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# METRO FIRE 2026 S-180 MODEL 3106 STOCK ENGINE

## INTENT OF SPECIFICATIONS

It shall be the intent of these specifications to provide a complete apparatus equipped as hereinafter and as specified. With a view to obtaining the best results and the most acceptable apparatus for service in the Department, these specifications cover only the general requirements as to the type of construction and tests to which the apparatus must conform, together with certain details as to finish, equipment and appliances with which the successful bidder shall conform. Minor details of construction and materials where not otherwise specified are left to the discretion of the contractor, who shall be solely responsible for the design and construction for all features. The manufacturer shall provide loose equipment only when specified by the customer. The current NFPA (Standard for Automotive Fire Apparatus) at time of contract, unless otherwise specified as requested by the customer in these specifications, shall prevail.

The apparatus must meet all NFPA, DOT, ICC, AE, SAE, UL, TRA, FMVSS and local state Motor Vehicle Requirements.

It is required that the apparatus be manufactured to current NFPA edition standards, all NFPA equipment (LOOSE EQUIPMENT) not specified in the specifications will not be provided by the contractor.

Bids shall only be considered from companies that have an established reputation in the field of fire apparatus construction that have been in business and construction for a minimum of twenty-five (25) years.

The bidder of the apparatus herein specified; shall be wholly owned (100%) and managed by a Company, Corporation, and/or Parent Company that is wholly based, and permanently resides in the United States of America.

The Company, Corporation, and/or Parent Company and all assets belonging to such; shall be wholly owned and managed (100%) by the entities specified above.

The bidder shall state the location of the manufacturing facility where the apparatus is to be built and the location of the parent company if a subsidiary of a manufacturer.

The bidder shall provide satisfactory evidence of their ability to construct the apparatus specified in the bidders manufacturing facilities.

The bidder's representation shall state the length of time representing the manufacturer of specified apparatus.

Due to the severe service requirements the department will impose on the apparatus as specified, each bidder shall provide a list of at least six (6) departments in which similar apparatus utilizing the brand of chassis proposed have been in service for over one year. This list shall include contact names and phone numbers.

Due to the importance of keeping this vital piece of firefighting apparatus in service with a minimum of downtime, the manufacturer shall maintain a network of service centers with factory-training personnel.

The bid shall be accompanied by a set of "Contractor's Specifications" consisting of a detailed description of the apparatus being furnished under this contract which conform. Computer runoff sheets are not acceptable as "Contractor's Specifications". Item compliance shall be indicated in the "Yes/No" column of each item by all Bidders. Note: Each bidder shall submit their bid in the same sequence as these specifications to allow the department to easily compare.

These specifications shall indicate size, type, model and make of all component parts and equipment.

# METRO FIRE APPARATUS

## QUALITY AND WORKMANSHIP

The design of the Apparatus shall embody the latest approved automotive engineering practices.

The workmanship must be of the highest quality in its respective field. Special consideration will be given to the following points: Accessibility of the various units, which require periodic maintenance, ease of operation (including both pumping and driving) and symmetrical proportions.

Construction shall be rugged and ample safety factors shall be provided to carry loads as specified and to meet both on and off road requirements and to speed conditions as set forth under “Performance tests and requirements”.

Welding shall be employed in the assembly of the apparatus in a manner that will not prevent the ready removal of any component part for service or repair, with apparatus bodies of bolt together design not being acceptable.

All steel welding shall follow American Welding Society requirements for AWS D1.1:2012 Structural Welding Code for welding steel structural assemblies. All aluminum welding shall follow American Welding Society requirements for AWS D1.2/D1.2M:2003 Structural Welding Code for any type of structure made from aluminum structural alloys. All sheet metal welding shall follow American Welding Society AWS D9.1M/D9.1:2006 Structural Welding code for Arc/Braze requirements of non-structural materials. All pressure pipe welding shall follow American Society of Mechanical Engineers ASME IX/ ASME B31:2010 requirements to the qualification of procedures in welding and brazing, in accordance with the ASME Boiler and Pressure Vessel Code and the ASME B31 Code for Pressure Piping. Flux core arc welding to use alloy rods, type 7000, American Welding Society AWS standards A5.20-E70T1.

## DELIVERY

The bidder shall provide the number of calendar days from the date the bid is awarded to the delivery of the completed unit.

A qualified delivery engineer representing the contractor shall deliver the apparatus and instruct the Fire Department personnel in the proper operation, care and maintenance of the equipment delivered.

To ensure proper break-in of all components while still under warranty, the apparatus shall be delivered under its own power. The unit will remain insured by the apparatus manufacturer until the department accepts the unit.

## PERFORMANCE TESTS AND REQUIREMENTS

A road test shall be conducted with the apparatus fully loaded to its estimated in-service weight and shall be capable of the following performance while on dry paved roads that are in good condition and for a continuous run of ten (10) miles or more, during which time the apparatus shall show no loss of power or overheating. The transmission drive shaft or shafts and rear axles shall run quietly and be free from abnormal vibration or noise throughout the operating range of the apparatus. The successful bidder shall furnish a Weight Certificate showing weights on front axle, rear axles and total weight for the completed apparatus at time of delivery.

A. The apparatus shall be capable of accelerating to 35 MPH (55 km/hr) from a standing start within 25 seconds on a level concrete highway without exceeding the maximum governed RPM of the engine.

B. The apparatus, fully loaded, shall be capable of obtaining a minimum top speed of 50 MPH (80 km/hr) on a level dry concrete highway with the engine not exceeding its governed RPM (fully loaded).

C. The service brakes shall be capable of stopping a fully loaded vehicle in 35ft (10.7 m) at 20 mph (32.2 km/hr) on a level concrete highway. The air brake system shall conform to Federal Motor Vehicle Safety Standards (FMVSS) 121.

D. The apparatus, when fully loaded, shall have not less than 25 percent or more than 50 percent of the

weight on the front axle, and not less than 50 percent nor more than 75 percent on the rear axle.

E. From a steady pace of 15 mph, the vehicle will accelerate to a true speed of 35 mph within 15 seconds. This will be accomplished without moving gear selector.

F. The apparatus will be able to maintain a speed of at least 20 mph on any grade up to and including 6 percent.

G. The contractor shall have the Underwriter's Laboratories, LLC conduct the tests of the apparatus as in accordance with standard practices required by the Underwriter Laboratories, LLC (Guide for the Certification of Fire Department Pumper latest edition). A copy of all tests shall accompany the Apparatus. (For apparatus sold within Canadian ULC S515 latest revision shall prevail).

H. The contractor shall furnish copies of the Pump Manufacturer's Certification of hydrostatic test, the Engine Manufacturer current certified brake horsepower curve, and the Manufacturer's record of pumper construction details when delivered.

I. All fluid levels and applicable pressures will be brought to proper levels and noted prior to final delivery.

**INFORMATION REQUIRED**

The manufacturer shall supply at time of delivery, a complete operation and maintenance manual covering the completed apparatus as delivered.

A Fire Apparatus Safety Guide published by Fire Apparatus Manufacturer's Association shall be provided with the apparatus upon delivery. 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 firefighting apparatus manufactured on either custom or commercial chassis.

A permanent plate shall be mounted in the driver's compartment to specify the quantity and type of the following fluids used in the vehicle: Engine oil, engine coolant, and chassis transmission fluid, pump transmission lubrication fluid, pump primer fluid (if used) and drive axle lubrication fluid.

The manufacture shall supply the final certification of GVWR and GAWR on a nameplate affixed to the vehicle.

A permanent plate in the driver's compartment shall be installed, specifying the seating capacity of the enclosed cab.

Signs that state "OCCUPANTS MUST BE SEATED AND BELTED WHEN APPARATUS IS IN MOTION" shall be provided and will be visible from each seated position. An accident prevention sign shall be located at the rear step area of the apparatus. It shall warn all personnel that standing on the step while apparatus is in motion shall be prohibited.

A nameplate indicating the chassis transmission shift selector position to be used when pumping shall be provided in the driving compartment and located so that it can be easily read from the driver's position.

**LIABILITY**

The bidder, if their bid is accepted, shall defend any and all suits and assume all liability for the use of any patented device or article forming part of the apparatus or any appliance provided under the contract.

**GENERAL CONSTRUCTION**

The apparatus shall be designed with due consideration to distribution of load between the front and rear axles, so that all specified equipment, including filled water tank, a full complement of personnel and fire hose will be carried without

injury to the apparatus. Weight balance and distribution shall be in accordance with the recommendations of the current NFPA, Standard for Automotive Fire Apparatus, documentation at time of contract signing.

The apparatus shall be designed so that all recommended daily maintenance checks can be performed easily by the operator without the need for hand tools. Apparatus components that interfere with repair or removal of other major components must be attached with fasteners (cap, screws, nuts, etc.) so that the components can be removed and installed with normal hand tools. These components must not be welded or otherwise permanently secured into place.

The GAWR and GVWR of the chassis shall be adequate to carry the fully equipped apparatus including all tanks filled, the specified hose load, unequipped personnel weight, ground ladders and a miscellaneous equipment allowance per NFPA criteria. It shall be the responsibility of the purchaser to provide the contractor with the weight of equipment to be carried if it is in excess of the allowance as set forth by NFPA.

The unequipped personnel weight shall be calculated at 250 lbs. per person times the maximum number of persons to ride on the apparatus.

The height of the fully loaded vehicle's center of gravity shall not exceed the chassis manufacturer's maximum limit.

The front to rear weight distribution of the fully loaded vehicle shall be within the limits set by the chassis manufacturer. The front axle loads shall not be less than the minimum axle loads specified by the chassis manufacturer, under full loads and all other loading conditions.

The difference in weight on the end of each axle, from side to side, when the vehicle is fully loaded and equipped shall not exceed 7 percent.

The apparatus shall be so designed that the various parts are readily accessible for lubrication, inspection, adjustment and repair.

Where special tools manufactured or designed by the contractor and are required to provide routine service on any component of the apparatus built or supplied by the contractor, such tools shall be provided with the apparatus.

**EXCEPTIONS TO SPECIFICATIONS**

The following specifications shall be strictly adhered to. Exceptions shall be allowed if they are equal to or superior to that as specified and providing, they are listed and entirely explained on a separate page entitled "Exceptions to Specifications". The exceptions list to refer to specification page number and paragraph.

Proposals taking total exception to specifications or total exception to certain parts of the specifications such as Electrical Systems, Chassis, Body or Pump, will not be accepted.

Prototype units will not be acceptable. Apparatus shall be inspected upon completion for compliance with specifications.

Deviations will not be tolerated and will be cause for rejection of Apparatus unless they were originally listed in bidder’s proposal and accepted in writing by the department.

If the bidder takes an exception, on the exception page, the bidder must state an option price to bring their specifications into full compliance with the Department specifications.

Failure to provide this information shall be cause to reject the proposal as being non-responsive.-

Copied or run off sheets of these specifications shall be unacceptable, and the bid will be rejected no exceptions.

# METRO FIRE APPARATUS

## WARRANTY

Warranties applicable to the chassis and body (excluding vendor supplied components {engine, transmission, axles, etc.} which carry their own specific warranties) will be addressed by a single point warranty service provider approved by the manufacturer to perform service as necessary.

## PURCHASER'S RIGHTS

The Purchaser reserves the right to accept or reject any or all bids as it deemed in their best interests.

## BID DRAWING

For purposes of evaluation, the bidder shall provide a drawing illustrating, but not limited to, the overall dimensions, wheelbase, and overall length of the proposed apparatus. Other specified equipment shall be required to be included with the bidder's proposal package.

The drawings shall be large "D" size (minimum 24.00 inches x 36.00 inches). Smaller size drawings, "similar to" drawings or general sales drawings, shall not be acceptable.

Failure to provide a bid evaluation drawing in accordance with these specifications shall be cause for rejection of the bid proposal.

## APPROVAL DRAWING

After the award of the bid, the contractor shall provide detailed colored engineering drawings including, but not limited to, the overall dimensions, wheelbase, and overall length of the proposed apparatus for use during the pre-construction conference.

The drawings shall include, but shall not be limited to, the right, left, top, front and rear views of the apparatus.

## SINGLE SOURCE MANUFACTURER

Bids shall only be accepted from a single source apparatus manufacturer.

The definition of a single source manufacturer is a company that designs and manufactures their products utilizing an approach that includes complete product integration, including the apparatus chassis, cab, and body modules being constructed, assembled, and tested on company premises only.

Warranties qualified to the chassis and body design construction (excluding vendor component warranties such as engine, axles, transmission, and pumps, etc.) will be from a single source manufacturer and not separated between manufacturers (i.e., body and chassis). The bidder shall provide evidence of maintaining compliance to this requirement.

## FINITE ELEMENT ANALYSIS AND TESTING

Finite Element Analysis (FEA) shall be provided by the manufacturer.

Prototype bodies have been subjected to rigorous testing over varied terrains simulating different environmental conditions.

The purpose of such complex engineering methods of analysis shall be to ensure the longevity of the design by analyzing stress levels throughout the body and incorporating the structural supports wherever necessary.

There shall have been a minimum of three (3) different load cases (per DOT, FHWA, and TTMA recommended practice) applied and analyzed to properly display the different areas and levels of stresses that will be present under the various operating conditions of the apparatus.

In addition to the FEA analysis, the core product design shall be strain gauged instrumental to ensure validation of FEA results and “Real World” drive/apparatus driving conditions.

Analysis shall also have been conducted on the mounting system for the apparatus body and pump house. EXCEPTIONS TO THIS STATEMENT MAY BE CAUSE FOR IMMEDIATE REJECTION AND/OR BE CONSIDERED NON-COMPLIANT.

**SUPPLIED INFORMATION & EXTRAS**

The apparatus manufacturer shall supply two (2) hard copies of apparatus manuals with all manufactured apparatus.

The manuals shall include, but not be limited to: all component warranties, users' manuals and information for supplied products, apparatus engineering information including drawings and build prints, and whatever other pertinent information the manufacturer can supply to its customer regarding the said apparatus.

Included in the delivery of the unit, the manufacturer shall also include spare hardware and extra fasteners, paint for touch-up, information regarding washing and care procedures, as well as other recommendations for care and maintenance of the general apparatus.

The manufacturer shall also supply a manufacturer's record of apparatus construction details, including the following information:

- Owner name and address;
- Apparatus manufacturer, model, and serial number;
- Chassis make, model, and serial number;
- GAWR of front and rear axles;
- Front tire size and total rated capacity in kilograms;
- Rear tire size and total rated capacity in kilograms;
- Chassis weight distribution in kilograms with water (if applicable) and manufacturer mounted equipment (front and rear);
- Engine make, model, serial number, rated horsepower, related speed and no load governed speed;
- Type of fuel and fuel tank capacity;
- Electrical system voltage and alternator output in amps;
- Battery make and model, capacity in CCA
- Paint numbers;
- Weight documents from a certified scale showing actual loading on the front axle, rear axle(s), and overall vehicle (with the water tank full (if applicable) but without personnel, equipment, and hose);
- Written load analysis and results of the electrical system performance tests;
- Transmission make, model, and type;
- Pump to drive through the transmission (yes or no);
- Engine to pump gear ratio and transmission gear ratio used;
- Pump make model, rated capacity in gallons per minute, serial number, and number of stages;
- Pump manufacturer's certification of suction capability;
- Pump manufacturer's certification of hydrostatic test;
- Pump manufacturer's certification of inspection and test for the fire pump;
- Copy of the apparatus manufacturer's approval for stationary pumping applications;
- Pump transmission make, model and serial number;
- Priming device type;
- Type of pump pressure control system;
- The engine manufacturer's certified brake horsepower curve for the engine furnished, showing the

maximum no load governed speed;
- Certification of the water tank capacity.

**LIABILITY INSURANCE COVERAGE**

In order to protect the department and its personnel, the bidder shall show proof that it has no less than $10 million dollars in liability insurance in force. A certificate of coverage shall be included in the bid package. Failure to carry liability insurance of at least this amount or failure to include proof of coverage shall be cause to reject the bidder's proposal.

**GENERAL WARRANTY**

The manufacturer shall provide a two (2) year warranty from the date of delivery.

In the case of a commercial chassis being used, the warranty on the chassis, engine, transmission, tires, storage batteries, generators, electrical lamps and other devices subject to deterioration is limited to the warranty of the manufacturer thereof and adjustments for the same are to be made directly with the manufacturer by the customer.

**STRUCTURAL BODY WARRANTY**

A structural Aluminum body warranty shall be provided by the apparatus manufacturer for products of its manufacture to be free from defects in material and workmanship, under normal use and service, for a period of ten (10) years.

**PAINT WARRANTY**

A Prorated Paint Warranty shall be provided by the apparatus manufacturer for products of its manufacture to be free from defects in material and workmanship, under normal use and service, for a period of ten (10) years.

**PUMP WARRANTY**

Waterous Company shall provide a limited manufacturer's pump warranty to be free from defects, under normal use and service, for a period of seven (7) years from the date placed into service.

**PLUMBING WARRANTY**

A Stainless Steel Plumbing/Piping warranty shall be provided by the apparatus manufacturer for products of its manufacture to be free from defects in material and workmanship, under normal use and service, for a period of ten (10) years from the date of delivery.

**TANK WARRANTY**

A lifetime tank warranty shall be provided by the tank manufacturer.

**MULTI-PLEXED ELECTRICAL WARRANTY**

A four (4) year limited (V-MUX) multiplex system warranty, of Weldon Technologies, Inc., shall be provided by the apparatus manufacturer, for parts and labor, while under normal use and service, against mechanical, electrical and physical defects from the date of installation.

The warranty shall exclude: sensors, shunt interface modules, serial or USB kits, transceivers, cameras, GPS, and electrical display screens, which shall be limited to a period of one (1) time a year repair for parts and labor from the date of installation. Please see the official warranty document in the appendix (attached) for specific details.

## PUMP CERTIFICATION AND TESTING

The apparatus upon completion will be tested and certified by Underwriters Laboratories, LLC. The certification tests will follow the guidelines outlined in current NFPA, Standard for Automotive Fire Apparatus, documentation at time of contract signing.

There shall be multiple tests performed by the contractor and Underwriter's Laboratories, LLC when the apparatus has been completed. The manufacturer shall provide the completed Test Certificate(s) to the purchaser at time of delivery. The inspection services of Underwriters Laboratories, LLC are available to all bidders on an equal basis; therefore, no third party certification of testing results shall be acceptable.

If the pumping system provided is rated at 3000gpm (12,000 L/min) or less, the pump shall be capable of delivering the following:

(1) One hundred percent of rated capacity at 150 psi (1000 kPa) net pump pressure.

(2) Seventy percent of rated capacity at 200 psi (1400 kPa) net pump pressure.

(3) Fifty percent of rated capacity at 250 psi (1700 kPa) net pump pressure.

If the fire pump has a rated capacity of 750gpm (3000 L/min) or greater, the pump shall be tested after the pump and all its associated piping and equipment have been installed on the apparatus.

The tests shall include at least the pumping test, the pumping engine overload test, the pressure control system test, the priming device tests, and the vacuum test.

A test plate shall be provided at the pump operator’s panel that gives the rated discharges and pressures together with the speed of the engine as determined by the certification test for each unit, the position of the parallel/series pump as used, and the governed speed of the engine as stated by the engine manufacturer on a certified brake horsepower curve. The plate shall be completely stamped with all information at the factory and attached to the vehicle prior to shipping.

**Pumping Test:**

The test site shall be adjacent to a supply of clear water at least 4 ft. (1.2 m) deep, with the water level not more than 10 ft. (3 m) below the center of the pump intake, and close enough to allow the suction strainer to be submerged at least 2 ft. (0.6 m) below the surface of the water when connected to the pump by 20 ft. (6 m) of suction hose.

Tests shall be performed when conditions are as follows:

(1) Air temperature: 0°F to 110°F (−18°C to 43°C)

(2) Water temperature: 35°F to 90°F (2°C to 32°C)

(3) Barometric pressure: 29 in. Hg (98.2 kPa), minimum (corrected to sea level)

Engine-driven accessories shall not be functionally disconnected or otherwise rendered inoperative during the tests.

The following devices shall be permitted to be turned off or not operating during the pump test:

(1) Foam pump
(2) Winch
(3) Windshield wipers
(4) Four-way hazard flashers

(5) Compressed air foam system (CAFS) compressor

All structural enclosures, such as floorboards, gratings, grilles, and heat shields, not provided with a means for opening them in service shall be kept in place during the tests.

All test gauges shall meet the requirements for Grade A gauges as defined in ASME B40.100, *Pressure Gauges and Gauge Attachments*, and shall be at least size 31⁄2 perASMEB40.100. The pump intake gauge shall have a range of 30 in. Hg (100 kPa) vacuum to zero for a vacuum gauge, or 30 in. Hg (100 kPa) vacuum to a gauge pressure of 150 psi (1000 kPa) for a compound gauge. The discharge pressure gauge shall have a gauge pressure range of 0 psi to 400 psi (0 kPa to 2800 kPa). All pilot gauges shall have a gauge pressure range of at least 0 psi to 160 psi (0 kPa to 1100 kPa). All gauges shall be calibrated in the month preceding the tests using a dead-weight gauge tester or a master gauge meeting the requirements for Grade 3Aor 4Agauges, as defined in ASME B40.100, *Pressure Gauges and Gauge Attachments*, that has been calibrated within the preceding year.

