120 VAC, 5-15 duplex straight-blade receptacle.
 - One (1) 120 VAC, 5-15 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.
- One (1) Engel, model MT80F-U1, 12 VDC/120VAC, refrigerator/freezer. The unit will be a top load chest style unit and mounted on a roll-out tray listed above in the lower compartment area. The refrigerator shall operate from 12 VDC. The re Fridgerator will be wired through shore power and generator. The dimensions are approximately 32"L x 15"W x 17"D. **The refrigerator/freezer 12V power will only be provided when the chassis engine is running.**
- There shall be two (2) Bunn model CW15-APS Airpot Dispensed Coffee Brewer(s) with Airpot(s) furnished and installed in the compartment.

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- There shall be one (1) commercial grade under-cabinet style microwave oven furnished and installed in the compartment. The unit shall be a 1000-watt minimum with stainless steel cabinet. The built-in dimensions shall be 12" high x 20-1/2" wide x 16" deep. The unit will be installed under the coffee makers suspended from under the extended compartment floor

SHOP NOTES

Place microwave under the coffee makers suspended from under the extended floor. (Under cabinet style unit)

- Two (2) OnScene 54" Access LED compartment lights, vertically mounted.
- There shall be three (3) 120 VAC outlet(s) located in compartment on the forward wall.
 - The outlet receptacle(s) shall be 20 amp, straight-blade (NEMA 5-20R).
 - Outlet(s) shall be powered through the on-board generator system.
- There shall be one (1) underbody slide-out step. Platform shall be constructed from 9" deep DiamondBack non-slip vented aluminum stair treads mounted to underbody using Delron plastic slides for corrosion resistance. Step slide shall be securely held in both out and stored position, utilizing a heavy duty pneumatic cylinder designed to have an over center location which will assist the step in both extension and retraction. Each step shall be designed to hold 500 lbs.
- One (1) OnScene 8" Access LED ground light(s) shall be provided below the body.

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REAR COMPARTMENT - CENTER (RC1)

The rear center compartment shall be closed to both side rear compartments.

The rear center compartment shall begin just above the bumper height and be as high as the side compartments, unless specified otherwise. The body sub-frame shall extend at least 20" into the compartment to allow for the spring loaded body mounts.

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 R•O•M series IV 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 on bottom rail of the roll-up door. Lock will be keyed 1250
- One (1) 1" wide nylon strap shall be provided to assist in closing the compartment door. The strap shall be fastened to the lower left inside door sill with a nickel plated Footman loop secured to back of door. The strap shall extend from door to a nickel plated Footman loop secured to wall or vertical slot of Shelf-Trac on left side of the door opening.
- 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

- One (1) Hannay EFH1516-17-18 high pressure air hose reel(s) shall be provided in this compartment. Reel shall be designed to hold 110% of the capacity needed.
 - Power rewind control(s) shall be in a position where the operator can observe the rewinding operation and shall be marked with a label indicating its function and shall be guarded to prevent accidental operation.
 - A label shall be provided in a visible location adjacent to reel with following information: (1) Utility air or breathing air, (2) Operating pressure, (3) Total hose length, (4) Hose size (ID).
- The hose reel shall be equipped with 300' of 3/16" Parker 6,000 PSI, high pressure air hose. A molded plastic ball clamp shall be provided on the hose to stop it at the 4-way roller. The hose shall be Gray in color with a red color coded end.

SHOP NOTES

Quick Connect coupling

- The fitting on the end of the high pressure air hose reel shall be a CGA-347 high pressure fitting.

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- The air supply shall be from the mobile breathing air system. A reel shut-off valve, pressure regulator, and 0-6,000 psi gauge shall be provided at the air control panel.
- The air supply shall be from the mobile breathing air system.
- The fairlead roller shall be mounted directly to the reel.
- Two (2) OnScene Access LED, full height compartment lights, vertically mounted.
- One (1) OnScene Access LED, full width compartment light mounted at the top of the compartment toward the door opening.
- A secondary Weldon V-MUX Vista IV multiplex system interface display with push-button control shall be provided in compartment RC1 easily accessible by operator standing on ground.
 - The full-color Vista interface display allows the user to control warning and scene lighting, and view on-board diagnostics including service information.
- The controls for the specified light tower(s).
- One (1) Bauer model CFS5.5 3M, NFPA 1901 compliant containment type three (3) 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 46.75" wide x 50.25" high x 21" deep, and weigh approximately 905 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.
 - One (1) high pressure air hose reel gauge(s), adjustable regulator(s), and fill control(s) shall be provided on front panel with outlet port located on the rear of 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.

PLASTIC FLOOR AND SHELF TILE

All compartment floors, shelves, and trays shall be covered with Dri-Dek plastic interlocking grating.

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

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LOWER SIDE BODY PROTECTION - RUB RAIL

Rub rails shall be provided below the compartment door openings on both the streetside and curbside.

The rub rail shall be fabricated from smooth aluminum flat bar stock. 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.

SHOP NOTES

Smooth flat bar stock to match there last SVI unit

FRONT GRAVEL GUARDS

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

ROLL-OUT AWNING STREETSIDE

One (1) Girard G-2000 Automatic Retractable Lateral Arm Awning shall be mounted on the body side.

The cassette housing is made of corrosion-resistant, powder-coated extruded aluminum with components made of stainless steel. The housing box to be powder coated to match the upper body white.

The unit shall measure 16' long x 5-1/4" deep x 7-3/8" high. The awning shall project outward 9' - 9" and will be mounted slightly lower in the rear to add in drainage.

The G-2000 will deploy and retract using a 12V DC motor with manual override (to retract awning in the event of a power failure). The controls shall be located in compartments S1 for a streetside awning, and C1 for a curbside awning.

The awning shall have a system to detect canopy motion. The awning shall automatically retract when the canopy reaches a certain level of movement. The G-2000 has a Limited Lifetime Warranty.

- The awning fabric color shall be red.

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 white housing color shall be re-painted to match upper body color.

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ROLL-OUT AWNING CURBSIDE

One (1) Girard G-2000 Automatic Retractable Lateral Arm Awning shall be mounted on the body side.

The cassette housing is made of corrosion-resistant, powder-coated extruded aluminum with components made of stainless steel. The housing box to be powder coated to match the upper body white.

The unit shall measure 16' long x 5-1/4" deep x 7-3/8" high. The awning shall project outward 9' - 9" and will be mounted slightly lower in the rear to add in drainage.

The G-2000 will deploy and retract using a 12V DC motor with manual override (to retract awning in the event of a power failure). The controls shall be located in compartments S1 for a streetside awning, and C1 for a curbside awning.

The awning shall have a system to detect canopy motion. The awning shall automatically retract when the canopy reaches a certain level of movement. The G-2000 has a Limited Lifetime Warranty.

- The awning fabric color shall be red.

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 white housing color shall be re-painted to match upper body color.

REAR ROLL-OUT AWNING

The upper rear of truck shall be equipped with a Girard G-208505 Automatic Retractable Lateral Arm wall mount awning.

The cassette housing is made of corrosion-resistant, powder-coated extruded aluminum with components made of stainless steel. The housing box shall be powder coated white.

The unit shall measure eight 8' x 5-1/4" deep x 7-3/8" high. The awning shall project outward 5'.

The G-208505 shall deploy and retract using a 12V DC motor with the power controls located in compartment RC1.

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

- The awning fabric color shall be red.

AWNING HOUSING COLOR

The awnings standard white housing color shall be re-painted to match upper body color.

AWNINGS LOCATIONS

All the awnings listed above will be mounted at the same heights on the body.