The engine speed–measuring equipment shall consist of a nonadjustable tachometer supplied from the engine or transmission electronics, a revolution counter on a checking shaft outlet and a stopwatch, or other engine speed–measuring means that is accurate to within ± 50 rpm of actual speed.

The pump shall be subjected to a 3 hour pumping test from draft consisting of 2 hours of continuous pumping at rated capacity at a minimum of 150 psi (1000 kPa) net pump pressure, followed by 1⁄2 hour of continuous pumping at 70 percent of rated capacity at a minimum of 200 psi (1400 kPa) net pump pressure and 1⁄2 hour of continuous pumping at 50 percent of rated capacity at a minimum of 250 psi (1700 kPa) net pump pressure and shall not be stopped until after the 2 hour test at rated capacity, unless it becomes necessary to clean the suction strainer.

**Pumping Engine Overload Test:**

The apparatus shall be subjected to an overload test consisting of pumping rated capacity at 165 psi (1100 kPa) net pump pressure for at least 10 minutes.

This test shall be performed immediately following the pumping test of rated capacity at 150 psi (1000 kPa).

The capacity, discharge pressure, intake pressure, and engine speed shall be recorded at least three times during the overload test.

**Pressure Control System Test:**

The pressure control system on the pump shall be tested as follows:

(1) The pump shall be operated at draft, delivering rated capacity at a discharge gauge pressure of 150 psi (1000 kPa).

(2) The pressure control system shall be set in accordance with the manufacturer’s instructions to maintain the discharge gauge pressure at 150 psi (1000 kPa) ±5 percent.

(3) All discharge valves shall be closed not more rapidly than in 3 seconds and not more slowly than in 10 seconds.

(4) The rise in discharge pressure shall not exceed 30 psi (200 kPa) and shall be recorded.

(5) The original conditions of pumping rated capacity at a discharge gauge pressure of 150 psi (1000 kPa) shall be reestablished.

(6) The discharge pressure gauge shall be reduced to 90 psi (620 kPa) by throttling the engine fuel supply, with no change to the discharge valve settings, hose, or nozzles.

(7) The pressure control system shall be set according to the manufacturer's instructions to maintain the discharge gauge pressure at 90 psi (620 kPa) ±5 percent.

(8) All discharge valves shall be closed not more rapidly than in 3 seconds and not more slowly than in 10 seconds.

(9) The rise in discharge pressure shall not exceed 30 psi (200 kPa) and shall be recorded.

(10) The pump shall be operated at draft, pumping 50 percent of rated capacity at a discharge gauge pressure of 250 psi (1700 kPa).

(11) The pressure control system shall be set in accordance with the manufacturer's instructions to maintain the discharge gauge pressure at 250 psi (1700 kPa) ±5 percent.

(12) All discharge valves shall be closed not more rapidly than in 3 seconds and not more slowly than in 10 seconds.

(13) The rise in discharge pressure shall not exceed 30 psi (200 kPa) and shall be recorded.

**Priming System Tests:**

With the apparatus set up for the pumping test, the primer shall be operated in accordance with the manufacturer's instructions until the pump has been primed and is discharging water. This test shall be permitted to be performed in connection with priming the pump for the pumping test.

The interval from the time the primer is started until the time the pump is discharging water shall be noted. The time required to prime the pump shall not exceed 30 seconds if the rated capacity is 1250 gpm (5000 L/min) or less. The time required to prime the pump shall not exceed 45 seconds if the rated capacity is 1500 gpm (6000 L/min) or more.

An additional 15 seconds shall be permitted in order to meet the requirements of 16.13.5.3 and 16.13.5.4 when the pump system includes an auxiliary 4 in. (100 mm) or larger intake pipe having a volume of 1 ft3 (0.03 m3) or more.

**Vacuum Test:**

The vacuum test shall consist of subjecting the interior of the pump, with all intake valves open, all intakes capped or plugged, and all discharge caps removed, to a vacuum of 22 in. Hg (75 kPa) by means of the pump priming system.

At altitudes above 2000 ft. (600 m), the vacuum attained shall be permitted to be less than 22 in. Hg (75 kPa) by 1 in. Hg (3.4 kPa) for each 1000 ft. (305 m) of altitude above 2000 ft. (610 m).

The vacuum shall not drop more than 10 in. Hg (34 kPa) in 5 minutes.

The primer shall not be used after the 5 minute test period has begun and the engine shall not be operated at any speed greater than the governed speed during this test.

**Water Tank–to–Pump Flow Test:**

A water tank–to–pump flow test shall be conducted as follows:

(1) The water tank shall be filled until it overflows.

(2) All intakes to the pump shall be closed.

(3) The tank fill line and bypass cooling line shall be closed.

(4) Hose lines and nozzles for discharging water at the rated tank-to-pump flow rate shall be connected to one or more discharge outlets.

(5) The tank-to-pump valve(s) and the discharge valves leading to the hose lines and nozzles shall be fully opened.

(6) The engine throttle shall be adjusted until the required flow rate −0/+5 percent is established.

(7) The discharge pressure shall be recorded.

(8) The discharge valves shall be closed, and the water tank refilled.

(9) The bypass line shall be permitted to be opened temporarily, if needed, to keep the water temperature in the pump within acceptable limits.

(10) The discharge valves shall be reopened fully, and the time noted.

(11) If necessary, the engine throttle shall be adjusted to maintain the discharge pressure recorded as noted in 16.13.7.1(7).

(12) When the discharge pressure drops by 10 psi (70 kPa) or more, the time shall be noted and the elapsed time from the opening of the discharge valves shall be calculated and recorded.

**Volume Discharge Calculation:**

The volume discharged shall be calculated by multiplying the rate of discharge in gallons per minute (liters per minute) by the time in minutes elapsed from the opening of the discharge valves until the discharge pressure drops by at least 10 psi (70 kPa).

Other means shall be permitted to be used to determine the volume of water pumped from the tank such as a totalizing flowmeter, weighing the truck before and after, or refilling the tank using a totalizing flowmeter.

The rated tank-to-pump flow rate shall be maintained until 80 percent of the rated capacity of the tank has been discharge.

**Engine Speed Advancement Interlock Test**

The engine speed advancement interlock system shall be tested to verify that engine speed cannot be increased at the pump operator’s panel unless there is throttle-ready indication.

If the apparatus is equipped with a stationary pump driven through split-shaft PTO, the test shall verify that the engine speed control at pump operator’s panel cannot be advanced when either of the following conditions exists:

- The chassis transmission is in neutral, the parking brake is off, and the pump shift in the driving compartment is in the road position.

- The chassis transmission has been placed in the position for pumping as indicated on the label provided in the driving compartment, the parking brake is on, and the pump shift in the driving compartment is in the road position.

If the apparatus is equipped with a stationary pump driven through a transmission mounted PTO, front-of-engine crankshaft PTO, or engine flywheel PTO, the test shall verify that the engine speed control on the pump operator’s panel cannot be advanced when either of the following conditions exists:

(1) The chassis transmission is in neutral, the parking brake is off, and the pump shift status in the driving compartment is disengaged.

(2) The chassis transmission is in any other gear other than neutral, the parking brake is on, and the pump shift in the driving compartment is in the “Pump Engaged” position.

If the apparatus is equipped with a pump driven by the chassis engine designed for both stationary pumping and pump-in-motion, the test shall verify that the engine speed control at pump operator’s panel cannot be advanced when either of the following conditions exists:

(1) The chassis transmission is in neutral, the parking brake is on, and the pump shift status in the driving compartment is disengaged.

(2) The chassis transmission is in any other gear other than neutral, the parking brake is on, and the pump shift in the driving compartment is in the “Pump Engaged” or the “OK to Pump In-Motion” position.

If the apparatus is equipped with a stationary pump driven through transfer case PTO, the test shall verify that the engine speed control on the pump operator’s panel cannot be advanced when either of the following conditions exists:

(1) The chassis transmission is in neutral, the transfer case is in neutral, the parking brake is off, and the pump shift in the driving compartment is in the road position.

(2) The chassis transmission is in neutral, the transfer case is engaged, the parking brake is off, and the pump shift in the driving compartment is in the road position.

(3) The chassis transmission has been placed in the position for pumping as indicated on the label provided in the driving compartment, the parking brake is on, and the pump shift in the driving compartment is in the road position.

**LOW-VOLTAGE ELECTRICAL SYSTEM PERFORMANCE TESTING**

The apparatus low-voltage electrical system will be tested and certified. Tests shall be performed when the air temperature is between 0°F and 110°F (–18°C and 43°C). The three tests defined in NFPA shall be performed in the order in which they appear. 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 10 minutes. Failure of any of these tests shall require a repeat of the sequence.

**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 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.

**Alternator Performance 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.

**Alternator Performance 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 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 system required in NFPA 13.3.4, or a system voltage of less than 11.8 V dc for a 12 V nominal system or 23.6 V dc for a 24 V nominal system, for more than 120 seconds, shall be considered a test failure.

**Low Voltage Alarm Test:**

Following the above test, a Low Voltage Alarm Test will be performed in the manner prescribed.

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 has not yet sounded 140 seconds after the voltage drops to 11.70V for a 12 V nominal system or 23.4 V for a 24 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.

**Certification Documentation:**

At the time of delivery, the manufacturer shall provide the following documentation:

(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 under the conditions specified above.

(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.

**WARNING AND INFORMATION LABELS**

All warning and informational labels (non-vendor specific) shall be provided in compliance with (NFPA) 1901, Standard for Automotive Fire Apparatus, and installed in the appropriate locations to alert the operator of potential hazards and operating instructions.

# METRO FIRE APPARATUS

**NO PRE-CONSTRUCTION CONFERENCE**

There shall be no Pre-construction conference, prior to manufacturing, with individuals from the Fire Department.

**NO FINAL INSPECTION**

There shall be no Final- Inspection unless otherwise specified.

**NFPA 1901**

The apparatus and product orientation of the vehicle will be provided per NFPA 1901-2016 revision.

**MAXIMUM OVERALL LENGTH REQUIREMENT**

The Apparatus specified shall be constructed with no restrictions to the Maximum Overall Length.

**MAXIMUM OVERALL HEIGHT REQUIREMENT**

The Apparatus specified shall be constructed as detailed and shall NOT exceed a Maximum Overall Height of 10 feet 2 inches.

**MAXIMUM WHEEL BASE REQUIREMENT**

The Apparatus specified shall be constructed as detailed and shall NOT exceed a Maximum Wheel Base of 184 inches.

**MODEL**

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

**COUNTRY OF SERVICE**

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

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

**CAB AND CHASSIS LABELING LANGUAGE**

The cab and chassis shall include the applicable caution, warning, and safety notice labels with text to be written in English. All applicable caution, warning, and safety notice labels shall be Innovative Controls brand. Where applicable to the location within the specific layout and label package of the cab and chassis, the labels shall include decorative chrome bezels. Designs shall include bezels that fit individual labels or packaged configurations of labels in certain common locations.

The following labels shall be Innovative Controls brand, each including a decorative chrome bezel (where applicable):

- Shoreline
- Aerial Stowed
- Aerial Breakers 2
- Air Conditioner

- Cab Tilt Plate
- Air Compressor Breaker
- Battery Conditioner Breaker
- Helmet Caution
- Horn Tag
- Q2B Tag
- Load Center Plate
- Not a Step Label
- Occupancy Tag
- Do Not Move
- Occupants Must Be Seated
- Do Not Stand
- Danger Do Not Weld
- Danger--Untrained Operator
- DEF Fill Access (Including Additional 2907 Optional Labels)
- Battery Direct
- Kneeling
- IFS Air Fault
- Engine Brake
- Retarder
- LR 100 Amp Node
- 300 Amp EPU
- 100 Amp Front O/R Node
- 100 Amp T/T Node
- 100 Amp RR O/R Node
- 10 Amp EPU
- Master Power
- 12 Volt Power
- Aerial Hours
- Pump In Drive

Windshield Washer Fluid

**APPARATUS TYPE**

The apparatus shall be a pumper vehicle designed for emergency service use which shall be equipped with a permanently mounted fire pump which has a minimum rated capacity of 750 gallons per minute (3000 L/min). The apparatus shall include a water tank and hose body whose primary purpose is to combat structural and associated fires.

**VEHICLE TYPE**

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

**VEHICLE ANGLE OF APPROACH PACKAGE**

The angle of approach of the apparatus shall be a minimum of 8.00 degrees.

NFPA1901 Angle of Approach definition:
“To determine the angle of approach, place a thin steel strip against the front of the tires where they touch the ground or stretch a tight string from one front tire to the other at the front where they touch the ground. Determine the lowest

point (component or equipment) on the vehicle forward of the front tire that would make the smallest angle of approach. Hang a plumb bob from the lowest point and mark the point on the ground where the point of the plumb bob touches. Measure the vertical distance from the ground to the point where the plumb bob was hung (distance *V*). Measure the horizontal distance from the plumb bob point to the steel strip or string running from front tire to front tire (distance *H*). Divide the vertical distance by the horizontal distance. The ratio of *V/H* is the tangent of the angle of approach. If the ratio is known, the angle of approach can be determined from a table of trigonometric functions of angles or from a math calculator. The standard requires a minimum angle of approach of 8.00 degrees: since the tangent of 8.00 degrees is 0.1405, if *V* divided by *H* is 0.1405 or larger, the angle of approach is 8.00 degrees or greater."

**AXLE CONFIGURATION**

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

**GROSS AXLE WEIGHT RATINGS FRONT**

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

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

**GROSS AXLE WEIGHT RATINGS REAR**

The rear gross axle weight rating (GAWR) of the chassis shall be 26,000 pounds.

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

**PUMP PROVISION**

The chassis shall include provisions to mount a drive line pump in the middle of the chassis, behind the cab, more commonly known as the midship location. Chassis driveline pump provisions shall include an interlock feature for automatic setting of the park brake when the vehicle is shifted into pump mode while the transmission is in neutral and the transmission output speed translates to less than 1 mph. When the conditions are met the driver side parking brake valve shall activate. Once shifted to road mode the condition for electric automatic brake engagement is no longer present and the driver's parking brake control valve shall function normally.

**WATER & FOAM TANK CAPACITY**

The chassis shall include a carrying capacity of 750 gallons (2839 liters) to 1250 gallons (4732 liters). The water and/or foam tank(s) shall be supplied and installed by the apparatus manufacturer.

**CAB STYLE**

The cab shall be a custom, fully enclosed, EMFD model with a 10.00 inch raised roof over the driver, officer, and crew area, designed and built specifically for use as an emergency response vehicle by a company specializing in cab and chassis design for all emergency response applications. The cab shall be designed for heavy-duty service utilizing superior strength and capacity for the application of protecting the occupants of the vehicle. This style of cab shall offer up to eight (8) seating positions.

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

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

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

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

The exterior width of the cab shall be 94.00 inches wide with a minimum interior width of 88.00 inches. The overall cab length shall be 137.10 inches with 60.00 inches from the centerline of the front of the axle to the back of the cab.

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

The cab shall offer an interior height of 57.50 inches from the front floor to the headliner and a rear floor to headliner height of 65.00 inches in the raised roof area, at a minimum. The cab shall offer an interior measurement at the floor level from the rear of the engine tunnel to the rear wall of the cab of 57.88 inches. All interior measurements shall include the area within the interior trimmed surfaces and not to any unfinished surface.

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

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

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

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

**OCCUPANT PROTECTION**

An IMMI 4Front® occupant protection system shall be installed in the vehicle’s cab. The system shall inflate three (3) air bags in the following locations:

- Steering wheel air bag to protect the head and neck of the driver
- Knee bolster air bag to protect the driver’s legs
- Knee bolster air bag to protect the officer’s legs

The air bags shall use a combination of high-pressure stored argon and oxygen with a pyrotechnic charge for initiation to inflate the bags remain inflated for several seconds.

The system shall be connected to the crash detection sensor that will also activate the driver and first officer integrated belt pretensioners if it detects a frontal crash.

A RollTek™ rollover occupant protection system shall be installed in the apparatus cab. The system shall include an integrated roll sensor (IRS) master module and a slave sensor in applicable configurations.

The IRS shall be a microprocessor-controlled solid-state sensing device that utilizes vehicle-specific calibrations to detect rollovers. The IRS shall be equipped with pyrotechnic loops for connection to the protective countermeasures which shall include seat integrated side roll airbags (SRA), integrated seat belt pretensioners, and air seat pull-downs (S4S), in applicable occupant seat positions.

The IRS shall continuously monitor the truck`s acceleration and angle, and upon detection of an imminent roll-over, shall activate protective countermeasures in a pre-programmed sequence. In addition, the IRS shall also act as a data recorder to record crash events for post-crash evaluation.

**CAB FRONT FASCIA**

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

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

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

**FRONT GRILLE**

The front fascia shall include a box style, 304 stainless steel front grille 44.45 inches wide X 33.50 inches high X 1.50 inches deep. The grille shall include a minimum free air intake of 732.00 square inches. The upper portion of the grille shall be hinged to provide service access behind the grille.

**CAB UNDERCOAT**

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

**CAB SIDE DRIP RAIL**

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

**CAB PAINT EXTERIOR**

The cab exterior shall be painted a single color per customers specified paint color.

**CAB PAINT PROCESS/MANUFACTURER**

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

All metal surfaces on the cab shall be mechanically etched by sanding disc to remove any surface oxidation or surface debris which may hinder the paint adhesion. Once all imperfections on the exterior surfaces are removed and sanded smooth, body fillers shall be applied to the cab on all surfaces that require a critically aesthetic finish and sanded smooth. The entire cab shall then be coated with a high quality base primer that is designed to fill any minor surface defects, provide an adhesive bond between the primer and the paint and improve the color and gloss retention of the color. The finish to this procedure shall be sanding the cab to a smooth finish followed by sealing the seams with an automotive seam sealer. The minimum thickness of the primer coat after sanding shall be 2.50 mils with a maximum thickness of 5.00 mils.

The cab shall then be painted the specific color(s) designated by the customer with an acrylic urethane type system designed to retain color and resist acid rain and most atmospheric chemicals found on an emergency scene. The paint shall have a minimum thickness of 1.00 mils with a maximum of 4 mills, followed by a clear top coat with a minimum of 2.5 mils and a maximum of 3.5 mils. The entire cab shall then be baked to speed the curing process of the coatings.

**CAB PAINT PRIMARY/LOWER COLOR**

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

**CAB PAINT INTERIOR**

The visible interior cab structure surfaces shall feature a medium gray spray on bedliner coating which shall mold to each surface of the cab interior. The bedliner shall be environmentally friendly and chemically resistant.

**CAB ENTRY DOORS**

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

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

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

**CAB ENTRY DOOR TYPE**

All cab entry doors shall be barrier clear design resulting in exposed lower cab steps. The doors shall provide approximately 32.00 inches of clearance from the ground to the bottom of the door so cab doors may be opened un-hindered by most obstacles encountered, such as guard rails along interstate highways.

Entry doors shall include Pollak mechanical plunger style switches for electrical component activation.

**CAB INSULATION**

The cab ceiling and walls shall include a nonwoven polyester fiber insulation. The insulation shall act as a barrier absorbing noise as well as assisting in sustaining the desired climate within the cab interior.

**CAB STRUCTURAL WARRANTY**

Purchaser shall receive a Cab Structure (Aluminum) Ten (10) Years or 100,000 Miles limited warranty in accordance with, and subject to, warranty certificate RFW0602. The warranty certificate is incorporated by reference into this proposal, and included with this proposal or available upon request.

# METRO FIRE APPARATUS

## CAB TEST INFORMATION

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

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

## ELECTRICAL SYSTEM

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

## MULTIPLEX DISPLAY SPECIAL LAYOUT

The Vista display and control screen shall be configured specifically for a virtual button on the control screen to override the park brake interlocked deactivation of the wiper system. This will reset when the park brake is cycled.

The Vista display and control screen shall also be configured specifically for the vista dimmer control screen to have two dimmer settings. The dimmer settings shall be labeled “DAY” (Normal) and “NIGHT”. This shall omit the additional default settings “MAX” and “DIM”.

## LOAD MANAGEMENT SYSTEM

The apparatus load management shall be performed by the included multiplex system. The multiplex system shall also feature the priority of sequences and shall shed electrical loads based on the priority list specifically programmed.

## DATA RECORDING SYSTEM

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

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

Each portion of the data shall be recorded at the specified intervals and stored for the specified length of time to meet NFPA 1901 guidelines and shall be retrievable by connecting a laptop computer to the VDR system. The laptop connection shall be a panel mounted female type B USB connection point, remotely mounted in the left side foot well.

**ACCESSORY POWER**

The electrical distribution panel shall include two (2) power studs. The studs shall be size #10 and each of the power studs shall be circuit protected with a fuse of the specified amperage. One (1) power stud shall be capable of carrying up to a 40 amp battery direct load. One (1) power stud shall be capable of carrying up to a 15 amp ignition switched load. The two (2) power studs shall share one (1) #10 ground stud.

An OEM body connections bracket shall be installed on the chassis near the left hand battery box. The bracket shall include one (1) set each of 200 amp master power switched and 300 amp battery direct fused power and ground studs.