SHOP NOTES

Need to make sure awning will be mounted at same heights

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ROOF ACCESS HATCH COVER

One (1) roof access hatch cover shall be provided in the roof structure to allow for installation or removal of large equipment into the compartment area. The roof around the hatch opening shall be reinforced as necessary to prevent deflection in the roof area. The hatch cover shall overlap a 2" vertical lip on the body roof to prevent entry of moisture. It shall be sealed with automotive type rubber molding to provide a weather resistant seal.

The hatch cover shall have a lift-up type door hinged on the front side. The door shall be fabricated from 3/16" aluminum treadplate with a pair of pneumatic type cylinders mounted to hold the door in the open position. The door shall be mounted using a full length 14 gauge stainless steel hinge, with 1/4" stainless steel pin. A polyester barrier film gasket shall be placed between the stainless steel hinge and any dissimilar metals as necessary to prevent corrosion.

LOW VOLTAGE ELECTRICAL SYSTEM- 12 VDC

General

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

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

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

Wiring

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

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

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

Wiring and Wire Harness Construction

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

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

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

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

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

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

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

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

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

Power Supply

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

Minimum Continuous Electrical Load

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

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

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

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

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

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

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

Electromagnetic Interference

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

Wiring Diagram

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

Low Voltage Electrical System Performance Test

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

12 VOLT 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.

Outputs:

The outputs shall perform all the following items without added modules to perform any of the tasks;

1. **Load Shedding:** The system shall have the capability to load shed with 8 levels any output. This means you can specify which outputs (barring NFPA restrictions) you would like load shed. Level 1 12.9v, Level 2 12.5V, Level 3 - 12.1V, Level 4 - 11.7V, Level 5 11.3V, Level 6 10.9V, Level 7 10.5, Level 8 10.1. Unlike conventional load shedding devices you can assign a level to any or all outputs.
2. **Load Sequencing:** The system shall be able to sequence from 0 8 levels any output. With 0 being no delay and 1 being a 1 second delay, 2 being a 2 second delay and so on. Sequencing reduces the amount of voltage spikes and drops on your vehicle, and can help limit damage to your charging system.

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3. Output Device: The system shall have solid-state output devices. Each solid-state output shall be a MOS-FET (Metal Oxide Semiconductor - Field Effect Transistors); MOS-FETs are solid-state devices with no moving parts to wear out. A typical relay when loaded to spec has a life of 100,000 cycles. The life of a FET is more than *100 times* that of a relay.
4. Flashing Outputs: The system shall be able to flash any output in either A or B phase, and logic is used to shut down needed outputs in park, or any one of several combined interlocks. The flash rate can be selected at either 80, 160 or 200 FPM. This means any light can be specified with a multiplex truck with no need to add flashers. Flashing outputs can also be used to warn of problems or other unique idea you may come up with.
5. PWM: The modules shall have the ability to PWM at some outputs so that a headlight PWM module is not needed.
6. Diagnostics: An output should be able to detect either a short or open circuit. The system should be able report in "real time" a text based message that points the maintenance person to a specific output.

Inputs:

1. The inputs shall have the ability to switch by a ground or vbatt signal.
2. The inputs shall be filtered for noise suppression via hardware and software so that RF or dirty power will not trick an input into changing its status.

Auto-Throttle:

The multiplex system shall be able to perform automatic high idle via a network gateway or by using an existing output on a module to provide the proper signals to an OEM Engine ECU. This task should be handled with existing inputs and outputs.

Displays:

Displays shall be able to provide real time information regarding load shedding and system status, such as network traffic/errors or shorts and open circuits.

System Network:

The multiplex system shall contain a Peer-to-Peer network. A Master Slave Type network is not suitable for this type of unit. A Peer-to-Peer network means that all the modules are equal on the network; a Master is not needed to tell other nodes when to talk, **No Exceptions**.

System Reliability:

The multiplex system shall be able to perform in extreme temperature conditions, from 40° to +85° C (-40° to +185° F.) The system shall be sealed against the environment, moisture, humidity, salt or fluids such as diesel fuel, motor oil or brake fluid. The enclosures shall be rugged to withstand being mounted in various locations or compartments around the vehicle. The modules shall be protected from over voltage and reverse polarity.

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.

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MULTIPLEX SYSTEM INTERFACE DISPLAY

Two (2) Weldon V-MUX Vista IV multiplex system interface display(s) with push-button control one shall be provided in cab easily accessible to driver and one located in body compartment RC1. The full-color Vista interface display allows the user to control warning and scene lighting, and view on-board diagnostics including service information. This display has a wide operating temperature range, automatic screen switching in response to current conditions, and a sleep mode option to eliminate night glare. The following features shall be included;

- 800 x 480 resolution
- Four video ports
- Flash updates with USB memory stick
- Display inside and outside temperature (when specified)
- Automatic climate control (when specified)
- 100% Configurable (OEM Level)
- Field re-programmable
- Peer to peer network
- On-board diagnostics / service information
- Colors change to indicate button status
- Video Ready for: Backup camera, Thermal camera, DVD, GPS...

The V-Mux display shall be located in the cab center console for control of all master and emergency lights.

CAB CONSOLE

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

The rear portion of the console shall be provided with open top storage for notebooks or maps. Two (2) adjustable dividers shall be provided in the storage area. The forward portion of console shall be slanted for easy viewing of the V-Mux display screen, and any siren or radio equipment. The area shall be within easy access to both Driver and Officer.

Arm rest shall be provided attached to console for driver and officer in board arms.

SHOP NOTES

Department request console design approval.

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.

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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.

An onboard battery conditioner or charger or a polarized inlet shall be provided for charging all batteries. Where an onboard conditioner or charger is supplied, the associated line voltage electrical power system shall be installed in accordance with Chapter 22.

One of the following master disconnect switches shall be provided:

- 1) A master body disconnect switch that disconnects all electrical loads not provided by the chassis manufacturer
- 2) A master load disconnect switch that disconnects all electrical loads on the apparatus except the starter

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 disconnect on" indicator light that is visible from the driver's position shall be provided.

Rechargeable hand lights, radios, and other similar devices shall be permitted to be connected to the electrical system ahead of the master disconnect switch.

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 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.

BATTERY SOLENOID

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

BATTERY CONDITIONER

One (1) Kussmaul model Auto Charge 1000 single battery conditioner, with 120 VAC input and 15 amp, 12 volt output shall be provided. This system shall monitor the condition of batteries and provide an electrical current at variable rates to overcome battery failure. A display shall be provided and located on the driver side front body face within in easy sight from the ground.

The display will be a Kussmaul model #091-194B-IND-WT-XX

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SHORE POWER INLET

One (1) Kussmaul 120 VAC, 20 amp Super Auto-Eject shore power inlet(s) shall be provided. The shore power connection shall automatically disengage from vehicle when chassis ignition is engaged.

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

- The outlet cover shall be red.
- The shore power plug shall be located near the Driver door area step towards the back of the cab so to not interfere with egress to and from the cab.

ENGINE COMPARTMENT LIGHT

There shall be one (1) light(s) mounted in the engine compartment with integral switch with a light output of at least 20 candlepower (250 lumens). The engine compartment light(s) shall operate only when the master battery switch is turned "On".

CAB HAZARD WARNING LIGHT

A red Whelen LIN3 Series Super-LED model # RSR02ZCR shall be, located in the driving compartment, 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 ft³ (0.1 m³).
- The compartment has an opening less than or equal to 144 in.² (92,900 mm²).
- The open door does not extend sideways beyond the mirrors or up above the top of the fire apparatus.
- All equipment in the compartment is restrained so that nothing can fall out if the door is open while the apparatus is moving.
- Manually raised pole lights with an extension of less than 5 ft (1.5 m).

The hazard light shall be labeled "DO NOT MOVE APPARATUS WHEN LIGHT IS ON".