**AUXILIARY ACCESSORY POWER**

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

**ADDITIONAL ACCESSORY POWER**

An additional twelve (12) position blade type fuse panel shall be installed behind the driver's seat on the engine tunnel. The fuse panel shall be protected by a 40 amp fuse. The panel shall be wired for a battery direct load.

**EXTRA ACCESSORY POWER**

An extra six (6) position Blue Sea Systems 5025 blade type fuse panel shall be provided and installed on the lower rear wall of the cab above the seat frame. The fuse panel shall be offset left of the cab centerline between the forward facing center seat and the forward facing outer seat. The fuse panel shall be protected by a 40 amp fuse and be wired battery direct.

**EXTERIOR ELECTRICAL TERMINAL COATING**

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

**ELECTRICAL SYSTEM WARRANTY**

Purchaser shall receive an Electrical System Two (2) Years or 36,000 Miles limited warranty in accordance with, and subject to, warranty certificate RFW0202. The warranty certificate is incorporated by reference into this proposal, and included with this proposal or available upon request.

**ENGINE**

The chassis engine shall be a Cummins X12 engine. The X12 engine shall be an in-line six (6) cylinder, four cycle diesel powered engine. The engine shall offer a rating of 500 horse power at 1900 RPM and shall be governed at 2000 RPM. The torque rating shall feature 1700 foot pounds of torque at 1000 RPM with 720 cubic inches (11.8 liter) of displacement.

The X12 engine shall feature a VGT™ Turbocharger, a high pressure common rail fuel system, fully integrated electronic controls with an electronic governor, and shall be EPA certified to meet the 2021 emissions standards using cooled exhaust gas recirculation and selective catalytic reduction technology.

The engine shall include an engine mounted combination full flow/by-pass oil filter with replaceable spin on cartridge for use with the engine lubrication system. The engine shall include Citgo brand Citgard 500, or equivalent SAE 15W40 CK-4 low ash engine oil which shall be utilized for proper engine lubrication.

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

**CAB ENGINE TUNNEL**

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

**DIESEL PARTICULATE FILTER CONTROLS**

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

**ENGINE PROGRAMMING HIGH IDLE SPEED**

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

**ENGINE HIGH IDLE CONTROL**

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

**ENGINE PROGRAMMING ROAD SPEED GOVERNOR**

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

**AUXILIARY ENGINE BRAKE**

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

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

**AUXILIARY ENGINE BRAKE CONTROL**

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

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

The compression brake shall be controlled via an off/low/medium/high virtual button on the Vista display and control screen. The multiplex system shall remember and default to the last engine brake control setting when the vehicle is shut off and re-started.

**ELECTRONIC ENGINE OIL LEVEL INDICATOR**

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

**FLUID FILLS**

The front of the chassis shall accommodate fluid fill for the engine oil through the grille. This area shall also accommodate a check for the engine oil. The transmission, power steering, and coolant fluid fills and checks shall be under the cab. The windshield washer fill shall be accessible through the front left side mid step.

**ENGINE DRAIN PLUG**

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

**ENGINE WARRANTY**

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

**REMOTE THROTTLE HARNESS**

An apparatus interface wiring harness for the engine and transmission pump interlocks shall be supplied with the chassis. The harness shall include a connector for connection to a chassis pump panel harness supplied by the body builder and shall terminate in the left frame rail behind the cab for connection by the body builder. The harness shall include circuits deemed for a pump panel and shall contain circuits for a hand throttle, and a multiplexed gauge. Separate circuits shall also be included for a pump control switch, “Pump Engaged” and “OK to Pump” indicator lights, open compartment ground, start signal, park brake ground, ignition signal, master power, clean power, customer ignition, air horn solenoid switch, high idle switch and high idle indicator light. The harness shall contain interlocks that will prevent shifting to road or pump mode unless the transmission output speed translates to less than 1 mph and the transmission is in neutral. The shift to pump mode shall also require the park brake be set.

**ENGINE PROGRAMMING REMOTE THROTTLE**

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

**ENGINE PROGRAMMING IDLE SPEED**

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

**ENGINE AIR INTAKE**

The engine air intake system shall include an ember separator. This ember separator shall be designed to protect the downstream air filter from embers using a combination of unique flat and crimped metal screens packaged in a heavy duty galvanized steel frame. This multilayered screen shall trap embers and allow them to burn out before passing through the pack.

The engine air intake system shall also include an air cleaner mounted above the radiator. This air cleaner shall utilize a replaceable dry type filter element designed to prevent dust and debris from being ingested into the engine. A service

cover shall be provided on the housing, reducing the chance of contaminating the air intake system during air filter service.

The air intake system shall include a restriction indicator light in the warning light cluster on the instrument panel, which shall activate when the air cleaner element requires replacement.

**ENGINE FAN DRIVE**

The engine cooling system fan shall incorporate a thermostatically controlled, Horton fully variable type fan drive with SmartClutch J-1939 CAN controller.

The variable speed fan clutch only engages at the amount needed for proper cooling to facilitate improved vehicle performance, cab heating in cold climates, and fuel economy. The fan clutch design shall be fail-safe so that if the clutch drive fails the fan shall engage to prevent engine overheating due to the fan clutch failure. The fan speed shall include a J-1939 CAN clutch controller to receive signal from the engine control module to activate at variable rates of speed. Variable speeds shall be set through thermostatic and engine speed signals to run as efficiently and quietly as required to maintain temperature.

**ENGINE COOLING SYSTEM**

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

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

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

The cooling system shall include a one piece injected molded polymer fan with a three (3) piece fiberglass fan shroud.

The cooling system shall be equipped with a surge tank that is capable of removing entrained air from the system. The surge tank shall be equipped with a low coolant probe and rearward oriented sight glass to observe coolant in the system. A cold fill and observation line shall be included within the frame mounted translucent recovery bottle to monitor the level of the coolant. The surge tank shall have a dual seal cap that meets the engine manufacturer's pressure requirements and allows for expansion and recovery of coolant into a separate integral expansion chamber.

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

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

The radiator and charge air cooler shall be removable through the bottom of the chassis.

## ENGINE COOLING SYSTEM PROTECTION

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

## ENGINE COOLANT

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

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

## ELECTRONIC COOLANT LEVEL INDICATOR

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

## COOLANT HOSES

The cooling systems hose shall be formed silicone hose and formed aluminized steel tubing and include stainless steel constant torque band clamps.

## ENGINE COOLANT OVERFLOW BOTTLE

A remote engine coolant overflow expansion bottle shall be provided in the case of over filling the coolant system. The overflow bottle shall capture the expansion fluid or overfill rather than allow the fluid to drain on the ground.

## ENGINE PUMP HEAT EXCHANGER

A single bundle type coolant to water heat exchanger shall be installed between the engine and the radiator. The heat exchanger shall be designed to prohibit water from the pump from coming in contact with the engine coolant. This shall allow the use of water from the discharge side of the pump to assist in cooling the engine.

## ENGINE EXHAUST SYSTEM

The exhaust system shall include an end-in end-out horizontally mounted single module after treatment device, and downpipe from the charge air cooled turbo. The single module shall include four temperature sensors, diesel particulate filter (DPF), urea dosing module (UL2), and a selective catalytic reduction (SCR) catalyst to meet current EPA standards. The selective catalytic reduction catalyst utilizes a diesel exhaust fluid solution consisting of urea and purified water to convert NOx into nitrogen, water, and trace amounts of carbon dioxide. The solution shall be mixed and injected into the system through the DPF and SCR.

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

The single module after treatment through the end of the tailpipe shall be connected with zero leak clamps. The discharge shall terminate horizontally on the right side of the vehicle ahead of the rear tires.

The exhaust system after treatment module shall be mounted below the frame in the outboard position.

## DIESEL EXHAUST FLUID TANK

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

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

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

## ENGINE EXHAUST ACCESSORIES

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

The tail pipe shall have a 7.00 inch offset shifting the exhaust pipe inboard of the exhaust canister to provide additional clearance from the body and frame mounted brackets.

## ENGINE EXHAUST WRAP

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

The exhaust flex joint shall not include the thermal exhaust wrap.

## EMISSIONS SYSTEMS WARRANTY

Purchaser shall receive a Regulated Emissions Systems Five (5) Years or 100,000 Miles limited warranty in accordance with, and subject to, warranty certificate RFW0140. The warranty certificate is incorporated by reference into this proposal, and included with this proposal or available upon request.

## TRANSMISSION

The drive train shall include an Allison model EVS 4000 torque converting, automatic transmission which shall include electronic controls. The transmission shall feature two (2) 10-bolt PTO pads located on the converter housing.

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

The transmission gear ratios shall be:

| | |
|---|---|
| 1st | 3.51:1 |
| 2nd | 1.91:1 |
| 3rd | 1.43:1 |
| 4th | 1.00:1 |
| 5th | 0.74:1 |
| 6th | 0.64:1 (if applicable) |
| Rev | 4.80:1 |

## TRANSMISSION MODE PROGRAMMING

The transmission, upon start-up, will select the fifth speed operation without the need to press the mode button.

## TRANSMISSION FEATURE PROGRAMMING

The Allison Gen V/VI-E transmission EVS group package number 127 shall contain the 198 vocational package in consideration of the duty of this apparatus as a pumper. This package shall incorporate an automatic neutral with selector override. This feature commands the transmission to neutral when the park brake is applied, regardless of drive range requested on the shift selector. This requires re-selecting drive range to shift out of neutral for the override.

This package shall be coupled with the use of a split shaft PTO and incorporate pumping circuits. These circuits shall be used allowing the vehicle to operate in the fourth range lockup while operating the pump mode due to the 1 to 1 ratio through the transmission, therefore the output speed of the engine is the input speed to the pump. The pump output can be easily calculated by using this input speed and the drive ratio of the pump itself to rate the gallons of water the pump can provide.

A transmission interface connector shall be provided in the cab. This package shall contain the following input/output circuits to the transmission control module. The Gen V/VI-E transmission shall include prognostic diagnostic capabilities. These capabilities shall include the monitoring of the fluid life, filter change indication, and transmission clutch maintenance.

| Function ID | Description | Wire assignment |
|---|---|---|
| Inputs | | |
| C | PTO Request | 142 |
| J | Fire Truck Pump Mode (4th Lockup) | 122 / 123 |
| Outputs | | |
| C | Range Indicator | 145 (4th) |
| G | PTO Enable Output | 130 |
| | Signal Return | 103 |

## TRANSMISSION SHIFT SELECTOR

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

## ELECTRONIC TRANSMISSION OIL LEVEL INDICATOR

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

## TRANSMISSION PRE-SELECT WITH AUXILIARY BRAKE

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

## TRANSMISSION COOLING SYSTEM

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

**TRANSMISSION DRAIN PLUG**

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

**TRANSMISSION WARRANTY**

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

**PTO LOCATION**

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

**DRIVELINE**

All drivelines shall be heavy duty metal tube and equipped with MSI 1810 series universal joints. The shafts shall be dynamically balanced prior to installation to alleviate future vibration. In areas of the driveline where a slip shaft is required, the splined slip joint shall be coated with Glide Coat®. The drivelines shall include Meritor brand u-joints with thrust washers.

**MIDSHIP PUMP / GEARBOX**

A temporary jackshaft driveline shall be installed by the chassis manufacturer to accommodate the mid-ship split shaft pump as specified by the apparatus manufacturer. Holes shall be provided as specified by the OEM for mounting a customer installed pump module.

See PDF for specific hole pattern.

**MIDSHIP PUMP / GEARBOX MODEL**

The midship pump/gearbox provisions shall be for a Waterous CSUC20 pump.

**MIDSHIP PUMP GEARBOX DROP**

The Waterous pump gearbox shall have a "C" (medium length) drop length.

**MIDSHIP PUMP RATIO**

The ratio for the midship pump shall be 2.27:1.

**MIDSHIP PUMP LOCATION C/L SUCTION TO C/L REAR AXLE**

The midship pump shall be located so the dimension from the centerline of the suction to the centerline of the rear axle is 99.50 inches.

**PUMP SHIFT CONTROLS**

One (1) air pump shift control panel shall be located on the left hand side of the engine tunnel, integrated with the shifter pod. The following shall be provided on the panel: a three (3) position control lever; an engraved PUMP ENGAGED identification light; and an engraved OK TO PUMP identification light. The pump shift control panel shall be black with a yellow border outline and shall include pump instructions. An instruction plate describing the transmission shift selector position used for pumping shall be provided and located so it can be read from the driver's position per NFPA **16.10.1.3**.

The road mode shall be selected when the control lever is in the forward position and pump mode shall be selected when the control lever is in the rearward position.

The control lever center position shall exhaust air from both pump and road sides of the pump gear box shift cylinder.

**PUMP SHIFT CONTROL PLUMBING**

Air connections shall be provided from the air supply tank to the pump shift control valve and from the pump shift control valve to the frame mounted bracket. The frame mounted bracket shall include labeling identifying the pump and road connection points with threaded 0.25 inch NPT fittings on the solenoid for attaching the customer installed pump. The air supply shall be pressure protected from service brake system.

**FUEL FILTER/WATER SEPARATOR**

The fuel system shall have a Racor GreenMAX 6600R fuel filter/water separator as a primary filter. The fuel filter shall have a drain valve and a see-through cover to allow visual inspection of fuel and filter condition. The Racor 6600R shall meet engine requirements for particulate size, collection capacity, removal efficiency, and water removal efficiency. The filter shall be capable of handling a maximum flow rate of 150 gallons per hour.

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

An instrument panel lamp and audible alarm which indicates when water is present in the fuel-water separator shall also be included.

**FUEL LINES**

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

**FUEL SHUTOFF VALVE**

There shall be two (2) fuel shutoff valves which shall be installed, one (1) in the fuel draw line at the primary fuel filter and one (1) in the fuel outlet line at the primary fuel filter to allow the fuel filters to be changed without loss of fuel to the fuel pump.

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

**ELECTRIC FUEL PRIMER**

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

**FUEL TANK**

The fuel tank shall have a capacity of sixty-eight (68) gallons and shall measure 35.00 inches in width X 17.00 inches in height X 29.00 inches in length.

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

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

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

**FUEL TANK MATERIAL AND FINISH**

The fuel tank shall be constructed of 12 gauge aluminized steel. The exterior of the tank shall be powder coated black and then painted to match the frame components.

All powder coatings, primers and paint shall be compatible with all metals, pretreatments and primers used. The cross hatch adhesion test per ASTM D3359 Method B, results to be 5B minimum. The pencil hardness test per ASTM D3363 shall have a final post-curved pencil hardness of H-2H. The direct impact resistance test per ASTM D2794, results to be 5B minimum.

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

**FUEL TANK STRAP MATERIAL**

The fuel tank straps shall be constructed of ASTM A-36 steel. The fuel tank straps shall be powder coated black and then painted to match the frame components if possible.

**FUEL TANK FILL PORT**

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

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

**FUEL TANK SERVICEABILTY PROVISIONS**

The chassis fuel lines shall have additional length provided so the tank can be easily lowered and removed for service purposes. The additional 8.00 feet of length shall be located above the fuel tank and shall be coiled and secured. The fuel line fittings shall be pointed towards the right side (curbside) of the chassis.

**FUEL TANK DRAIN PLUG**

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

**FRONT AXLE WARRANTY**

The front axle shall be warranted by Tuthill for three (3) years or 150,000 miles, which ever comes first. Details of the Tuthill warranty are provided on the PDF document attached to this option.

**FRONT WHEEL BEARING LUBRICATION**

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

**FRONT SHOCK ABSORBERS**

Two (2) Koni shock absorbers shall be provided and installed as part of the front suspension system. Each shock shall deliver improved road handling and durability.

**STEERING COLUMN/ WHEEL**

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

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

**ELECTRONIC POWER STEERING FLUID LEVEL INDICATOR**

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

**POWER STEERING PUMP**

The hydraulic power steering pump shall be a TRW PS and shall be gear driven from the engine. The pump shall be a balanced, positive displacement, sliding vane type. The power steering system shall include an oil to air passive cooler.

**FRONT AXLE CRAMP ANGLE**

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

**POWER STEERING GEAR**

The power steering gear shall be a TRW model TAS 85/RCS 85.

**CHASSIS ALIGNMENT**

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

**REAR AXLE**

The rear axle shall be a Meritor model RS-25-160 single drive axle. The axle shall include precision forged, single reduction differential gearing, and shall have a fire service rated capacity of 27,000 pounds.

The axle shall be built of superior construction and quality components to provide the rugged dependability needed to stand up to the fire industry's demands. The axle shall include rectangular shaped, hot-formed housing with a standard wall thickness of 0.63 of an inch for extra strength and rigidity and a rigid differential case for high axle strength and reduced maintenance.

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

## REAR AXLE DIFFERENTIAL LUBRICATION

The rear axle differential shall be lubricated with oil.

## REAR WHEEL BEARING LUBRICATION

The rear axle wheel bearings shall be lubricated with oil.

## VEHICLE TOP SPEED

The top speed of the vehicle shall be approximately 68 MPH +/-2 MPH at governed engine RPM.

## REAR SUSPENSION

The single rear axle shall feature a Reyco 79KB vari-rate, self-leveling captive slipper type parabolic five (5) leaf spring pack suspension with 57.50 inch X 3.00 inch springs. The suspension shall also utilize one (1) adjustable and one (1) fixed torque rod.

The rear suspension capacity shall be rated to 27,000 pounds.

## REAR SHOCK ABSORBERS

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

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

The Bilstein front shocks shall include a digressive working piston assembly allowing independent tuning of the compression and rebound damping forces to provide optimum ride and comfort without compromise. The working piston design shall feature fewer parts than most conventional twin tube and “road sensing” shock designs and shall contribute to the durability and long life of the Bilstein shock absorbers.

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

## TIRE INTERMITTENT SERVICE RATING

The chassis shall be rated using the stamped rating on the side of the tire as the basis for determining the maximum vehicle load and speed.

## FRONT TIRE

The front tires shall be Michelin 385/65R22.5 “L” tubeless radial X Multi HL Z regional tread.

The front tire stamped load capacity shall be 22,000 pounds per axle with a nominal speed rating of 68 miles per hour when properly inflated to 130 pounds per square inch.

The Michelin Intermittent Service Rating maximum load capacity shall be 23,540 pounds per axle with a maximum speed of 68 miles per hour when properly inflated to 130 pounds per square inch.

The Michelin Intermittent Service Rating maximum speed capacity shall be 22,000 pounds per axle with a speed rating of 75 miles per hour when properly inflated to 130 pounds per square inch.

The Michelin Intermittent Service Rating limits the operation of the emergency vehicle to no more than fifty (50) miles of continuous operation under maximum recommended payload, or without stopping for at least twenty (20) minutes. The emergency vehicle must reduce its speed to no more than 50 MPH after the first fifty (50) miles of travel.

**REAR TIRE**

The rear tires shall be Michelin 12R-22.5 16PR "H" tubeless radial XZE regional tread.

The rear tire stamped load capacity shall be 27,120 pounds per axle with a speed rating of 75 miles per hour when properly inflated to 120 pounds per square inch.

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

**REAR AXLE RATIO**

The rear axle ratio shall be 4.89:1.

**TIRE PRESSURE INDICATOR**

There shall be electronic chrome LED valve caps shipped loose for installation by the OEM which shall illuminate with a red LED when tire pressure drops 8psi provided. The valve caps are self-calibrating and set to the pressure of the tire upon installation.

**FRONT WHEEL**

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

**REAR WHEEL**

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

**BALANCE WHEELS AND TIRES**

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

**WHEEL TRIM**

The front wheels shall include stainless steel lug nut covers and stainless steel baby moons shipped loose with the chassis for installation by the apparatus builder. The baby moons shall have cutouts for oil seal viewing when applicable.

The rear wheels shall include stainless steel lug nut covers and band mounted spring clip stainless steel high hats shipped loose with the chassis for installation by the apparatus builder.

The lug nut covers, baby moons, and high hats shall be RealWheels® brand constructed of 304L grade, non-corrosive stainless steel with a mirror finish. Each wheel trim component shall meet D.O.T. certification.

**BRAKE SYSTEM**

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

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

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

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

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

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

**FRONT BRAKES**

The front brakes shall be Knorr/Bremse SN7 disc brakes with 17.00 inch vented rotors.

**REAR BRAKES**

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

## PARK BRAKE

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

## PARK BRAKE CONTROL

A Meritor-Wabco manual hand control push-pull style valve shall operate the parking brake.

The parking brake actuation valve shall be mounted to the left side of the engine tunnel integrated into the transmission shift pod console within easy access of the driver. The control shall include a protective guard which shall prevent accidental activation of the parking brake and still allow proper actuation of the control.

## AIR DRYER

The brake system shall include a Wabco System Saver 1200 air dryer with an integral 100 watt heater with a Metri-Pack sealed connector. The air dryer incorporates an internal turbo cutoff valve that closes the path between the air compressor and air dryer purge valve during the compressor "unload" cycle. The turbo cutoff valve allows purging of moisture and contaminants without the loss of turbo boost pressure. The air dryer shall be located on the right hand frame rail forward of the front wheel behind the right hand cab step.

## FRONT BRAKE CHAMBERS

The front brakes shall be provided with type 24 brake chambers as supplied with the independent front suspension axle.

## REAR BRAKE CHAMBERS

The rear axle shall include TSE 24/30 H.O.T. (High Output Technology) brake chambers shall convert the energy of compressed air into mechanical force and motion. This shall actuate the brake camshaft, which in turn shall operate the foundational brake mechanism forcing the brake pads against the brake rotor.

## AIR COMPRESSOR

The air compressor provided for the engine shall be a naturally aspirated Wabco® SS440 single cylinder pass-through drive type compressor which shall be capable of producing 26.0 CFM at 1200 engine RPMs. The compressor shall include an aluminum cylinder head which shall improve cooling, reduce weight and decrease carbon formation.

## AIR GOVERNOR

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

## MOISTURE EJECTORS

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

# METRO FIRE APPARATUS

## AIR SUPPLY LINES

The air system on the chassis shall be plumbed with color coded reinforced nylon tubing air lines. The primary (rear) brake line shall be green, the secondary (front) brake line red, the parking brake line orange and the auxiliary (outlet) will be blue.

Brass compression type fittings shall be used on the nylon tubing. All drop hoses shall include fiber reinforced neoprene covered hoses.

## AIR INLET CONNECTION

An air connection for the shoreline air inlet shall be supplied.

## AIR INLET LOCATION

The air inlet shall be installed in the left hand side lower front step in the forward position.

## AIR INLET/ OUTLET FITTING TYPE

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

## AIR TANK SPACERS

There shall be spacers included with the air tank mounting. The spacers shall move the air tanks 3.00 inches inward towards the center of the chassis. This shall provide clearance between the air tanks and the frame for body U-bolt clearance.

## REAR AIR TANK MOUNTING

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

## WHEELBASE

The chassis wheelbase shall be 184.00 inches.

## REAR OVERHANG

The chassis rear overhang shall be 47.00 inches.

## FRAME

The frame shall consist of double rails running parallel to each other with cross members forming a ladder style frame. The frame rails shall be formed in the shape of a "C" channel, with the outer rail measuring 10.25 inches high X 3.50 inches deep upper and lower flanges X 0.38 inches thick with an inner channel of 9.44 inches high X 3.13 inches deep and 0.38 inches thick. Each rail shall be constructed of 110,000 psi minimum yield high strength low alloy steel. Each double rail section shall be rated by a Resistance Bending Moment (RBM) minimum of 3,213,100 inch pounds and have a minimum section modulus of 29.21 cubic inches. The frame shall measure 35.00 inches in width.

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

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

A minimum of seven (7) fully gusseted 0.25 inch thick cross members shall be installed. The inclusion of the body mounting, or bumper mounting shall not be considered as a cross member. The cross members shall be attached using zinc coated grade 8 fasteners. The bolt heads shall be flanged type, held in place by distorted thread flanged lock nuts. Each cross member shall be mounted to the frame rails utilizing a minimum of 0.25 inch thick gusset reinforcement plates at all corners balancing the area of force throughout the entire frame.

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

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

**MISCELLANEOUS FRAME OPTIONS**

The frame shall include hole patterns which shall be specific to Spartan ERV Legend style body mounting.

See PDF for OEM specified pattern.

**REAR TOW DEVICE**

The frame rails shall contain (6) holes per frame in a pattern specified by the OEM for mounting Spartan ERV tow eyes at the rear of the frame at a location defined by the OEM.

**FRAME PAINT**

The frame rails shall be hot dip galvanized prior to assembly and attachment of any components. The components that shall be galvanized shall include:

- Main frame “C” channel or channels

The frame parts which are not galvanized shall be powder coated prior to any attachment of components. Parts which shall be powder coated shall include but are not limited to:

- Steering gear bracket
- Front splayed rails and fish plates
- Bumper extensions
- Cross members
- Cross member gussets
- Fuel tank mounting brackets
- Fuel tank straps (unless material/finish is specified in 3130 subcat)
- Air tanks (unless color coded tanks are specified in 3205 subcat)
- Air tank mounting brackets
- Exhaust mounting brackets
- Air cleaner skid plate
- Radiator skid plate
- Battery supports, battery trays and battery covers

Other non-galvanized under carriage components which are received from the suppliers with coatings already applied shall include but are not limited to:

- Suspension components

- Front and rear axles

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

**FRAME PAINT - MISCELLANEOUS**

There shall be an RTV type sealant applied to the seams between the frame rail and the frame liner(s) to help prevent water intrusion between the frame rails. The sealant shall be applied to all seams along the length of the frame and at the top, front, and rear ends of the liner(s). The sealant shall be applied after the frame rails have been assembled and painted.

**FRAME ASSEMBLY STRUCTURAL**

Purchaser shall receive a Frame Assembly Structural Fifty (50) Years or 250,000 Miles limited warranty in accordance with, and subject to, warranty certificate RFW0305. The warranty certificate is incorporated by reference into this proposal, and included with this proposal or available upon request.

**FRAME RAIL CORROSION**

Purchaser shall receive a Frame Rail Corrosion (Zinc Plate and Powder Coat) Twenty Five (25) Years or 150,000 Miles limited warranty in accordance with, and subject to, warranty certificate RFW0316. The warranty certificate is incorporated by reference into this proposal, and included with this proposal or available upon request.

**FRAME COMPONENTS CORROSION**

Purchaser shall receive a Frame Components Corrosion (Powder Coat) Three (3) Years or 48,000 Miles limited warranty in accordance with, and subject to, warranty certificate RFW0313. The warranty certificate is incorporated by reference into this proposal, and included with this proposal or available upon request.

**REAR MUD FLAP**

The unit shall be equipped with a temporary wooden fender and mud flap assembly for transport to the body manufacturer.

**FRONT BUMPER**

The chassis shall be equipped with a severe duty front bumper constructed from structural steel channel. The bumper material shall be 0.38 thick ASTM A36 steel which shall measure 12.00 inches high with a 3.05 inch flange and shall be 99.00 inches wide with angled front corners.

The bumper shall be primed and painted as specified.

**FRONT BUMPER EXTENSION LENGTH**

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

**FRONT BUMPER PAINT**

The front bumper shall be painted the same as the lower cab color. The front bumper trim shall feature a black spray on bedliner coating.

# METRO FIRE APPARATUS

**FRONT BUMPER APRON**

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

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

**FRONT BUMPER COMPARTMENT CENTER**

The front bumper shall include a compartment in the bumper apron located in the center between the frame rails which may be used as a hose well. The compartment shall be constructed of 0.13 inch 5052-H32 grade aluminum and shall include drain holes in the bottom corners to allow excess moisture to escape. The compartment shall be the full size of available space in the apron from the cab fascia to the bumper and 38.00 inches wide X 10.88 inches deep. The clear opening shall be 37.75 inches wide. The compartment shall include a cover constructed of 0.19 inch thick bright embossed aluminum tread plate.

**FRONT BUMPER COMPARTMENT COVER HARDWARE**

The front bumper compartment cover(s) shall include gas cylinder stays which shall hold the cover open. Each cover shall be held in the closed position via a D-ring style latch.

**MECHANICAL SIREN**

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

**MECHANICAL SIREN LOCATION**

The siren shall be pedestal mounted on the bumper apron on the furthest outboard section of the bumper on the driver side.

**AIR HORN**

The front bumper shall include two (2) Hadley brand E-Tone air horns which shall measure 21.00 inches long with a 6.00 inch round flare. The air horns shall be trumpet style with a chrome finish on the exterior and a painted finish deep inside the trumpet.

**AIR HORN LOCATION**

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

**AIR HORN RESERVOIR**

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

**ELECTRONIC SIREN SPEAKER**

There shall be two (2) Cast Products Inc. model SA4301, 100 watt speakers provided. Each speaker shall measure 6.20 inches tall X 7.36 inches wide X 3.06 inches deep. Each speaker shall include a flat mounting flange which shall be polished aluminum.

**ELECTRONIC SIREN SPEAKER LOCATION**

The two (2) electronic siren speakers shall be located on the front bumper face outboard of the frame rails with one (1) on the right side and one (1) on the left side in the outboard positions.

**FRONT BUMPER TOW HOOKS**

Two (2) heavy duty tow hooks, painted to match the frame components, shall be installed below the front bumper in the forward position, bolted directly to the underside of each chassis frame rail with grade 8 bolts.

**FRONT LICENSE PROVISION**

The bumper shall include four (4) mounting holes and screws to allow for a license plate to be installed by the OEM or end user. The mounting holes shall be drilled and tapped for ¼-20 threaded bolts.

**CAB TILT SYSTEM**

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

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

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

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

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

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

**CAB TILT AUXILIARY PUMP**

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

**CAB TILT LIMIT SWITCH**

A cab tilt limit switch shall be installed. The switch will effectively limit the travel of the cab when being tilted. The limit adjustment of the switch shall be preset by the chassis manufacturer to prevent damage to the cab or any bumper mounted option mounted in the cab tilt arc. Further adjustment to the limit by the apparatus manufacturer shall be available to accommodate additional equipment.

## CAB TILT CONTROL RECEPTACLE

A 25.00 foot cab tilt control harness shall be provided on the right side of frame just behind the cab. This harness shall consist of an 8.00 foot harness connected to the tilt pump and a 17.00 foot extension harness with a six (6) pin Deutsch connector with cap for mounting in a compartment in the body.

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

## CAB TILT LOCK DOWN INDICATOR

The cab dash shall include a message located within the dual air pressure gauge which shall alert the driver when the cab is unlocked and ajar. The alert message shall cease to be displayed when the cab is in the fully lowered position and the hold down hooks are secured and locked to the cab mounts.

In addition to the alert message an audible alarm shall sound when the cab is unlocked and ajar with the parking brake released.

## CAB WINDSHIELD

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

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

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

## GLASS FRONT DOOR

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

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

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

## GLASS TINT FRONT DOOR

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

## GLASS REAR DOOR RH

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

**GLASS TINT REAR DOOR RIGHT HAND**

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

**GLASS REAR DOOR LH**

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

**GLASS TINT REAR DOOR LEFT HAND**

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

**GLASS SIDE MID RH**

The cab shall include a window on the right side behind the front and ahead of the crew door which shall measure 16.00 inches wide X 26.00 inches high. This window shall be fixed within this space and shall be rectangular in shape. The window shall be mounted using self locking window rubber. The glass utilized for this window shall include a green automotive tint unless otherwise noted.

**GLASS TINT SIDE MID RIGHT HAND**

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

**GLASS SIDE MID LH**

The cab shall include a window on the left side behind the front door and ahead of the crew door and above the wheel well which shall measure 16.00 inches wide X 26.00 inches high. This window shall be fixed within this space and shall be rectangular in shape. The window shall be mounted using self locking window rubber. The glass utilized for this window shall include a green automotive tint unless otherwise noted.

**GLASS TINT SIDE MID LEFT HAND**

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

**CLIMATE CONTROL**

A ceiling mounted combination defroster and cabin heating and air conditioning system shall be located above the engine tunnel area. The system covers and plenums shall be of severe duty design made of aluminum which shall be coated with a customer specified interior paint. The design of the system's covers shall provide quick access to washable air intake filters as well as easy access to other serviceable items.

The air delivery plenums provide targeted airflow directly to the vehicle occupants. Six (6) adjustable louvers will provide comfort for the front seat occupants and ten (10) adjustable louvers will provide comfort for the rear crew occupants.

The system shall be capable of producing up to 12 FPM of air velocity at all occupant seating positions. Separate front and rear blower motors shall be of brushless design and shall be controlled independently. It shall be capable of reducing the interior cabin air temperature from 122˚ F (+/- 3˚ F) to 80˚ F in thirty minutes with 50% relative humidity and full solar load as described in SAE J2646.

The system shall also provide heater pull up performance which meets or exceeds the performance requirements of SAE J1612 as well as defrost performance that meets or exceeds the performance requirements of SAE J381.

A gravity drain system shall be provided that is capable of evacuating condensate from the vehicle while on a slope of up to a 13% grade in any direction.

The air conditioning system plumbing shall be a mixture of custom bent zinc coated steel fittings and Aeroquip flexible hose with Aeroquip EZ-Clip fittings.

The overhead heater/defroster plumbing shall include an electronic flow control valve that re-directs hot coolant away from the evaporator, via a bypass loop, as the temperature control is moved toward the cold position.

Any component which needs to be accessed to perform system troubleshooting shall be accessible by one person using basic hand tools. Regularly serviced items shall be replaceable by one person using basic hand tools.

***The chassis manufacturer recommends that the overall climate system performance be based off third-party testing in accordance with the Society of Automotive Engineering standards as a complete system.***

***Individual component level BTU ratings is not an accurate indicator of the performance capability of the completed system. System individual component BTU ratings:***

- Air conditioning evaporator total BTU/HR: 82,000
- Air conditioning condenser total BTU/HR: 59,000
- Heater coil total BTU/HR: 98,000

***Performance data specified is based on testing performed by an independent third-party test facility using a medium four-door 10” raised roof cab equipped with an ISL engine.***

**CLIMATE CONTROL DRAIN**

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

**CLIMATE CONTROL ACTIVATION**

The heating, defrosting and air conditioning controls shall be in the center dash center switch panel, in a position which is easily accessible to the driver. The climate control shall be activated by a rotary switch.

**A/C CONDENSER LOCATION**

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

**A/C COMPRESSOR**

The air-conditioning compressor shall be a belt driven, engine mounted compressor. The compressor shall be compatible with R134-a refrigerant.

***The chassis manufacturer recommends that the overall climate system performance be based off third-party testing in accordance with the Society of Automotive Engineering standards as a complete system.***

***Individual component level ratings are not an accurate indicator of the performance capability of the completed system.***

Refrigerant Compressor displacement: 19.1 cubic inches per revolution.

**UNDER CAB INSULATION**

The underside of the cab tunnel surrounding the engine shall be lined with multi-layer insulation, engineered for application inside diesel engine compartments.

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

The engine tunnel insulation shall measure approximately 0.30 inch thick including a multi-layer foil faced glass cloth and polyester fiber layer. The foil surface acts as protection against heat, moisture and other contaminants. The insulation shall meet or exceed FMVSS 302 flammability test.

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

The insulation shall be cut precisely to fit each section and sealed for additional heat and sound deflection. The insulation shall be held in place by acrylic pressure sensitive adhesive. In addition, the insulation on the underside of the cab floor shall have aluminum pins with hard hat, hold in place fastening heads and an expanded metal overlay to assist in retaining the insulation tight against the cab. The insulation inside the tunnel shall have a removable aluminum overlay installed to protect the insulation and assist in retaining the insulation tight against the engine tunnel surfaces.

The cab floor insulation shall cover the driver and officer floor areas as well as all crew floor areas and compartment floor areas if applicable.

**INTERIOR TRIM FLOOR**

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

**INTERIOR TRIM**

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

**REAR WALL INTERIOR TRIM**

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

**HEADER TRIM**

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

# METRO FIRE APPARATUS

**TRIM CENTER DASH**

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

**TRIM LH DASH**

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

**TRIM RH DASH**

The right hand dash shall be constructed of 5052-H32 Marine Grade, 0.13 of an inch thick aluminum plate and shall include a glove compartment with a hinged door and a Mobile Data Terminal (MDT) provision. The glove compartment size will measure 14.00 inches wide X 4.50 inches high X 5.88 inches deep. The MDT provision shall be provided above the glove compartment.

**ENGINE TUNNEL TRIM**

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

**STEP TRIM**

Each cab entry door shall include a three step entry. The first step closest to the ground shall be constructed of SAE 304 stainless steel with embossed perforations and diamond shaped cutout. The perforations and cutouts shall allow water and other debris to flow through rather than becoming trapped within the stepping surface. The step shall feature a splash guard to reduce water and debris from splashing in to the step. The splash guard shall have drainage holes beneath the back of the step to allow debris and water to flow through rather than becoming trapped within the stepping surface. The stainless steel material shall have a number 8 mirror finish. The lower step shall be mounted to a frame which is integral with the construction of the cab for rigidity and strength. The middle step shall be integral with the cab construction and shall be trimmed in 0.08 inch thick 3003-H22 embossed aluminum tread plate.

**STEP TRIM KICKPLATE**

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

**UNDER CAB ACCESS DOOR**

The cab shall include an aluminum access door in the left crew step riser painted to match the cab interior paint with a push and turn latch. The under cab access door shall provide access to the diesel exhaust fluid fill.

**INTERIOR DOOR TRIM**

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

# METRO FIRE APPARATUS

**CAB DOOR TRIM REFLECTIVE**

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

**INTERIOR GRAB HANDLE "A" PILLAR**

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

**INTERIOR GRAB HANDLE FRONT DOOR**

Each front door shall include one (1) ergonomically contoured 9.00 inch cast aluminum handle mounted horizontally on the interior door panels. The handles shall feature a DA sand finish to assist personnel entering and exiting the cab.

**INTERIOR GRAB HANDLE REAR DOOR**

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

**INTERIOR SOFT TRIM COLOR**

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

**INTERIOR TRIM SUNVISOR**

The header shall include two (2) sun visors, one each side forward of the driver and officer seating positions above the windshield. Each sun visor shall be constructed of Masonite and covered with padded vinyl trim.

**INTERIOR FLOOR MAT COLOR**

The cab interior floor mat shall be gray in color.

**CAB PAINT INTERIOR**

The inner door panel surfaces shall feature a medium gray spray on bedliner coating.

**HEADER TRIM INTERIOR PAINT**

The metal surfaces in the header area shall feature a medium gray spray on bedliner coating.

**TRIM CENTER DASH INTERIOR PAINT**

The entire center dash and any accessory pods attached to the dash shall feature a medium gray spray on bedliner coating.

**TRIM LEFT HAND DASH INTERIOR PAINT**

The left hand dash shall feature a medium gray spray on bedliner coating.

**TRIM RIGHT HAND DASH INTERIOR PAINT**

The right hand dash shall feature a medium gray spray on bedliner coating.

**DASH PANEL GROUP**

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

**SWITCHES CENTER PANEL**

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

**SWITCHES LEFT PANEL**

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

**SWITCHES RIGHT PANEL**

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

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

**SEAT BELT WARNING**

A Weldon seat belt warning system, integrated with the Vehicle Data Recorder system, shall be installed for each seat within the cab. The system shall provide a visual warning indicator in the Vista display and control screen(s) and a fast tone audible alarm. The wiring connections at each seat shall have heat shrink tubing applied so that the wiring cannot be easily disconnected to disable the system.

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

**SEAT MATERIAL**

The Bostrom Firefighter seats shall include a covering of extra high strength, wear resistant fabric made of durable low seam Durawear Plus™ ballistic polyester. A PVC coating shall be bonded to the back side of the material to help protect the seats from UV rays and from being saturated or contaminated by fluids. Durawear Plus™ meets or exceeds specification of the common trade name Imperial 1800. The material meets FMVSS 302 flammability requirements.

*If applicable, Theatre style seats located in the cab shall be high strength, wear resistant fabric made of durable ballistic polyester. A PVC coating shall be bonded to the back side of the material to help protect the seats from UV rays and from being saturated or contaminated by fluids. Common trade names for this material are Imperial 1200 and Durawear.*

# METRO FIRE APPARATUS

**SEAT COLOR**

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

**SEAT BACK LOGO**

The seat back shall include the “Spartan” logo. The logo shall be centered on the standard headrest of the seat back and on the left side of a split headrest.

**SEAT DRIVER**

The driver's seat shall be an H.O. Bostrom 500 Series Firefighter Sierra model seat. The seat shall feature eight-way electric positioning. The eight positions shall include up and down, fore and aft with 8.00 inches of travel, back angle adjustment and seat rake adjustment. The seat shall feature integral springs to isolate shock.

The seat shall feature an all belts to seat (ABTS) style of safety restraint. The ABTS feature shall include a three-point shoulder harness with the lap belt, automatic retractor and buckle as an integral part of the seat assembly. The ABTS feature shall also include the RiteHite™ shoulder adjustment feature to provide enhanced comfort and safety by allowing customized seat belt fit.

The minimum vertical dimension from the seat H-point to the ceiling for this belted seating position shall be 35.00 inches measured with the seat height adjusted to the lowest position of travel.

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

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

**SEAT BACK DRIVER**

The driver’s seat shall include a standard seat back incorporating the all belts to seat feature (ABTS). The seat back shall feature a contoured head rest.

**SEAT MOUNTING DRIVER**

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

**OCCUPANT PROTECTION DRIVER**

The driver’s position shall be equipped with the IMMI 4Front and RollTek™ Systems which shall secure belted occupants and increase the survivable space within the cab. The 4Front and RollTek™ Systems shall selectively deploy integrated systems to protect against injuries in qualifying frontal impact, and rollover events.

The Driver’s seating area protection shall include:

- Drivers airbag **DAB** - inflates a steering wheel airbag to protect the head and neck of the driver.
- Driver’s knee airbag **DKAB** - inflating knee bolster airbags to protect the knees.
- Integrated roll sensor **IRS** - detects an imminent rollover, activates protective devices and records crash events.

- Integrated belt pretension **IBP -** device for mechanical and/or electrical seats tightens the seat belt, securing driver in seat and positions driver for contact with seat integrated head cushion side roll airbag.