SHOP NOTES

Whelen LIN3 Series Super-LED model # RSR02ZCR shall be provided.

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

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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.

REAR VIEW CAMERA

There shall be one (1) ASA Voyager rear observation camera system provided and installed on completed unit. The system shall include one (1) model VCC150 high resolution CCD color camera installed on the rear body.

The camera(s) shall be wired to the cab/chassis supplied Weldon Vista display(s). The rear camera shall activate when the transmission is placed in reverse. If a right camera is provided it shall activate with the right side turn signal and if a left camera is provided it shall activate with the left side turn signal. All camera(s) shall also be activated by a button on the Vista display(s).

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 specified lower Zone "C" warning lights
- Two (2) Whelen M6 Series M6BTT red LED stop/tail lights
- Two (2) Whelen M6 Series M6T amber LED turn signal lights
- Two (2) Whelen M6 Series M6BUW LED back-up lights with clear lens

Each of the lights above shall be mounted in an M6FCV4, 4-light chrome finish bezels.

SHOP NOTES

Locate stop/tail above turn signals

MIDSHIP MARKER/TURN SIGNAL

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

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

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.

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LICENSE PLATE MOUNTING BRACKET

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

ELECTRONIC SIREN

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

A switch shall be provided at the 12 volt control panel so that the steering wheel horn ring can be used to activate electronic siren.

SIREN SPEAKER

Two (2) Cast Products Inc. model SA4311, 100 watt siren speaker shall be provided recessed in the front bumper, one (1) on the streetside and one (1) on the curbside.

SIDE SCENE LIGHTS

There shall be four (4) Whelen M9LZC series (9" x 7") surface mounted Super-LED scene light(s) provided on the upper body. Light quantity shall be divided equally per side. Each light will have an 8-32 degree gradient lens and chrome flange.

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

The lights shall be switched at the Vista display in the cab.

REAR SCENE LIGHTS

Two (2) Whelen M9LZC series (9" x 7") surface mounted Super-LED scene lights shall be provided on the upper rear body to light the work area. Each light will have a 8-32 degree gradient lens and chrome flange.

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

The lights shall be switched at the Vista display in the cab.

The rear scene lights shall also be activated when the apparatus is in reverse.

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SIGTRONICS INTERCOM SYSTEM

The following Sigtronics intercom system shall be provided and installed to improve the safety of firefighters and rescue professionals through enhanced communication and hearing protection. System shall have the following major components as minimum;

- One (1) US45S Single radio intercom system
- Three (3) PTT Stations - Driver, Officer and compartment RC1 at fill-station
- One (1) intercom jack at driver side rear exterior body panel recess mounted so just the plug/cover is exposed
- Two (2) SE-8 Headsets

INTERCOM SYSTEM INSTALLATION

The above listed intercom system shall be installed in the cab locations as follows;

Front of Cab

- Driver's – Mounted above the right shoulder position on ceiling.
- Officer's – Mounted above the left shoulder position on ceiling.

SHOP NOTES

No rear crew positions

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.

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

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

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

UPPER LEVEL OPTICAL WARNING DEVICES

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

ZONE A - FRONT WARNING LIGHTS

There shall be one (1) Whelen Freedom F4N0VLED LED 60" lightbar permanently mounted to the cab roof.

The lightbar configuration (streetside to curbside) shall be:

<u>SECTION</u>	<u>INTERNAL COMPONENTS</u>	<u>LENS COLOR</u>
1	Red/White Corner LED	Clear
2	TIR Alley, 3 LED's	Clear
2	Red/White Front Corner LED	Clear
3	Red/White Long Super-LED	Clear
4	Red/White Long Super-LED	Clear
5	Red/White Long Super-LED	Clear
6	Red/White Long Super-LED	Clear
7	GTT 795H Opticom w/TIR Takedown Lts	Clear
8	GTT 795H Opticom w/TIR Takedown Lts	Clear
9	Red/White Long Super-LED	Clear
10	Red/White Long Super-LED	Clear
11	Red/White Long Super-LED	Clear
12	Red/White Long Super-LED	Clear
13	Red/White Front Corner LED	Clear
	TIR Alley, 3 LED's	Clear
14	Red/White Rear Corner LED	Clear

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

SHOP NOTES

WeCad on file. BTW 4/13/18.