Inflatable head cushion seat integrated side roll airbag **SRA** - protects driver's head/neck and shields driver from dangerous surfaces.

**SEAT OFFICER**

The officer's seat shall be a H.O. Bostrom 500 Series Sierra seat model. The seat shall feature a tapered and padded seat, and cushion. The seat shall be mounted in a fixed position.

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

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

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

**SEAT BACK OFFICER**

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

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

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

**SEAT MOUNTING OFFICER**

The officer’s seat shall offer a special mounting position which is approximately 2.50 inches rearward of the standard location offering increased leg room for the occupant. The front face of the officer’s under seat storage box shall be modified 8.13 inches rearward for floor storage below the seat eliminating the under seat storage compartment and access door.

## OCCUPANT PROTECTION OFFICER

The officer's position shall be equipped with the IMMI 4Front and RollTek™ Systems which shall secure belted occupants and increase the survivable space within the cab. The 4Front and RollTek™ Systems shall selectively deploy integrated systems to protect against injuries in qualifying frontal impact, and rollover events.

The Officer's seating area protection shall include:

- Officer's knee airbag **OKAB** - inflating knee bolster airbags to protect the knees.

- Integrated roll sensor **IRS** - detects an imminent rollover, activates protective devices and records crash events.

- Integrated belt pretension **IBP -** device for mechanical and/or electrical seats tightens the seat belt, securing officer in seat and positioning officer for contact with seat integrated head cushion side roll airbag.

- Inflatable head cushion seat integrated side roll airbag **SRA** - protects officer's head/neck and shields officer from dangerous surfaces.

## POWER SEAT WIRING

The power seat or seats installed in the cab shall be wired directly to battery power.

## SEAT BELT ORIENTATION CREW

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

## SEAT FORWARD FACING OUTER LOCATION

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

## SEAT CREW FORWARD FACING OUTER

The crew area shall include a seat in the forward facing outer position which shall be a H.O. Bostrom 500 Series Firefighter model seat. The seat shall feature a tapered and padded seat, and cushion. The seat shall be mounted in a fixed position. The seat and cushion shall be hinged and compact in design for additional room. The seat shall include a "Fold and Hold" feature so that the cushion shall remain in the seated position and simply touched to flip up.

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

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

This model of seat shall have successfully completed the static load tests by FMVSS 207/210. This testing shall include a simultaneous forward load of 3000 pounds each on the lap and shoulder belts and twenty (20) times the weight through the center of gravity. This model of seat installed in the cab model, as specified, shall have successfully completed the dynamic sled testing using FMVSS 208 as a guide with the following accommodations. In order to reflect the larger size outfitted firefighters, the test dummy used shall be a 95th percentile hybrid III male

weighing 225 pounds rather than the 50th percentile male dummy weighing 165 pounds as referenced in FMVSS 208. The model of seats shall also have successfully completed the flammability of materials used in the occupant compartments of motor vehicles as outlined in FMVSS 302, of which decides the burning rate of materials in the occupant compartments of motor vehicles.

**SEAT BACK FORWARD FACING OUTER**

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

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

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

**SEAT MOUNTING FORWARD FACING OUTER**

The forward facing outer seat shall be mounted inboard from the side wall for additional clearance facing the front of the cab.

**OCCUPANT PROTECTION FFO**

The forward facing outer seat positions shall be equipped with the RollTek™ rollover occupant protection system which shall secure occupants, increase the survivable space within the cab and protect against head/neck injuries in the event of a roll over accident.

The system shall function using a microprocessor-controlled, solid-state sensing device which, when the system detects a side roll shall provide instantaneous occupant protection (less than 0.3 seconds from trigger to total deployment) by automatically initiating the following sequence:

1. The seat belt shall tighten around the occupant.

System Components Shall Include:

Integrated Roll Sensor **IRS** - detects an imminent rollover, activates protective devices and records crash events.

Integrated Belt Pretension **IBP** with flip-up (non theatre) and fixed mechanical seats - tightens the seat belt around occupant, securing occupant in seat.

Integrated Gas Pretension **IGP** with flip-up theatre style seats - tightens the seat belt around occupant, securing occupant in seat.

**SEAT FRAME FORWARD FACING**

The forward facing center seating positions shall include an enclosed style seat frame located and installed at the rear wall. The seat frame shall measure 62.38 inches wide X 12.38 inches high X 22.00 inches deep. The seat frame shall be constructed of Marine Grade 5052-H32 0.19 inch thick aluminum plate. The forward corners of the bench shall be chamfered 45-degrees X 4.00 inches.

## SEAT FRAME FORWARD FACING STORAGE ACCESS

There shall be two (2) access points to the storage area centered on the front of the seat frame. Each access point shall be covered by a hinged door to allow access for storage in the seat box.

## CAB FRONT UNDERSEAT STORAGE ACCESS DOOR

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

## SEAT COMPARTMENT DOOR FINISH

All underseat storage compartment access doors shall feature a medium gray spray on bedliner coating.

## WINDSHIELD WIPER SYSTEM

The cab shall include a triple arm linkage wiper system which shall clear the windshield of water, ice and debris. There shall be two (2) windshield wipers; each shall be affixed to a radial arm. The wiper motor shall be activated by an intermittent wiper control located within easy reach of the driver's position. The windshield wipers shall be interlocked with the park brake allowing activation only when the park brake is released.

There shall be virtual button on the Vista display and control screen to override the park brake deactivation. This will reset when the park brake is cycled.

## ELECTRONIC WINDSHIELD FLUID LEVEL INDICATOR

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

## CAB DOOR HARDWARE

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

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

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

## DOOR LOCKS

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

When the doors are unlocked using the external keypad or the key fobs the interior dome lights shall illuminate and remain on for a period of twenty (20) seconds. The interior dome safety feature shall require the interior lighting power to be battery direct.

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

**POWER DOOR LOCK COMPARTMENT ACTIVATION**

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

**GRAB HANDLES**

The cab shall include one (1) 18.00 inch three-piece knurled aluminum anti-slip exterior grab handle behind each cab door. The Hansen Anti-Slip Rails shall be mounted in bright anodized aluminum 4000 Series II stanchions, complete with weep holes to prevent the buildup of moisture.

The grab rails shall include red reflective tape.

**LIGHTED GRAB HANDLES**

The grab rails shall include a 12 volt, 17.00 inch long clear LED light to provide an increased margin of safety for night time cab entry and egress.

**REARVIEW MIRRORS**

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

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

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

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

**REARVIEW MIRROR HEAT SWITCH**

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

**EXTERIOR TRIM REAR CORNER**

There shall be an overlay of 3003-H22 aluminum tread plate which shall be 0.07 inches thick on the outside corners at the back of the cab. The overlay shall wrap 1.00 inches forward on the sides of the cab and 12.00 inches inboard on the rear wall.

**CAB FENDER**

Full width wheel well liners shall be installed on the extruded cab to limit road splash and enable easier cleaning. Fender shall consist of an inner liner 16.00 inches wide made of ABS composite and an outer fenderette 5.00 inches wide made of polished aluminum.

**MUD FLAPS FRONT**

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

**CAB EXTERIOR FRONT & SIDE EMBLEMS**

The cab shall include three (3) Spartan emblems. There shall be one (1) installed on the front air intake grille and one (1) emblem on each of the cab sides.

**IGNITION**

A master battery system with a keyless start ignition system shall be provided. There shall be a three-position rocker switch with off, battery, and ignition positions as well as a stainless-steel etched engine start push-button. The engine start button shall include an illuminated LED halo ring. Both switches shall be mounted to the left of the steering wheel on the dash.

The engine start switch shall only operate when the master battery and ignition switch is in the “ignition” position.

**BATTERY**

The single start electrical system shall include six (6) Harris BCI 31 925 CCA batteries with a 210 minute reserve capacity and 4/0 welding type dual path starter cables per SAE J541.

**BATTERY TRAY**

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

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

**BATTERY BOX COVER**

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

**BATTERY CABLE**

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

**BATTERY JUMPER STUD**

The starting system shall include battery jumper studs. These studs shall be located in the forward most portion of the driver's side lower step, 8.00 inches apart. The studs shall allow the vehicle to be jump started, charged, or the cab to be raised in an emergency in the event of battery failure.

**ALTERNATOR**

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

## STARTER MOTOR

The single start electrical system shall include a Delco brand starter motor.

## CAB/CHASSIS ELECTRICAL OUTLET

There shall be a 120V 20A power junction box behind the officer's seat wired into the cab from the shore power inlet junction box. The junction box shall include two (2) circuit breakers labeled as 'ELECTRICAL RECEPTACLE'. The junction box shall provide provisions for the body builder to wire and install electrical receptacle(s) to customer specified locations in the cab.

## ELECTRICAL INLET LOCATION

An electrical inlet shall be installed on the left hand side of cab centered directly over the wheel well.

## ELECTRICAL INLET

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

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

***Amp Draw Reference List:***
*Kussmaul 40 LPC Charger - 5 Amps*
*Kussmaul 40/20 Charger - 8.5 Amps*
*Kussmaul 80 LPC Charger - 13 Amps*
*Kussmaul EV-40 - 6.2 Amps*
*Blue Sea P12 7532 - 7.5 Amps*
*Iota DLS-45/IQ4 - 11 Amps*
*1000W Engine Heater - 8.33 Amps*
*1500W Engine Heater - 12.5 Amps*
*120V Air Compressor - 4.2 Amps*
*120V Dometic HVAC - 15 Amps*

## ELECTRICAL INLET CONNECTION

The electrical inlet shall be connected to the battery conditioner and the electrical outlet receptacle.

## ELECTRICAL INLET COLOR

The electrical inlet connection shall include a yellow cover.

## HEADLIGHTS

The cab front shall include two (2) FireTech rectangular LED headlamps with high/low beam in the same housing and two (2) separate FireTech LED high beam only headlamps mounted in bright chrome bezels.

## HEADLIGHT LOCATION

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

## FRONT TURN SIGNALS

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

## SIDE TURN/MARKER LIGHTS

The sides of the cab shall include two (2) Tecniq S170 LED side marker lights which shall be provided just behind the front cab radius corners. The lights shall be amber with chrome bezels.

## MARKER AND ICC LIGHTS

In accordance with FMVSS, there shall be five (5) Tecniq S170 LED cab marker lamps designating identification, center and clearance provided. These lights shall be installed on the face of the cab within full view of other vehicles from ground level. The lights shall be amber with chrome bezels.

## HEADLIGHT AND MARKER LIGHT ACTIVATION

The headlights and marker lights shall be controlled via a virtual button on the Vista display. The headlamps shall be equipped with an LED halo parking light around the perimeter of each lamp that shall activate with marker lights “on”. The headlights shall turn on in the low beam setting when the park brake is disengaged. The headlights shall turn off when the park brake is engaged. The marker and LED halo parking lights shall turn on when the ignition switch is in the "On" position. There shall be a virtual dimmer control on the Vista display to adjust the brightness of the dash lights.

## INTERIOR OVERHEAD LIGHTS

The cab shall include a Whelen 60CREGCS LED dome lamp located over each door. The dome lamps shall be circular in shape and shall measure approximately 6.00 inches in diameter. The lights shall include push buttons on each lamp to activate both the clear and red portions of the light individually.

## INTERIOR OVERHEAD LIGHTS ACTIVATION

The clear portion of each lamp shall be activated by opening the respective door and via the multiplex display.

## LIGHTBAR PROVISION

There shall be one (1) light bar installed on the cab roof. The light bar shall be provided and installed by the chassis manufacturer. The light bar installation shall include a lowered mounting that shall place the light bar just above the junction box and wiring to a control switch on the cab dash.

## CAB FRONT LIGHTBAR MODEL

The cab shall be provided with one (1) Whelen light bar.

See the light bar layout for specific details.

## CAB FRONT LIGHTBAR

The lightbar provisions shall be for one (1) Whelen brand Freedom IV LED lightbar mounted centered on the front of the cab roof. The lightbar shall be 72.00 inches in length. The lightbar shall feature fourteen (14) red LED light modules and two (2) clear LED light modules. The entire lightbar shall feature a clear lens. The clear lights shall be disabled with park brake engaged. The cable shall exit the lightbar on the right side of the cab.

## LIGHTBAR SWITCH

The light bar shall be controlled by a virtual button on the Vista display and control screen. This button shall be clearly labeled for identification.

## FRONT SCENE LIGHTS

The front of the cab shall include two (2) Whelen Pioneer model PCH2 contour roof mount scene lights installed on the brow of the cab.

Each 150 watt lamp head shall incorporate a 12 volt DC Super-LED combination flood/spot light installed in a die-cast aluminum housing. Each lamp head shall use a collimator/metalized redux spot/flood reflector assembly with Proclera™ silicone optics and a clear non-optic polycarbonate lens. The lens/reflector assembly shall utilize a liquid injected molded silicone gasket to be resistant to water, moisture, dust, and other environmental conditions. The PCH2 shall be vibration resistant. The Pioneer PC boards shall be conformal coated for additional protection. Each combination flood/spot light lamp head shall draw 13.0 amps in spotlight mode and generate 17,750 lumens total. Each lamp head shall measure 4.25 inches in height X 14.00 inches in width. The lamp heads and brackets shall be powder coated white.

## FRONT SCENE LIGHT LOCATION

There shall be two (2) scene lights mounted to the front brow of the cab in the outboard position.

## FRONT SCENE LIGHTS ACTIVATION

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

## SIDE SCENE LIGHTS

The cab shall include two (2) Whelen model Pioneer PCH2 semi-recess mount lights installed one (1) on each side of the cab.

Each 150 watt lamp head shall incorporate a 12 volt DC Super-LED combination flood/spot light installed in a die-cast aluminum housing. Each lamp head shall use a collimator/metalized redux spot/flood reflector assembly with Proclera™ silicone optics and a clear non-optic polycarbonate lens. The lens/reflector assembly shall utilize a liquid injected molded silicone gasket to be resistant to water, moisture, dust, and other environmental conditions. The PCH2 shall be vibration resistant. The Pioneer PC boards shall be conformal coated for additional protection. Each combination flood light lamp head shall draw 13.0 amps in spotlight mode and generate 17,750 lumens total. Each lamp head shall measure 4.25 inches in height X 14.00 inches in width. Each lamp head shall be mounted within a semi-recess housing featuring a chrome flange which shall measure 7.92 inches in height X 17.17 inches in width. The lamp heads and brackets shall be powder coated white.

## SIDE SCENE LIGHT LOCATION

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

## SIDE SCENE ACTIVATION

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

## REAR SCENE LIGHTS

The vehicle shall include multiplex activated rear scene lighting for body builder installed scene lights and body builder installed multiplex output.

## REAR SCENE LIGHT ACTIVATION

The rear scene lighting shall be activated via a virtual button on the Vista display and control screen.

## GROUND LIGHTS

Each door shall include a Tecniq T44 LED ground light mounted to the underside of the cab step below each door. The lights shall include a polycarbonate lens, a housing which is vibration welded and LEDs which shall be shock mounted for extended life.

## GROUND LIGHTS

The ground lighting shall be activated when the parking brake is set, by the opening of the door on the respective cab side, through a virtual button on the Vista display and control screen, when the truck is placed into reverse, and by the respective side turn signal.

## UNDER BUMPER LIGHTS

There shall be two (2) 4.00 inch round LED NFPA compliant ground lights mounted under the bumper. The lights shall include a polycarbonate lens, a housing which is vibration welded, and LEDs which shall be shock mounted for extended life. The under bumper ground lighting shall activate with the ground lights.

## LOWER CAB STEP LIGHTS

The middle step located at each door shall include a Tecniq T44 LED light which shall activate with the opening of the respective door. The lights shall include a polycarbonate lens, a housing which is vibration welded and LEDs which shall be shock mounted for extended life.

## INTERMEDIATE STEP LIGHTS

The intermediate step well area at each door shall include a TecNiq D06 LED light within a chrome housing. The egress step lights shall provide visibility to the step well area for the first step exiting the vehicle. The egress step lights shall activate with entry step lighting.

## ENGINE COMPARTMENT LIGHT

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

## DO NOT MOVE APPARATUS LIGHT

The front headliner of the cab shall include a flashing red TecNiq K50 LED light clearly labeled "Do Not Move Apparatus". In addition to the flashing red light, an audible alarm shall be included which shall sound while the light is activated.

The flashing red light shall be located centered left to right for greatest visibility.

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

## MASTER WARNING SWITCH

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

There shall be an additional virtual button on the Vista display and control screen to manually override an automatic warning light dimmer clearly labeled “WARNING LIGHT DIMMER”. The warning light dimmer will automatically reduce the brightness of the warning lights with Multiplex Vista screen “Night” dimmer setting and with the park brake set. The operator can override the warning light dimmer feature and manually select the warning lights to be at normal brightness using the warning light dimmer virtual button or ”Day” vista brightness. The lights shall also default to normal brightness when the “E Master” button is activated, and the park brake is released.

## HEADLIGHT FLASHER

The LED Halo ring shall alternate from left to right on the driver side, outer to inner light and the LED Halo ring shall alternate from right to left on the officer side, outer to inner light.

Deliberate operator selection of high beams will override the flashing function until low beams are again selected.

## HEADLIGHT FLASHER SWITCH

The flashing headlights shall be activated through a virtual button on the Vista display and control screen. There shall be no blocking mode on clear warning lights.

## INBOARD FRONT WARNING LIGHTS

The cab front fascia shall include two (2) Whelen M6 Super LED front warning lights in the left and right inboard positions. The lights shall feature multiple flash patterns including steady burn. The lights shall be mounted to the front fascia of the cab within a chrome bezel. The warning lights shall be set to emit the “TripleFlash 75” in/out flash pattern.

## INBOARD FRONT WARNING LIGHTS COLOR

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

## OUTBOARD FRONT WARNING LIGHTS

The cab front fascia shall include two (2) Whelen M6 Super LED front warning lights in the left and right outboard positions. The lights shall feature multiple flash patterns including steady burn. The lights shall be mounted to the front fascia of the cab within a chrome bezel. The warning lights shall be set to emit the “TripleFlash 75” in/out flash pattern.

## OUTBOARD FRONT WARNING LIGHTS COLOR

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

## BUMPER FACE WARNING LIGHT COLOR

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

## FRONT WARNING SWITCH

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

**INTERSECTION WARNING LIGHTS**

The chassis shall include two (2) Whelen M6 series Super LED intersection warning lights, one (1) each side. The lights shall feature multiple flash patterns including steady burn. The lights shall be set to flash “TripleFlash 75” I/O flash pattern.

**INTERSECTION WARNING LIGHTS COLOR**

The intersection lights shall be red with a clear lens.

**INTERSECTION WARNING LIGHTS LOCATION**

The intersection lights shall be mounted centered front to rear on the flat portion of the side of the bumper tail.

**SIDE WARNING LIGHTS**

The cab sides shall include two (2) Whelen M6 Super LED warning lights, one (1) on each side. The lights shall feature multiple flash patterns including steady burn for solid colors and multiple flash patterns for split colors. The lights shall be mounted to the sides of the cab within a chrome bezel. The light shall be programmed to emit the "TripleFlash 75” in/out flash pattern.

**SIDE WARNING LIGHTS COLOR**

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

**SIDE WARNING LIGHTS LOCATION**

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

**AUXILIARY SIDE WARNING LIGHTS**

The cab sides shall include two (2) Whelen series M6 Super LED 4.00 inch X 6.00 inch warning lights, one (1) each side, which shall feature multiple flash patterns including steady burn. The warning lights shall be set to flash “TripleFlash 75” in/out flash pattern.

**AUXILIARY SIDE WARNING LIGHTS COLOR**

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

**AUXILIARY SIDE WARNING LIGHTS LOCATION**

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

**SIDE AND INTERSECTION WARNING SWITCH**

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

**TANK LEVEL LIGHTS**

There shall be two (2) FRC MaxVision surface mount water level light strips.

The light strips shall feature four (4) colors of LED lights to indicate the fluid level of a tank. The colors from top to bottom shall be green, blue, amber, and red.

**TANK LEVEL LIGHTS ACTIVATION**

The tank level lights shall be pre-wired and coiled at rear of the cab for connection to the apparatus by the body builder.

**TANK LEVEL LIGHTS LOCATION**

There shall be water level lights mounted on each side of the cab, centered between the rear cab doors and the rear corners of the cab.

**REAR WARNING LIGHTS**

The cab shall have a Whelen TACTL5 Traffic Advisor control head installed and wired in the header above the driver.

Wiring provisions shall be provided routed to the rear of the frame for OEM installation of up to eight (8) individual traffic advisor warning lights rated at no more than one (1) amp each.

The power to the control head shall be ignition switched and activation dependent upon the state of the controllers switched position upon ignition.

**INTERIOR DOOR OPEN WARNING LIGHTS**

The interior of each door shall include one (1) 15.87 inch long X 0.73 inch tall amber Weldon LED warning light. The light shall be located on the upper portion of the door frame to be visible when a person is standing in front of the door while entering or exiting the cab. Each light shall activate with a scrolling directional flash pattern which moves from inside to outside when the door is in the open position. This shall serve as a warning to oncoming traffic.

**SIREN CONTROL HEAD**

A Whelen 295HFSC9 electronic siren control head shall be provided. The siren head shall feature a 200-watt output, wail, yelp, manual siren, and hands free operation which shall allow the operator to turn the siren on and off from the horn ring if a horn/siren selector switch option is also selected. The siren shall be installed in the switch panel with a location specific to the customer's needs.

**STEERING WHEEL HORN BUTTON SELECTOR SWITCH**

A virtual button on the Vista display and control screen shall be provided to allow control of the electric horn or the air horn from the steering wheel horn button. The horn button selection shall default to the air horn each time the Vista screen power is cycled off and on.

**AUDIBLE WARNING LH FOOT SWITCH**

A foot switch wired to actuate the mechanical siren(s) shall be supplied for installation in the front section of the cab for driver actuation.

**MECHANICAL SIREN FOOT SWITCH LH**

The mechanical siren foot switch shall be a Linemaster model 491-S.

**MECHANICAL SIREN FOOT SWITCH LH LOCATION**

The mechanical siren foot switch shall be located on the left hand side accessible to the driver between the steering column and the door.

**MECHANICAL SIREN FOOT SWITCH LH POSITION**

The mechanical siren foot switch shall be positioned outboard of any other foot switch, if applicable.

**AUDIBLE WARNING LH FOOT SWITCH BRACKET**

A 30.00 degree angled foot switch bracket, wide enough to accommodate (2) foot switches, shall be installed outboard of the steering column for specified driver accessible foot switch activations.

**AIR HORN AUXILIARY ACTIVATION**

The air horn activation shall be accomplished by two (2) lanyard cables, one (1) on the left hand side accessible to the driver and one (1) on the right hand side accessible to the officer, and by a momentary rocker switch on the switch panel. An air horn activation circuit shall be provided to the chassis harness pump panel harness connector.

**MECHANICAL SIREN BRAKE/AUXILIARY ACTIVATION**

The mechanical siren shall be actuated by a momentary rocker switch in the switch panel on the dash. A red momentary siren brake rocker switch shall be provided in the switch panel on the dash. A virtual button for the siren brake shall be provided on the Vista display.

**MECHANICAL SIREN INTERLOCK**

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

**BACK-UP ALARM**

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

**INSTRUMENTATION**

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

A twenty eight (28) icon lightbar message center with integral LCD odometer/trip odometer shall be included. The odometer shall display up to 999,999.9 miles. The trip odometer shall display 9,999.9 miles. The LCD message center screen shall be capable of custom configuration by the users for displaying certain vehicle status and diagnostic functions.

The instrument panel shall contain the following gauges:

One (1) three-movement gauge displaying vehicle speed, fuel level, and Diesel Exhaust Fluid (DEF) level. The primary scale on the speedometer shall read from 0 to 100 MPH, and the secondary scale on the speedometer shall read from 0 to 160 KM/H. The scale on the fuel and DEF level gauges shall read from empty to full as a fraction of full tank capacity. Red indicator lights in the gauge and an audible alarm shall indicate low fuel or low DEF at 1/8$^{th}$ tank level.

One (1) three-movement gauge displaying engine RPM, and primary and secondary air system pressures shall be included. The scale on the tachometer shall read from 0 to 3000 RPM. The scale on the air pressure gauges shall read from 0 to 150 pounds per square inch (PSI) with a red line zone indicating critical levels of air pressure. Red indicator lights in the gauge and an audible alarm shall indicate low air pressure.

One (1) four-movement gauge displaying engine oil pressure, coolant temperature, voltmeter, and transmission temperature shall be included. The scale on the engine oil pressure gauge shall read from 0 to 100 pounds PSI with a red line zone indicating critical levels of oil pressure. A red indicator light in the gauge and audible alarm shall indicate low engine oil pressure. The scale on the coolant temperature gauge shall read from 100 to 250 degrees Fahrenheit (°F) with a red line zone indicating critical coolant temperatures. A red indicator light in the gauge and audible alarm shall indicate high coolant temperature. The scale on the voltmeter shall read from 9 to 18 volts with a red line zone indicating critical levels of battery voltage. A red indicator light in the gauge and an audible alarm shall indicate high or low system voltage. The low voltage alarm shall indicate when the system voltage has dropped below 11.8 volts for more than 120 seconds in accordance with the requirements of NFPA 1901. The scale on the transmission temperature gauge shall read from 100 to 300 degrees °F with a red line zone indicating critical temperatures. A red indicator light in the gauge and an audible alarm shall indicate a high transmission temperature.

The light bar portion of the message center shall include twenty-eight (28) LED backlit indicators. The lightbar shall be split with fourteen (14) indicators on each side of the LCD message screen. The lightbar shall contain the following indicators and produce the following audible alarms when supplied in conjunction with applicable configurations:

**RED INDICATORS**
Stop Engine - indicates critical engine fault
Air Filter Restricted - indicates excessive engine air intake restriction
Park Brake - indicates parking brake is set
Low Coolant - indicates critically low engine coolant
Cab Tilt Lock - indicates the cab tilt system locks are not engaged.

**AMBER INDICATORS**
Malfunction Indicator Lamp (MIL) - indicates an engine emission control system fault
Check Engine - indicates engine fault
Check Transmission - indicates transmission fault
Anti-Lock Brake System (ABS) - indicates anti-lock brake system fault
High exhaust system temperature – indicates elevated exhaust temperatures
Water in Fuel - indicates presence of water in fuel filter
Wait to Start - indicates active engine air preheat cycle
Windshield Washer Fluid – indicates washer fluid is low
DPF restriction - indicates a restriction of the diesel particulate filter
Regen Inhibit-indicates regeneration of the DPF has been inhibited by the operator
Range Inhibit - indicates a transmission operation is prevented and requested shift request may not occur.
SRS - indicates a problem in the supplemental restraint system
Check Message - indicates a vehicle status or diagnostic message on the LCD display requiring attention.

**GREEN INDICATORS**
Left and Right turn signal indicators
ATC - indicates low wheel traction for automatic traction control equipped vehicles, also indicates mud/snow mode is active for ATC system
High Idle - indicates engine high idle is active.
Cruise Control - indicates cruise control is enabled
OK to Pump - indicates the pump is engaged and conditions have been met for pump operations
Pump Engaged - indicates the pump transmission is currently in pump gear
Auxiliary Brake - indicates secondary braking device is active

**BLUE INDICATORS**
High Beam indicator

**AUDIBLE ALARMS**
Air Filter Restriction
Cab Tilt Lock
Check Engine
Check Transmission
Open Door/Compartment
High Coolant Temperature
High or Low System Voltage
High Transmission Temperature
Low Air Pressure
Low Coolant Level
Low DEF Level
Low Engine Oil Pressure
Low Fuel
Stop Engine
Water in Fuel
Extended Left/Right Turn Signal On
ABS System Fault

**BACKLIGHTING COLOR**

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

**RADIO**

A Jensen brand radio with weather band, AM/FM stereo receiver, rear RCA input pigtail connector, Bluetooth, satellite radio capability, and a covered front auxiliary mini stereo input with iPod ready front and rear USB inputs shall be installed in a customer specified location.

**RADIO LOCATION**

The radio shall be installed in the right hand overhead position above the officer.

**AM/FM ANTENNA**

A small antenna shall be located on the left hand side of the cab roof for AM/FM and weather band reception.

**RADIO SPEAKERS**

There shall be two (2) speakers installed in the front portion of the cab recessed overhead and two (2) speakers installed on the upper rear wall of the cab. The speakers shall be provided for connection to the sound system.

**RADIO CUTOFF**

The radio shall cut-out with activation of a virtual button on the Vista control and display screen.

**CAMERA RIGHT HAND**

One (1) Audiovox Voyager heavy duty rearview teardrop shaped chrome plated housing camera shall be mounted on the officer side of the cab below the windshield ahead of the front door at approximately the same level as the cab door handles. The camera display shall activate when the right side turn signal is activated.

# METRO FIRE APPARATUS

**CAMERA REAR**

One (1) Audiovox Voyager heavy duty box shaped HD camera shall be shipped loose for OEM installation in the body to afford the driver a clear view to the rear of the vehicle.

The rear camera display shall activate when the vehicle's transmission is placed in reverse.

**CAMERA DISPLAY**

The camera system shall be wired to a single Weldon Vista display located on the driver's side dash. The camera system display can be activated through the Vista display panel.

**COMMUNICATION ANTENNA**

An antenna base, for use with an NMO type antenna, shall be mounted on the left hand front corner of the cab roof so not to interfere with light bars or other roof mounted equipment installed by chassis builder. The antenna base shall be an Antenex model MABVT8 made for either a 0.38 inch or 0.75 inch receiving hole in the antenna and shall include 17 foot of RG58 A/U cable with no connector at the radio end of the cable. The antenna base design provides the most corrosion resistance and best power transfer available from a high temper all brass construction and gold plated contact design. The antenna base shall be chassis builder supplied.

**COMMUNICATION ANTENNA CABLE ROUTING**

The antenna cable shall be routed from the antenna base mounted on the roof to the area inside the center rocker switch console.

**AUXILIARY COMMUNICATION ANTENNA**

An auxiliary antenna base, for use with and NMO type antenna, shall be installed on the cab. The antenna base shall be an Antenex model MABVT8 and shall include 17.00 foot of RG58 A/U cable with no connector at the radio end of the cable. The antenna shall be mounted on the right hand front corner of the cab roof so not to interfere with light bars or other roof mounted equipment installed by chassis builder. The antenna base shall be chassis builder supplied.

**AUXILIARY COMMUNICATION ANTENNA CABLE ROUTING**

The auxiliary antenna cable shall be routed from the antenna base mounted on the roof to the area inside the center rocker switch console.

**FIRE EXTINGUISHER**

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

**DOOR KEYS**

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

**WARRANTY**

Purchaser shall receive a Custom Chassis Two (2) Years or 36,000 Miles limited warranty in accordance with, and subject to, warranty certificate RFW0102. The warranty certificate is incorporated by reference into this proposal, and included with this proposal or available upon request.

# METRO FIRE APPARATUS

## CHASSIS OPERATION MANUAL

The chassis operation manual shall be contained in an on board USB digital storage device. The chassis operation manual shall be accessible through a USB port provided in the OBD diagnostic panel.

## ENGINE AND TRANSMISSION OPERATION MANUALS

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

(1) Hard copy of the Engine Operation and Maintenance manual with digital copy

(1) Digital copy of the Transmission Operator’s manual

(1) Digital copy of the Engine Owner’s manual

## CAB/CHASSIS AS BUILT WIRING DIAGRAMS

The cab and chassis wiring schematics and option wiring diagrams shall be contained in an on board USB digital storage device. The cab and chassis wiring schematics and option wiring diagrams shall be accessible through a USB port provided in the OBD diagnostic panel.

## SALES TERMS

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

## CHASSIS REQUIRED LABELING

Signs that state "Occupants must be seated and belted when apparatus is in motion" shall be provided.

They shall be visible from each seating position.

There shall be a lubrication plate mounted inside the cab listing the type and grade of lubrication used in the following areas on the apparatus and chassis:

- Engine oil
- Engine Coolant
- Transmission Fluid
- Pump Transmission Lubrication Fluid
- Drive Axle Lubrication Fluid
- Generator Lubrication Fluid (where applicable)
- Tire Pressures

## APPARATUS INFORMATION LABEL

There shall be a high-visibility label installed in a location clearly detectable to the driver while in the seated position.

The label shall indicate the following specified information.

Overall Height (feet and inches)
Overall Length (feet and inches)
Overall GVWR (tons or metric tons)

## HELMET RESTRAINTS

All NFPA required helmet restraints will be supplied and installed by the Fire Department prior to the truck being placed into service.

## MUD FLAPS

Heavy-duty rubber mud flaps shall be installed behind the rear wheels. The mud flaps shall be black rubber type and be bolted in place.

## CAB TILT PENDANT CONTROL

There shall be a cab tilt pendant control provided and installed on the right side of the apparatus. The pendant shall be located directly behind the lower auxiliary pump access panel, accessible through a small hinged door secured with a push button style latch. A label shall be provided that states "CAB TILT". The cab tilt door shall open towards the rear of body.

There shall also be a cab tilt instruction plate located as close as possible to the control pendant for ease of operation.

## AIR TANK DRAIN LINES (extended)

There shall be manual pull air tank drain lines provided with the apparatus. The air drain lines shall be extended to the outer edge of the apparatus to facilitate draining moisture from the chassis air tanks to a single location for all drains and shall be actuated by a key ring. A label shall be affixed indicating “Air Tank Drain”.

## HEAT EXCHANGER

A supplementary heat exchanger cooling system shall be provided with the chassis and shall be complete to the discharge side of the fire pump through the engine compartment, without intermixing, for absorption of excess heat. The heat exchanger shall be adequate in size to maintain the temperature of the coolant in the pump drive engine not in excess of the engine manufacturer's temperature rating under all pumping conditions.

Appropriate drains shall be provided to allow draining the heat exchanger to prevent damage from freezing. A manual shut-off valve shall be supplied at the pump operator's position.

## FUEL FILL DOOR

There shall be an aluminum fuel fill assembly located on the apparatus body accessing the chassis supplied fuel tank. The assemblies shall be located in the upper area of the rear wheel on the left and right side.

The fuel fill assembly will have a brushed aluminum door. There shall be a drain in the fuel fill assembly to allow over flow to drain on the back side of the apparatus body. The fuel fill cap shall be removable, manufactured of plastic materials, green in color and equipped with a tether.

The fuel fill cap shall be labeled "DIESEL FUEL". The stainless steel fuel fill neck shall have a 3/8" inside diameter vent line installed from the top of the fuel tank to the fill tube.

## SIDE MOUNT PUMP CONTROL MODULE

The pump control module shall be a self-supported structure mounted independently from the body and chassis cab. The pump module frame shall be constructed entirely of 6061-T6 aluminum extrusions and 5052-H32 aluminum plate. The pump module design shall allow normal frame deflection through isolation mounts without imposing stress on the pump module structure or side running boards. The pump module support shall bolt directly to the chassis frame web.

## VIBRA-TORQ MOUNTING

The entire pump module assembly shall be mounted so that it “floats” above the chassis frame rails exclusively with Vibra-Torq™ torsion isolator assemblies to reduce the vibration and stress providing an extremely durable pump module mounting system.

The pump module substructure shall be mounted above the frame to allow independent flexing to occur between the body and the chassis. Each assembly shall be mounted to the chassis frame rails with steel, gusseted mounting brackets. Each bracket shall be powder coated for corrosion resistance. Each pump compartment mount bracket shall be mounted to the side chassis frame flange with two 5/8”-UNC Grade 5 HHCS.

Each assembly shall have a two-part rubber vibration isolator. The isolator shall be of a specific durometer to carry the necessary loads of the pump module, apparatus body, equipment, tank, water, and hose. The quantity of mounts utilized shall correspond directly to the anticipated weight being supported. Certain assemblies shall also incorporate a torsion spring. Helical coil springs shall be incorporated into specific mounts in tandem with the rubber isolators to minimize the stress absorbed by the body caused from chassis frame rail flexing.

There shall be no welding to the chassis frame rail sides, web or flanges, or drilling of holes in the top or bottom frame flanges between axles. All pump module to chassis connections shall be bolted so that in the event of an accident, the body shall be easily removable from the truck chassis for repair or replacement.

Because of the constant vibration and twisting action that occurs in chassis frame rails and suspension, the torsion mounting system is required to minimize the possibility of premature pump module structural failures. The Vibra-Torque™ mounting system shall have a lifetime warranty.

## PUMP COMPARTMENT WORK LIGHT

One (1) 54.00 inch OnScene "Access Pro" LED tube light shall be installed inside the pump compartment module to illuminate the plumbing and piping components.

The light shall be activated by water proof toggle switch installed inside the pump compartment.

## PUMP MODULE PANELS

The panels shall be an integral part of the pump module structure.

The driver’s side panels shall consist of a removable lower panel fastened with mechanical fasteners, a removable middle operator's panel fastened with mechanical fasteners and a removable diamond plate panel above the operator's panel.

The officer’s side panels shall consist of a removable upper diamond plate panel and two lower removable panels. The lower removable panel shall be fastened with mechanical fasteners. Above the lower panel shall be a removable access panel to provide ease of entrance for service and maintenance. The middle panel shall be attached to the module frame with push button latches.

## OPERATOR’S GAUGE PANEL

The operator gauge panel shall be located on the upper portion of the left (drivers) side main pump module.

## PUMP PANEL & OPERATOR'S PANEL FINISH

The pump module panels and the operator's panel shall be brushed stainless steel finish.

## LEFT SOFT SUCTION HOSE STORAGE

There shall be a recessed cavity on the left side of the pump compartment module integrated into the side panel. The cavity shall be located rearward of the steamer inlet and be capable of storing a 25 foot roll of 5.00 inch suction hose. The cavity shall be approximately 12 inches (304.8 mm) wide x 17.5 inches (444.5 mm) high x 12.5 inches (317.5 mm) deep. The floor area shall have a light taper downward to assist in restraining the hose. Drain holes shall be provided in the rear corners.

## SEATBELT HOLD DOWN STRAP

There shall be one (1) seat belt type hose hold down installed on each storage area. The hold down will be used to secure the stored hose in place during transit.

## STORAGE CAVITY INTERIOR FINISH

The interior of the storage compartments shall feature a painted medium gray speedliner finish.

## PUMP PANEL LIGHTS

There shall be adequate illumination provided at the side pump panels with the installation of two (2) shielded light assemblies functioning as an intermediate step and installed on a stationary surface, one (1) on the left and one (1) on the right side pump compartment.

There shall be up to three (3) handhold cutouts provided in the top step surface measuring approximately 2.50 inches deep. There shall be one (1) full length aluminum non lit handrail integrated into each side assembly.

Each shield shall contain two (2) 18 inch (457.2 mm) OnScene LED "Access" lights.

## PUMP PANEL SWITCHING

There shall be a rocker switch located on the operator's pump panel to turn on or off all four (4) pump panel lights.

One light on the driver's side and one light on the passenger's side pump module shall be activated by "pump engagement “and it is "OK TO PUMP".

## SWITCH HOUSING

All specified lighting fixtures and electrical components activated at the pump operator's panel shall be activated by Carling W-series rocker style switches.

The switches shall be located on a separate matte black Innovative Controls 6-position electrical panel, complete with backlit name tags describing the function of each individual switch.

The switches shall be laid out in the following order left to right: Panel Lights, Left Scene, Right Scene, Rear Scene, Blank Space, Air Horn.

## VALVE CONTROL - T-HANDLE PULL ASSEMBLY

Unless specified otherwise, the discharge valves shall be controlled from an Innovative Controls side mount valve control assembly. The ergonomically designed handle shall be chrome-plated with recessed areas for name plate and color code. A .75 inch (19.5 mm) diameter hardcoat anodized aluminum control rod and housing shall, together with a stainless spring steel locking mechanism, eliminate valve drift. Teflon impregnated bronze bushings in both ends of the rod housing shall minimize rod deflection, never need lubrication, and ensure consistent long-term operation. The control

assembly shall include a decorative chrome-plated panel-mounting bezel. The valve operating mechanism will indicate the position of the valve at all times.

**RUNNING BOARDS**

Running boards shall be installed on each side of the pump compartment module. The running boards shall be constructed of .188 inch (4.76 mm) embossed aluminum diamond plate. Each shall be a minimum of approximately 12.00 inches deep by the width of the module.

The running boards shall have a 1.25 inch upward bend on the inside edge to act as a kick plate.

The aluminum diamond plate shall meet recommendations for slip resistant surfaces at the time of proposal.

The running boards shall be attached to a frame mounted outrigger support structure. Each running board to have a 3.00 inch downward bend on the outboard face with a 1.50 inch underside return for superior strength.

**RUNNING BOARD HOSE WELL**

A floating hose well shall be installed in the running board directly below the pump house module, on the right hand side.

**SEATBELT HOLD DOWN STRAP**

There shall be two (2) seat belt type hose hold downs installed on each storage area. The hold downs will be used to secure the stored hose in place during transit.

**APPARATUS PLUMBING LABELING**

Innovative Controls verbiage tag bezels shall be installed. The bezel assemblies will be used to identify apparatus components. These tags shall be designed and manufactured to withstand the specified apparatus service environment and shall be backed by a warranty equal to that of the exterior paint and finish. The verbiage tag bezel assemblies shall include a chrome-plated panel-mount bezel with durable easy-to-read UV resistant polycarbonate inserts featuring the specified verbiage and color coding. These UV resistant polycarbonate verbiage and color inserts shall be subsurface screen printed to eliminate the possibility of wear and protect the inks from fading. Both the insert labels and bezel shall be backed with 3M permanent adhesive, which meets UL969 and NFPA standards.

Where it is appropriate to denote foam discharges, the notation shall be incorporated into the discharge label itself. A secondary "FOAM" label and bezel will not be accepted.

**PRESSURE GOVERNOR AND MONITORING DISPLAY**

Fire Research "InControl 400" Series pressure governor and monitoring display kit shall be installed. The kit shall include a control module, intake pressure sensor, discharge pressure sensor, and cables. The control module case shall be waterproof and have dimensions not to exceed 5.50 inches high by 10.50 inches wide by 2.00 inches deep. The control knob shall be 2.00 inches in diameter with no mechanical stops, have a serrated grip, and a red idle push button in the center. It shall not extend more than 1.75 inches from the front of the control module. Inputs for monitored information shall be from a J1939 data bus or independent sensors. Outputs for engine control shall be on the J1939 data bus or engine specific wiring.