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

ZONES B AND D - SIDE WARNING LIGHTS

UPPER REAR CORNER 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.

UPPER FORWARD CORNER 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.

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 1600 mm) above level ground.

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

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ZONE A - FRONT WARNING LIGHTS

There shall be two (2) Whelen M7 series Red Linear Super-LED lights (M7RC) provided, one (1) each side. Each light shall have a clear lens and chrome flange.

The lights shall be controlled at the switch panel in cab.

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

There shall be two (2) Whelen M7 series Red Linear Super-LED lights (M7RC) provided, one (1) each side. Each light shall have a clear lens and chrome flange.

The lights shall be controlled at the switch panel in cab.

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

Locate to the rear of wheel well panel ILO front of wheel well panel.

There shall be two (2) Whelen M7 series Red Linear Super-LED lights (M7RC) provided, one (1) each side. Each light shall have a clear lens and chrome flange.

The lights shall be controlled at the switch panel in cab.

ZONE C - REAR WARNING LIGHTS (LOWER REAR CORNERS)

There shall be two (2) Whelen M6 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.

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LINE VOLTAGE ELECTRICAL SYSTEM

LIMA PTO GENERATOR

The vehicle shall be equipped with a Lima MAC 360 series, single bearing generator system with a capacity of 40,000 watts at 120/208 volt, 3-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.

The direct drive generator shall be mounted so that it does not change the ramp break-over 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 Marathon's written instruction; Marathon warrants that the MAC series PTO continuous duty generators shall be free from defects in material and workmanship for a period of one (1) year, from the date of delivery to the first purchaser.

The generator shall be engaged at the driver's Vista display in the cab.

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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.

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 280GKFJP-B5XV, 164% Ratio.

Double check the model number and ratio with engineering before ordering the PTO on the chassis.

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 an Eaton BR Series specifically designed for protection and distribution of AC line voltage such as lighting and small motor branch circuits. The loadcenter enclosure is made of 16 gauge galvanized sheet steel with a galvanized coating provided for corrosion protection. All trims used on BR loadcenters are chromate sealed and finished with an electro-disposition epoxy paint (ANSI-61) which exceeds requirements for outdoor and indoor applications. A combination surface/flush cover with integral door is supplied with indoor loadcenters rated from 100 through 400 amperes. All plug-in loadcenters are CSA listed to file LL98266. CSA Certified to C22.2 No.29, to loadcenter type and CSA listing.

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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

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.

SHORE POWER INLET - BATTERY CHARGER

Shore power shall be wired to all primary 120 VAC, 20 ampere electrical outlets on apparatus (maximum of two (2) circuits). Circuits shall be provided with circuit breaker protection with either generator or shore power providing power.

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:

- Two (2) 120 volt exterior outlets, one (1) each side rear of body.
 - The outlet receptacle(s) shall be 20 amp, twist-lock (NEMA L5-20R).

LINE VOLTAGE ELECTRICAL SYSTEM

GENERAL REQUIREMENTS

Stability

Any fixed line voltage power source producing alternating current (ac) shall produce electric power at 60 Hz, ± 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 ± 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.

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Location Ratings

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.

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.

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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.

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:

- 1) Voltmeter
- 2) Current meters for each ungrounded leg
- 3) Frequency (Hz) meter
- 4) 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.

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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 ampere rating and shall be sized to carry not less than 115 percent of the ampere rating of the nameplate current rating of the power source.

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).

Over-current Protection

Manually re-settable 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 ampere 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 Over-current 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.

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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.

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.

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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.

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.

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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.