The following continuous displays shall be provided:

- Pump discharge; shown with four daylight bright LED digits more than 1/2" high
- Pump Intake; shown with four daylight bright LED digits more than 1/2" high
- Pressure / RPM setting; shown on a dot matrix message display
- Pressure and RPM operating mode LEDs

- Throttle ready LED
- Engine RPM; shown with four daylight bright LED digits more than 1/2" high
- Check engine and stop engine warning LEDs
- Oil pressure; shown on a dual color (green/red) LED bar graph display
- Engine coolant temperature; shown on a dual color (green/red) LED bar graph display
- Transmission Temperature: shown on a dual color (green/red) LED bar graph display
- Battery voltage; shown on a dual color (green/red) LED bar graph display.

The dot-matrix message display shall show diagnostic and warning messages as they occur. It shall show monitored apparatus information, stored data, and program options when selected by the operator. All LED intensity shall be automatically adjusted for day and nighttime operation.

The program shall store the accumulated operating hours for the pump and engine to be displayed with the push of a button. It shall monitor inputs and support audible and visual warning alarms for the following conditions:

- High Battery Voltage
- Low Battery Voltage (Engine Off)
- Low Battery Voltage (Engine Running)
- High Transmission Temperature
- Low Engine Oil Pressure
- High Engine Coolant Temperature
- Out of Water (visual alarm only)
- No Engine Response (visual alarm only).

The program features shall be accessed via push buttons and a control knob located on the front of the control panel. There shall be a USB port located at the rear of the control module to upload future firmware enhancements.

Inputs to the control panel from the pump discharge and intake pressure sensors shall be electrical. The discharge pressure display shall show pressures from 0 to 600 psi. The intake pressure display shall show pressures from -30 in. Hg to 600 psi.

The governor shall operate in two control modes, pressure and RPM. No discharge pressure or engine RPM variation shall occur when switching between modes. A throttle ready LED shall light when the interlock signal is recognized. The governor shall start in pressure mode and set the engine RPM to idle. In pressure mode the governor shall automatically regulate the discharge pressure at the level set by the operator. In RPM mode the governor shall maintain the engine RPM at the level set by the operator except in the event of a discharge pressure increase. The governor shall limit a discharge pressure increase in RPM mode to a maximum of 30 psi. Other safety features shall include recognition of no water conditions with an automatic programmed response and a push button to return the engine to idle.

**PRESSURE RELIEF VALVE**

A Task Force Tips model #A18XX pressure relief valve shall be provided. The valve shall have an easy to read adjustment range from 90 to 300 PSI with 90, 125, 150, 200, 250 and 300 PSI adjustment settings and an "OFF" position. Pressure adjustments shall be made utilizing a 1/4" hex key, 9/16" socket or 14mm socket.

For corrosion resistance the cast aluminum valve shall be a hardcoat anodized with a powder coat interior and exterior finish. The valve shall meet current NFPA, Standard for Automotive Fire Apparatus, requirements for pump inlet relief valves. The unit shall be covered by a five year warranty. The valve shall be preset at 125 PSI (860 kPa) suction inlet pressure. The valve shall be installed inside the pump compartment where it will be easily accessible for future adjustment. The excess water shall be plumbed to the atmosphere via the unloader pipe and shall dump on the opposite side of the pump operator.

For normal pumping operations, the relief valve shall not be capped and there shall be a placard stating "DO NOT CAP" installed.

**UL TEST PORTS**

One (1) set of UL testing ports with plugs shall be provided on the pump panel for testing of the vacuum and pump pressures.

**WATER TANK LEVEL GAUGE**

A Fire Research TankVision model WLA300-A00 tank indicator kit shall be installed on the operator's panel.

The kit shall include an electronic indicator module, a pressure sensor, and a 20' sensor cable. The indicator shall show the volume of water in the tank on nine (9) easy to see super bright LEDs. A wide view lens over the LEDs shall provide for a viewing angle of 180 degrees. The indicator case shall be waterproof, manufactured of aluminum, and have a distinctive blue label.

The program features shall be accessed from the front of the indicator module. The program shall support self-diagnostics capabilities, self-calibration, and a datalink to connect remote indicators. Low water warnings shall include flashing LEDs at 1/4 tank, down chasing LEDs when the tank is almost empty, and an output for an audio alarm.

The indicator shall receive an input signal from an electronic pressure sensor. The sensor shall be mounted from the outside of the water tank near the bottom. No probe shall place on the interior of the tank. Wiring shall be weather resistant and have automotive type plug-in connectors.

**AIR HORN BUTTON**

The air horn shall be activated by a Carling W-series non-illuminated, momentary rocker switch with a solid red actuator provided and installed on the pump operator's panel in a rocker switch bezel.

The button shall be labeled “AIR HORN”.

**PUMP COMPARTMENT TOP OVERLAY**

The top of the pump compartment shall be overlaid with .1875 inch embossed aluminum diamond plate.

**MIDSHIP PUMP**

The pump shall have a capacity of 2000 gallons per minute, measured in U.S. Gallons. The pump shall be a Waterous model CSU, single stage midship pump.

The pumps impellers shall be bronze with double suction inlets, accurately balanced (mechanically and hydraulically), of mixed flow design with reverse-flow, labyrinth-type, wear rings that resist water bypass and loss of efficiency due to wear. The impeller shall have flame plated hub to assure maximum pump life and efficiency despite the presence of abrasive particles, such as fine sand, in the water being pumped. The wear rings shall be bronze and easily replaceable to restore original pump efficiency and eliminate the need for replacing the entire pump casing due to wear.

Pump casing shall be close grained gray iron, bronze fitted and horizontally split in two sections for easy removal of entire impeller assembly, including wear rings, without disturbing setting of pump in chassis or pump piping. The pump, for ease and rapid servicing in the future, shall have the separable impeller shaft which allows true separation of transmission or pump without disassembly or disturbing the other component. This shall be accomplished by using a two piece shaft. This feature will allow field service to accomplish in much less time since each component (pump or transmission) can be repaired independently. The impeller shaft shall be stainless steel, accurately ground to size and

polished. Shaft shall be supported at each end by ball type oil grease lubricated bearings. Sleeve bearings or bushings will not be acceptable. The bearings shall be protected from water at each end of the impeller shaft.

The discharge manifold shall be cast as an integral part of the pump body assembly and shall provide at least three full 3.50 inch openings for ultimate flexibility in providing various discharge outlets for maximum efficiency and shall be located as follows: one outlet on the right side of the pump body, one outlet on the left side of the pump body, and one outlet directly on top of the pump discharge manifold.

The entire pump shall be cast, manufactured and tested at the pump manufacturer's factory. The pump transmission housing shall be high strength aluminum, three pieces and horizontally split. Power transfer to the pump shall be through a Morse Hy-Vo drive chain. Chain shall be pressure lubricated through oil pump. Chain sprockets shall be cut from carbonized, hardened alloy steel. Spur gears will not be acceptable.

The drive shafts shall be 2.35 inches in diameter, made of hardened and ground alloy steel. All shafts shall be ball bearing supported. Case shall be designed to eliminate the need of water cooling.

The entire pump, both suction and discharge passages, shall be hydrostatically tested to a pressure of 600 PSI. A certificate documenting this test shall be provided with the completed apparatus. The pump shall be fully tested at the pump manufacturer's factory to the performance requirements as outlined by the latest NFPA, Standard for Automotive Fire Apparatus. Pump shall be free from objectionable pulsation and vibration.

The pump shall be the Class "A" type and shall deliver the percentage of rated discharge at pressures indicated below.

100% of rated capacity at 150 PSI net pump pressure.
100% of rated capacity at 165 PSI net pump pressure.
70% or rated capacity at 200 PSI net pump pressure.
50% of rated capacity at 250 PSI net pump pressure.

**PUMP DE-RATE**

The above specified pump shall be de-rated to 1500 GPM at time of pump testing.

**PUMP HOUSE WIDTH**

The width of the pump house shall be 48.00 inches from front to back.

**PUMP SEALS**

The pump shall be equipped with maintenance free mechanical shaft seals that shall not require manual adjustment. The seal size, type, component materials, and housing configuration shall be specifically designed for the pump application and rated operating parameters as specified.

**AIR PRIMER SYSTEM**

The priming system shall be a Trident Emergency Products compressed air powered high efficiency, multi-stage, venturi based Air Prime System.

All wetted metallic parts of the priming system are to be of brass and stainless steel construction. A single panel mounted control will activate the priming pump and open the priming valve to the pump.

The primer shall be mounted above the pump impeller so that the priming line will automatically drain back to the pump. The primer shall also automatically drain when the panel control actuator is not in operation. The inlet side of the primer

shall include a brass ‘wye’ type strainer with removable stainless steel fine mesh strainer to prevent entry of debris into the primer body.

The system shall employ an 80 PSI (5.5 bar) pressure protection valve, located on the chassis auxiliary air tank.

The primer shall be covered by a five (5) year parts warranty.

**6.0" STEAMER INLETS**

Two (2) 6.00 inch (150.00 mm) steamer inlets shall be provided, one (1) on the left side and one (1) on the right side.

Each inlet shall have a chrome plated long handle chrome vented caps and die cast zinc screens designed to provide cathodic protection for the pump. The caps shall be National Standard Thread with long handles.

**PUMP COOLING LINE**

There shall be a .375 inch line run from the pump to the water tank to assist in keeping the pump water from overheating. A manual Class 1 1/4 turn .25 inch on/off valve with a rectangular handle shall be supplied on the operator's panel.

**PUMP ANODES**

Two (2) pump anodes shall be installed in plumping system of the apparatus, to prevent damage from galvanic corrosion within the pump system. There shall be one (1) anode on the intake side and one (1) on the discharge side.

**MASTER PUMP DRAIN**

The pump shall be equipped with a Master Pump drain to allow draining of the lower pump cavities, volute and selected water carrying lines and accessories. The drain shall have an all brass body.

The drain valve control shall be panel mounted and identified as MASTER DRAIN.

**DRAIN VALVES**

All manual drains shall be Class 1 with .75 inch J-style lift handle kit.

Each drain shall have a 90 degree push lock fitting supply with a 90 degree poly elbow drain. Reinforced clear vinyl tubing shall be utilized to route the water to atmosphere.

**VALVES**

All valves shall be of a heavy duty design capable of bi-directional flow and incorporate a self-locking ball feature and full flow optimizing characteristics that reduce the operational force required for actuation.

The valves shall be Akron 8000 series.

The valves shall be of a self-adjusting dual seat design requiring no lubrication or regular maintenance. The valve shall meet or exceed NFPA standard requirements.

**PLUMBING**

All plumbing and piping shall be of 304 stainless steel or flexible type piping. All inlet and outlet plumbing 3.00 inch (77 mm) and smaller shall be plumbed with either stainless steel piping or synthetic reinforced rubber hose blended with high tensile strength cord for maximum performance in tight bend applications.

Secondary plumbing such as small diameter drain lines shall be stainless steel, brass or hose. Where chassis and module flexing or vibration may damage or loosen piping or where a coupling is required for servicing, the piping shall be equipped with Victaulic or rubber type couplings.

All lines shall drain through the master drain valve or shall be equipped with individual drain valves. All individual drain lines for discharges shall be extended to the point where they shall drain below the chassis frame rails. All water carrying drain lines shall be of flexible polypropylene type tubing.

**MANIFOLDS**

Plumbing manifold bodies shall be ductile cast iron or stainless steel. The suction inlets shall include removable die cast zinc screens designed to provide cathodic protection for the pump, therefore reducing deterioration within the pump.

**TANK FILL**

One (1) 2.00 inch (50 mm) pump to tank fill line shall be installed from the discharge manifold directly to the booster tank.

**TANK TO PUMP**

One (1) 3.50 inch (88.9 mm) Waterous valve shall be installed between the water tank and the pump with flow recommendations as set forth by (NFPA) 1901, Standard for Automotive Fire Apparatus, and shall be tested to those standards when the pump is being certified.

**TANK TO PUMP CHECK VALVE**

There shall be a tank to pump check valve, conforming to NFPA standard requirements to prevent water from back flowing at an excessive rate if the pump is being supplied from a pressurized source.

The check valve shall be mounted as an integral part of the pump suction extension. A hole up to .25 inch (6.35 mm) is allowable in the check valve to release steam or other pressure buildup so that the void between the valve and check valve may drain of water that could be subject to freezing.

**2.5" LEFT SIDE INLET**

There shall be one (1) 2.50 inch (65 mm) gated suction inlet with .75 inch (19 mm) bleeder installed on the left side of the apparatus, forward of the steamer.

The inlet shall be controlled at the operator's panel.

**INTAKE PLUMBING**

The plumbing shall consist of 2.50 inch (65 mm) piping and shall incorporate a manual drain control installed below the pump area for ease of access.

**INTAKE TERMINATION**

The termination shall include the following components:

One (1) 2.50 inch (65 mm) NST swivel female straight adapter with screen

One (1) 2.50 inch (65 mm) self-venting plug, secured by a cable

**2.5" LEFT SIDE DISCHARGE**

There shall be one (1) 2.50 inch (65 mm) gated discharge installed on the left side of the apparatus. The discharge shall be controlled with a rack & sector control with a rod bezel.

**2.5" SIDE DISCHARGE PLUMBING**

The plumbing shall consist of 2.50 inch (65 mm) piping and shall incorporate a manual drain control installed below the pump area for ease of access.

**DISCHARGE TERMINATION**

The discharge termination shall include the following components:

One (1) 2.50 inch (65 mm) Male NST adapter

One (1) 2.50 inch (65 mm) NST female swivel by male with 30 degree polished elbow

One (1) 2.50 inch (65 mm) female self-venting cap, secured by a cable

**2.5" RIGHT SIDE DISCHARGE**

There shall be one (1) 2.50 inch (65 mm) gated discharge installed on the right side of the apparatus.

**2.5" SIDE DISCHARGE PLUMBING**

The plumbing shall consist of 2.50 inch (65 mm) piping and shall incorporate a manual drain control installed below the pump area for ease of access.

**DISCHARGE TERMINATION**

The discharge termination shall include the following components:

One (1) 2.50 inch (65 mm) Male NST adapter

One (1) 2.50 inch (65 mm) NST female swivel by male with 30 degree polished elbow

One (1) 2.50 inch (65 mm) female self-venting cap, secured by a cable

**4.0" RIGHT SIDE DISCHARGE WITH 3.0" VALVE**

There shall be one (1) gated 4.00 inch (100 mm) discharge with a 3.00 inch ball valve installed on the right side of the apparatus.

**4.0" SIDE DISCHARGE PLUMBING**

The plumbing shall consist of 4.00 inch (100 mm) piping and shall incorporate a manual drain control installed below the pump area for ease of access.

**DISCHARGE TERMINATION**

The discharge termination shall include the following components:

One (1) 4.00 inch (100 mm) NST adapter

One (1) 4.00 inch (100 mm) NST female by 5.00 inch (125 mm) Storz with 30 degree elbow

One (1) 5.00 inch (125 mm) Storz cap, secured by a cable

**2.5" LEFT REAR DISCHARGE**

There shall be one (1) 2.50 inch (65 mm) discharge located on the left side at the rear of the vehicle.

**REAR DISCHARGE PLUMBING**

The plumbing shall consist of 2.50 inch (65 mm) piping, be plumbed from the right hand discharge manifold, and incorporate a manual drain control installed below the pump area for ease of access.

**DISCHARGE TERMINATION**

The discharge termination shall include the following components:

One (1) 2.50 inch (65 mm) Male NST adapter

One (1) 2.50 inch (65 mm) NST female swivel by male with 30 degree polished elbow

One (1) 2.50 inch (65 mm) female self-venting cap, secured by a cable

**3.0" DECK GUN DISCHARGE**

There shall be a 3.00 inch (77 mm) deck gun discharge provided.

**DECK GUN PIPING**

The deluge waterway shall be plumbed with 3.00 inch (77 mm) piping that terminates in the center location at the top of the pump compartment module.

The plumbing shall be drained with an auto-drain located at the lowest point of the waterway plumbing if required.

**EXTEND-A-GUN**

There will be a Task Force Tips 18.00 inch (457 mm) manual Extenda-Gun, model XG18VL-PL, installed on the deluge pipe.

If the Extenda-Gun is not properly stowed and the parking brake is released, it shall activate the hazard light in the cab to alert the crew.

**CROSSLAYS**

Two (2) crosslays hose beds shall be located in the upper portion of the pump compartment, toward the front. The crosslay area shall span the entire width of the pump compartment module. Slotted aluminum flooring shall be provided for the hose bed area for drainage.

**CROSSLAY CAPACITY**

The two (2) crosslays shall each have capacity for 200 feet of 1.75 inch (45 mm) double stacked double jacket fire hose.

The ends of the crosslay dividers shall be cut at a 62 degree angle to provide room for the hand holes cut into the crosslay cover ends.

# METRO FIRE APPARATUS

## DISCHARGE PLUMBING

The plumbing shall consist of 2.00 inch (50 mm) piping and shall incorporate a manual drain control installed below the pump area for ease of access.

## DISCHARGE TERMINATION

The discharge termination shall include the following components:

One (1) 2.00 inch (50 mm) NPT x 1.50 inch (38 mm) NST chrome plated brass chicksan swivel

The use of a swivel shall allow hose payout to either side of the pump compartment.

## FOAM CAPABLE

The following discharges shall be foam capable:

- Two (2) 1.75" crosslays
- Front Bumper Discharge
- Hose Reel

## 2.5" CROSSLAY DISCHARGE

One (1) additional crosslay hose bed shall be provided.

The crosslay shall have capacity for 200 feet of 2.50 inch (65 mm) single stacked double jacket fire hose.

## DISCHARGE PLUMBING

The plumbing shall consist of 2.50 inch (65 mm) piping and shall incorporate a manual drain control installed below the pump area for ease of access.

## DISCHARGE TERMINATION

The discharge termination shall include the following components:

One (1) 2.5" NPT x 2.5" NST chrome plated brass chicksan swivel

The use of a swivel shall allow hose payout to either side of the pump compartment.

## CROSSLAY COVER

The crosslay hose bed area shall have a .188 inch (4.76 mm) embossed aluminum diamond plate cover installed. The cover shall be installed to provide a solid surface over all bays. The cover shall have a hand hold slot on each end. The cover shall be attached with a full length piano style hinge.

When opened, the diamond plate cover shall rest upon rubber bumpers or an equivalent protective type stop to eliminate marring or scratching of other apparatus body work.

## CROSSLAY SIDE COVERS

The crosslay hose bed area shall have a cover installed at each end of the crosslay area by the Fire Department or Dealership prior to the apparatus being placed into service.

**CROSSLAY HOSE BED LIGHT**

One (1) On Scene LED 60" Walkway series waterproof light shall be installed in an anodized aluminum housing on the front of the body to illuminate the crosslay area.

**CROSSLAY LIGHT ACTIVATION**

The crosslay light shall be activated with the pump "Panel Lights" switch.

**FRONT BUMPER DISCHARGE**

One (1) front bumper discharge outlet shall be provided and installed in the location specified.

**DISCHARGE VALVE**

A 2.50 inch (65 mm) Akron Brass 8000 series swing-out valve with a stainless steel ball.

**DISCHARGE VALVE CONTROL**

The discharge shall be controlled from the pump operator's panel location.

**DISCHARGE PLUMBING**

The plumbing shall consist of 2.50 inch (65 mm) piping and shall incorporate a manual drain control installed below the pump area for ease of access. Auto-drain(s) shall be installed in the discharge piping at lowest point of the plumbed system.

**DISCHARGE TERMINATION**

The discharge termination shall include the following components:

One (1) 2.50 inch (65 mm) NPT x 2.50 inch (65 mm) NST SST chiksan swivel

**FRONT BUMPER DISCHARGE LOCATION**

The front bumper discharge shall be mounted on top of the bumper apron of the front bumper extension. The discharge shall be placed outboard of the frame rail extensions on the right side.

**FRONT BUMPER DISCHARGE CHICKSAN GUARD**

The front bumper discharge chicksan shall include a chicksan guard installed on the front bumper gravelshield to prevent the chicksan from hitting the cab. The guard shall be fabricated of smooth aluminum with a dual-action sanded finish on all sides. There shall be two (2) rubber bumper stops installed on the guard to protect the chrome chicksan.

**FOAM CAPABLE**

The discharge shall be foam capable.

**BOOSTER HOSE REEL**

There shall be one (1) Hannay electric rewind booster reel with automatic brake installed on the apparatus.

There shall be a manual rewind device provided. A manual crank shall be mounted adjacent to booster reel.

The reel shall be model number EPF28-25-26-RT, 12V, standard assembly, electric rewind right hand side, manual rewind horizontal orientation, inlet shall be 1.0” with a 90 degree swivel.

**REEL FINISH**

The hose reel specified shall be steel and painted the standard silver utilized by Hannay.