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

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 5-20 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 PFP2AP provided. The 150 watt 120 VAC Pioneer light head 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 switch box below the lamphood.

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LIGHT TOWER

Two (2) Command Light, CL Series light tower(s) shall be provided and installed on the completed unit. A flashing warning light shall be provided in cab, indicating when a light tower is not in nested position as required by NFPA 1901.

The Command Light shall be covered by a five (5) year limited warranty from defects in materials and workmanship. An operation, maintenance, and parts manual shall be provided with the completed unit.

The light tower shall extend 131" above the mounting surface and shall extend to full upright position in less than 15 seconds. The overall size of nested light tower shall be approximately 42" wide x 74" long x 12" high and weigh approximately 300 pounds.

Light Tower Construction and Design

The Command Light assembly shall be of aluminum construction, with stainless steel shafts and bronze bushings for long life and low maintenance.

The electrically controlled unit shall 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 shall 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 shall 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 shall be a two-stage articulating device with a lighting bank on top of the second stage capable of continuous 360 degree rotation. The light shall 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 shall be supplied through power collecting rings thus allowing continuous 360 degree rotation in either direction.

The tower base shall 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 CL615A-2MH shall 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 shall 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 shall be provided on the light tower. The lower pair of light heads shall 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 shall have an additional switch supplied for the backlight rotation option.

Light Tower Paint

The light tower shall be electro-statically powder coated with a hammer tone gray color.

Light Tower Controls

The light tower(s) shall be operated with a hand-held 15-foot umbilical line remote control. The storage station for the remote control unit shall be equipped with a button to activate the "Auto-Park" automatic nesting feature. The remote control shall be located per the itemized compartment list and include;

Three (3) switches; one (1) for each pair of lights.

One (1) switch for light bank rotation.

One (1) switch for elevating lower stage.

One (1) switch for elevating upper stage.

One (1) switch for optional light bank rotation.

One (1) switch for the optional strobe.

One (1) indicator light to indicate when light bank is out of the roof nesting position.

One (1) indicator light to indicate when light bank is rotated to proper nesting position.

Light Tower Mounting

The specified light tower(s) shall be recessed into the roof of body to allow light tower(s) to be stowed below roof level. The floor and side walls of recessed area shall be fabricated as a separate module from 3/16" aluminum treadplate with an overlapping 3" flange around perimeter roof line. The recessed area shall be completely water tight. All electrical connections made to light tower shall be located on sidewalls for a water tight connection.

The recessed area shall have two (2) water drain holes (in opposite corners) with flexible 1" diameter hose routed to the area below the body. The drains shall be provided with sheet metal screen to prevent debris from clogging drain hoses.

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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 Santa Fe Springs 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.
- There shall be two (2) Zico AC-32, NFPA approved aluminum wheel chocks provided for 32" diameter tires that together will hold the vehicle when loaded to its GVWR or GCWR, on a hard surface with a 20% grade, with the transmission in neutral, and the parking brake released.
 - The wheel chock(s) shall be shipped loose with the completed apparatus.

Will be stored in S1 or S2

- Two (2) Super Vac V18VE, 18" electric variable speed ventilation fan(s) shall be provided with the completed unit.
- Two Super Vac Mountain Misters will be shipped loose on the apparatus.

SHOP NOTES

Valor V18-EV Electric fan variable motor and two (2) Super Vac Mountain Mister

- The above specified ventilation fan(s) shall be shipped loose with the completed unit.
- Two (2) Pelican 8060 LED flashlight(s) with shoulder strap shall be provided with 1,131/558 lumen output and 3.75/9 hour run time. Each flashlight shall be yellow in color and have a 12 volt DC charger and vehicle mount kit. The flashlight(s) shall be wired to battery direct unless otherwise specified by Santa Fe Springs Fire Department.
 - The flashlight(s) shall be mounted on the completed unit in the cab. (Will be determined at mid inspection).

REMAINING NFPA MINOR EQUIPMENT BY PURCHASER

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