**HOSE REEL VALVE**

The reel shall be plumbed to the pump with a 1.50 inch (38.10 mm) quarter turn Akron 8815 ball valve and 1.00 inch (25.40 mm) high pressure hose and couplings.

The valve shall be controlled from the operator's panel with a push-pull control.

**REWIND ACTIVATION**

An electric rewind switch shall be mounted directly on the side wall in the B1 compartment. The switch shall have a weather resistant rubber cover and label denoting its function.

The switch shall be labeled "REEL REWIND".

The circuit breaker for the electric rewind shall be of the manual reset type and be located within easy reach of the operator.

**HOSE REEL LOCATION**

The hose reel shall be mounted on the floor of the B1 compartment as far to the rear and left side walls to maximize storage space on the floor of the compartment for the nozzle and other accessories.

**BOOSTER REEL GAUGE**

A discharge gauge shall be included for the booster reel, the discharge gauges shall be specified in the specification.

**BOOSTER HOSE**

The booster hose shall be provided and installed by the Fire Department or Dealership prior to the apparatus being placed into service.

**HOSE ROLLER GUIDES**

There shall be a four-way roller assembly provided and installed directly to the reel.

**DISCHARGE GAUGES**

An (Innovative Controls) TC 3010xxxx Series nominal 2.50 inch gauge shall be supplied for reading the pressure of each discharge greater than 1.50 inches (38 mm) in diameter, unless otherwise specified.

A KEM-X socket saver diaphragm, located in the stem, eliminates freeze-up by preventing water from entering and/or clogging the gauge internals while containing a low temperature instrument oil that fills and protects the socket and the bourdon tube.

The molded glass-filled Nylon 66 case will not corrode and includes a scratch-resistant molded polycarbonate lens with O-ring seal. The gauge shall withstand pressures up to 100psi over gauge range with operation from –40° F to +160°F.

# METRO FIRE APPARATUS

**GAUGE SCALE**

Each gauge shall be marked for reading a discharge pressure of 0-400 PSI.

**GAUGE FACE COLOR**

Each gauge shall have black markings on a white face.

**BEZELS FOR 2.5" DISCHARGE GAUGES**

There shall be a deluxe metal bezel supplied around each of the 2.50 inch (65 mm) discharge pressure gauges. The bezels shall be constructed from chrome-plated zinc with large, easily identifiable recessed labels for color-coding and verbiage.

**FOAMPRO 1600**

There shall be a fully automatic electronic direct injection foam proportioning system furnished and installed on the apparatus. The system shall be capable of Class A foam concentrate. The proportioning operation shall be based on an accurate direct measurement of water flows with no water flow restriction. The foam system shall be installed in accordance with the manufacturer's recommendations. The foam system shall have a 12 volt, 1/3 horsepower electric positive displacement foam concentrate pump with a rated capacity of .01 to 1.7 GPM with operating pressures up to 400 psi.

The system shall be manufactured by the Fire Research Corporation and be model FoamPro 1600.

The system shall be equipped with a control module. It shall be installed on the pump operators panel and enable the pump operator to perform the following functions:
- Activate the foam system
- Change foam concentrate proportioning rates from .1% to 1%
- Flash a "low concentrate" warning light when the foam concentrate tank runs low. In two (2) minutes if foam concentrate is not added to tank, the foam concentrate pump shall be deactivated.

**FOAM SYSTEM TESTING**

The apparatus foam system shall be tested, and the Foam Flow meter shall be certified by the manufacturer prior to delivery.

**FOAM TANK**

There shall be one (1) 20 gallon foam tank with square hinged lid, equipped with a hold down device, installed and plumbed with non-corrosive piping to the foam system. The fill tower shall be approximately 8.00 inches by 8.00 inches.

A label shall be affixed to the foam tank fill indicating: “WARNING” Class A (or B) foam tank fill, do not mix brands or types of foam.

Foam tank shall be integral with the booster water tank provided

**SYSTEM PLUMBED TO 1 TANK**

The system shall be supplied by a single foam tank.

**SHUTOFF VALVE**

There shall be a 1/4 turn valve installed at the foam tank to shut off the flow from the supply line.

## SINGLE 1" TANK DRAIN

There shall be a 1.00 inch quarter turn drain valve installed for drainage of the foam tank. The valve shall be installed in the pump house with a drain line extended to the side running board.

## FOAM TANK LEVEL GAUGE

Fire Research TankVision Pro model WLA360-A00 tank indicator kit shall be installed. The kit shall include an electronic indicator module, a pressure sensor, a 20' sensor cable and a tank vent. The indicator shall show the volume of Class A foam concentrate in the tank on nine (9) easy to see super bright RGB LEDs. A wide view lens over the LEDs shall provide for a viewing angle of 180 degrees. The indicator case shall be waterproof, manufactured of Polycarbonate/Nylon material, and have a distinctive green label.

The program features shall be accessed from the front of the indicator module. The program shall support self-diagnostics capabilities, self-calibration, six (6) programmable colored light patterns to display tank volume, adjustable brightness control levels and a datalink to connect remote indicators. Low water warnings shall include flashing LEDs at 1/4 tank, down chasing LEDs when the tank is almost empty, and an output for an audio alarm.

The indicator shall receive an input signal from an electronic pressure sensor. The sensor shall be mounted from the outside of the foam tank near the bottom. No probe shall be placed on the interior of the tank. Wiring shall be weather resistant and have automotive type plug-in connectors.

## VIBRA-TORQUE™ BODY MOUNTING SYSTEM

The entire body module assembly shall be mounted to the chassis frame rails exclusively with Vibra-Torq™ torsion isolator assemblies to reduce the vibration and stress providing an extremely durable body mount.

The body substructure shall be mounted above the frame to allow independent flexing to occur between the body and the chassis. Two (2) assemblies shall be mounted to the chassis frame rails with steel, gusseted mounting brackets. Each bracket shall be painted for corrosion resistance. Each body mount bracket shall be mounted to the side chassis frame flange with two 5/8”-UNC Grade 5 HHCS.

The rear assemblies shall have a two-part rubber vibration isolator. Certain assemblies shall also incorporate a torsion spring. Helical coil springs shall be incorporated into specific mounts in tandem with the rubber isolators to minimize the stress absorbed by the body caused from chassis frame rail flexing.

There shall be no welding to the chassis frame rail sides, web or flanges, or drilling of holes in the top or bottom frame flanges between axles. All body to chassis connections shall be bolted so that in the event of an accident, the body shall be easily removable from the truck chassis for repair or replacement.

Because of the constant vibration and twisting action that occurs in chassis frame rails and suspension, the torsion mounting system is required to minimize the possibility of premature body structural failure. The Vibra-Torque™ body mounting system shall have a lifetime warranty.

## COMPARTMENT VENTILATION

To allow for proper air circulation and flow, each compartment shall have a venting route. The venting locations shall be determined by "best-fit" locations for each body style configuration. The vents will be a chrome louvered and mounted appropriately on the compartment interior walls.

## COMPARTMENTATION

The following compartments shall be supplied on the apparatus:

# METRO FIRE APPARATUS

Compartment "L1"

There shall be one (1) full height compartment ahead of the rear wheels on the left side of the apparatus with interior dimensions of the following:

The upper portion shall be approximately 37.75 inches (958.85 mm) wide by 39.00 inches (990.60 mm) high by 12.50 inches (317.50 mm) deep.

The lower portion shall be approximately 37.75 inches (958.85 mm) wide by 33.00 inches (838.20 mm) high by 26.00 inches (660.40 mm) deep.

Clear door opening dimensions shall be 29.70" (754.38 mm) wide by 63.10" (1602.74 mm) high.

Compartment "L2"

There shall be one (1) compartment over the rear wheels on the left side of the apparatus with interior dimensions of the following:

The upper portion shall be approximately 68.00 inches (1727.20 mm) wide by 39.00 inches (990.60 mm) high by 12.50 inches (317.50 mm) deep.

The lower portion shall be approximately 68.00 inches (1727.20 mm) wide by 8.00 inches (203.20 mm) high by25.75 inches (654.05 mm) deep.

Clear door opening dimensions shall be 65.50" (1663.70 mm) wide by 38.10" (967.74 mm) high.

Compartment "L3"

There shall be one (1) full height compartment behind the rear wheels on the left side of the apparatus with interior dimensions of the following:

The upper portion shall be approximately 46.75 inches (1187.45 mm) wide by 39.00 inches (990.60 mm) high by 12.50 inches (317.50 mm) deep.

The lower portion shall be approximately 46.75 inches (1187.45 mm) wide by 33.00 inches (838.20 mm) high by 26.00 inches (660.40 mm) deep.

Clear door opening dimensions shall be 41.70" (1059.18 mm) wide by 63.10" (1602.74 mm) high.

Compartment "R1"

There shall be one (1) full height compartment ahead of the rear wheels on the right side of the apparatus with interior dimensions of the following:

The upper portion shall be approximately 37.75 inches (958.85 mm) wide by 39.00 inches (990.60 mm) high by 12.50 inches (317.50 mm) deep.

The lower portion shall be approximately 37.75 inches (958.85 mm) wide by 33.00 inches (838.20 mm) high by 26.00 inches (660.40 mm) deep.

Clear door opening dimensions shall be 29.70" (754.38 mm) wide by 63.10" (1602.74 mm) high.

Compartment "R2"

There shall be one (1) compartment over the rear wheels on the right side of the apparatus with interior dimensions of the following:

The upper portion shall be approximately 68.00 inches (1727.20 mm) wide by 39.00 inches (990.60 mm) high by 12.50 inches (317.50 mm) deep.

The lower portion shall be approximately 68.00 inches (1727.20 mm) wide by 8.00 inches (203.20 mm) high by25.75 inches (654.05 mm) deep.

Clear door opening dimensions shall be 65.5" (1663.70 mm) wide by 38.1" (967.74 mm) high.

Compartment "R3"

There shall be one (1) full height compartment behind the rear wheels on the right side of the apparatus with interior dimensions of the following:

The upper portion shall be approximately 46.75 inches (1187.45 mm) wide by 39.00 inches (990.60 mm) high by 12.50 inches (317.50 mm) deep.

The lower portion shall be approximately 46.75 inches (1187.45 mm) wide by 33.00 inches (838.20 mm) high by 26.00 inches (660.40 mm) deep.

Clear door opening dimensions shall be 41.70" (1059.18 mm) wide by 63.10" (1602.74 mm) high.

**FORMED BODY DESIGN CONSTRUCTION**

The apparatus body shall be a formed sheet metal design, which serves as the compartment enclosures and supporting substructure of the body. The substructure and enclosures shall work in unison to provide maximum storage that supports and protect the contents contained within.

**BODY CONSTRUCTION**

The body substructure and compartments shall utilize a combination of huck bolting and welding methods.

The huck bolt systems utilized in either body or substructure shall be .3125 inch (7.94 mm) or .375 inch (9.53 mm) diameter stainless steel fasteners for maximum shear and tension strength. Other system of fasteners that do not consist of stainless steel shall NOT be acceptable.

In combination with the huck bolt system, strictly monitored welding procedures shall be instituted. To ensure maximum joint strength, any welding zones shall be welded together utilizing American Welding Standard (AWS), Certified welding procedures.

Due to the engineered combination of specifically chosen materials, no dissimilar metals shall be used in the body and its supporting substructure without being separated by a sufficient corrosion and electrolysis inhibitor. This shall consist of isolation pads and structural adhesives.

**ECK® ANTI-CORROSION PROCESS**

Absolutely no dissimilar metals shall be used in the body and its supporting substructure without being separated by Eck®, which prevents corrosion by providing a barrier between dissimilar metals, sealing out moisture and absorbing energy created by a dissimilar metal reaction.

# METRO FIRE APPARATUS

## BODY STRUCTURE

The supporting tank and compartment substructure shall be manufactured from corrosion resistant 304L stainless steel material. The supporting material shall be engineered from 7 gauge stainless steel material to provide both high strength and corrosion resistance for longevity of the apparatus body. The use of black carbon steel materials that have been painted or coated to try to prevent corrosion shall not be acceptable.

## BODY COMPARTMENTS

The formed sheet metal compartments shall utilize a 0.125 inch (3.18 mm) thick 5052-H32 aluminum alloy to provide maximum strength and durability. Each compartment sheet and enclosure shall be fabricated in a manor to provide proper sheet alignment and weld location application. The body shall consist of multiple pre-engineered compartment assemblies that shall be combined to create a series of body combinations. In the event of body damage, these assemblies shall allow for easier disassembly and assembly through the use of common tools and materials.

## COMPARTMENT TOPS AND EXTERIOR HOSE BED WALL

The exterior compartment tops and outer hose bed walls shall consist of .125 inch (3.18 mm) embossed aluminum diamond plate material to provide both strength and pleasing appearance. The hose bed walls shall be embossed aluminum diamond plate to the outward face while incorporating an additional smooth aluminum interior wall sheet to form the hose bed area. The use of interior and exterior hose bed wall sheets shall provide an enclosed section for strength integrity, wire routing, etc. Single hose bed wall sheet construction shall NOT be acceptable.

## COMPARTMENT FLOORS

The body compartments shall be enclosed with aluminum sheet metal as specified above. The compartment floors shall have a 1.00 inch (25.40 mm) lip downward at the door opening side of the compartment. This lip shall integrate with a structural member on the bottom edge and form a “sweep-out” compartment. This design shall also allow for a structural flush fitting door frame and a complete door/weather seal.

## COMPARTMENT LOAD CAPACITY

Each compartment shall have a minimum of one additional structural compartment floor support hat section centered on the underside of the compartment floor. This additional member shall be integral with compartment assemblies of each area. Each compartment must be designed, and analyzed to carry a working load of:

Full depth side compartment: 500 pounds (226.80 kg) per compartment
Half depth side compartment: 375 pounds (170.10 kg) per compartment
Rear center compartment: 500 pounds (226.80 kg)

## REAR COMPARTMENT

The following compartment shall be supplied on the apparatus:

Compartment "B1":

There shall be one (1) compartment installed at the rear of the apparatus with a R·O·M Series IV roll up door.

The interior dimensions of this compartment shall be approximately 41.50 inches (1054.10 mm) wide by 39.50 inches (1003.30 mm) high by 33.63 inches (854.08 mm) deep.

Clear door opening dimensions shall be 33.50" (850.90 mm) wide by 31.80" (807.72 mm) high.

**DOOR OPEN INDICATOR**

The rear compartment roll up door shall have an integral door open indicator magnet in the lift bar. If the bar is not properly closed and the parking brake is released, it shall activate the hazard light in the cab to alert the crew.

**ROLL-UP DOOR PROTECTOR**

There shall be a protective cover installed under the rear compartment door roll to protect the door in the rolled up position.

**ROLL-UP DOOR PROTECTOR FINISHING**

The cover shall be fabricated of smooth aluminum and of Natural finish.

**ROLL-UP DOOR CONSTRUCTION**

All horizontal and vertical side compartment doors shall be roll-up style doors.

**REAR COMPARTMENT DOOR**

A R•O•M Corporation Series IV roll-up shutter door shall be installed. 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 inches 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. Slats must have interlocking joints with an inverted locking flange. Slat inner seal shall be a one piece PVC extrusion; seal design shall 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 inches. 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 counterbalance system. Counterbalance system shall be 4.00 inches in diameter and held in place by 2 heavy duty 18 gauge zinc plated plates. Counterbalance system shall have 2 over-molded rubber guide wheels to provide a smooth transition from vertical track to counterbalance system.

**SIDE COMPARTMENT DOOR/TRACK/TRIM WET PAINTED**

The side compartment doors, track, and trim shall be aluminum finish and wet painted to color match the apparatus body.

**REAR COMPARTMENT DOOR/TRACK/TRIM WET PAINTED**

The rear compartment door, track and trim shall be aluminum finish and wet painted to color match the apparatus body.

# METRO FIRE APPARATUS

**ROLL-UP DOOR PROTECTORS**

There shall be a protective cover installed under each body side compartment door roll to protect the door in the rolled up position.

**ROLL-UP DOOR PROTECTORS FINISHING**

Each cover shall be fabricated of smooth aluminum and of Natural finish.

**ROLL-UP DOOR ASSIST STRAPS**

There shall be nylon straps installed on both the left and right side body side, 'high side' compartment doors, to assist in closing the door. The strap shall be attached to each door and shall be permanently mounted to the rearward wall with footman loops using Nutserts, halfway between the top and bottom of the compartment.

**DOOR OPEN INDICATOR**

Each roll up door shall have an integral door open indicator magnet in the lift bar.

If the bar is not properly closed and the parking brake is released, it shall activate the hazard light in the cab to alert the crew.

**COMPARTMENT LIGHTING**

Two (2) OnScene Access LED strip lights shall be installed in each body compartment.

The tube lights shall be centered vertically along each side of the door framing and shall be maximum length available to fit the opening.

The lights in each compartment shall be on a separate circuit, turning on only those lights that have open compartment doors. The lights shall not be tied into the park brake control.

**HOSE STORAGE**

A hose bed shall be provided that meets the minimum NFPA storage requirements. The hose bed shall have slotted .25 inch (6.35 mm) aluminum flooring installed to allow drainage through the tank cavity to the ground below.

The aluminum flooring shall be manufactured in discrete sections to allow for easy removal and outstanding stability. The area shall be free of sharp edges to protect the hose when loaded or distributed.

**HOSE BED FINISH**

The apparatus hose bed interior walls shall be incorporated with a brushed stainless steel overlay material.

**HOSE BED DIVIDER WITH HAND CUTOUT**

There shall be a full height adjustable hose bed divider provided and installed in the hose bed area of the apparatus body.

The divider shall be fabricated of .25 inch (6.35 mm) thick aluminum plate with a double sided reinforcement and attached to the adjustable slide rails. The rear of the divider shall have a radius to provide a smooth corner and a hand cut out to aid in access to the hose bed area. Hose payout shall be unobstructed by the divider.

There shall be a total of two (2) provided and installed in the hose bed.

## HOSEBED RISER

A 15.00 inch (381.00 mm) hosebed riser made from the same material as the body shall be provided in order to increase the hosebed capacity.

There shall be a red reflective stripe installed at the top of the hosebed riser sides.

## HOSE BED SIGN PANELS

A smooth aluminum panel shall be provided on the outside of the hose bed walls, one (1) each side. These sign board panels will be painted to match the body. The sign panels shall be fastened with screws.

## CATWALKS

Catwalks shall be provided over the top of the compartments. The catwalks shall be manufactured with .125 inch (3.18 mm) embossed aluminum diamond plate material.

The outboard edge shall be bent downward at a 90 degree angle and over the compartments on both sides.

Catwalks shall not be an approved stepping surface, "Do not walk" labels to be installed

## 'A' FRAME HOSEBED COVER

There shall be a double door cover provided and installed which overlays a tubular structure for the hosebed.

Each cover shall be capable of supporting 600 pounds (272 kg) while standing on the cover. Each cover shall be capable of being opened independently and rest on a tubular structure which runs down the middle of the hose bed with a truss support at the rear of the apparatus. The covers in the closed position shall be higher in the center of the hose bed than they are at the hinged end to create an 'A' frame appearance and to aid in water runoff.

The front of the hose bed covers shall have vertical end caps that extend down to create a level line of diamond plate the width of the covers.

The doors shall be fabricated of .125 inch (3.18 mm) embossed aluminum diamond plate with full length two-piece stainless steel piano hinges.

The hosebed covers shall be wired to the hazard light in chassis cab. Inductive proximity switches shall be installed at the hosebed cover door hinges. If the door is not properly closed and the parking brake is released, it shall activate the “hazard light” in the cab to alert the crew.

## MANUAL RAISED COVERS

Each cover shall be raised independently and manually. There shall be a gas strut installed on each cover to assist in opening the covers. Each gas shock shall be accompanied by a vinyl covered safety chain. There shall be a mechanical hold-open device to hold each cover in the open position at the front of the hosebed covers.

## REAR OF A-FRAME HANDRAILS

Two (2) 1.25-inch diameter handrails constructed of extruded aluminum with a knurled grip full length red reflective stripe with 18.00 inches of grip surface shall be installed on the rear face of the A-Frame structure at the rear of the hosebed.

## FRONT OF COVER ILLUMINUATED HANDRAILS

Two (2) handrails shall be installed on the front vertical flanges of the hose bed covers, one (1) each cover. The handrails

shall be constructed of 1.25-inch diameter extruded aluminum with a knurled grip full length red reflective stripe and full length illuminated LED light strip and shall be up to 18.00 inches (457.20 mm) in length.

Each handrail LED light strip specified shall be white/clear in color.

**FRONT COVER ILLUMINATED HANDRAIL LIGHTING ACTIVATION**

The illuminated handrail light shall be activated when the park brake and marker light activation to match chassis.

**REAR HOSE BED COVER**

The cover that extends down over the rear of the hose bed shall be supplied and installed by the Fire Department or Dealership prior to the apparatus being placed into service.

**HOSEBED COVER LIGHTING**

Two (2) OnScene "Access" LED strip light shall be mounted to the underside of each hosebed cover. Each light shall be 48.00 inches each, evenly spaced from front to back.

The lights on each side shall be on a separate circuit and activate only when the covers are opened.

**DUNNAGE AREA**

A vertical bulkhead shall be installed at the front of the hose bed area, just behind the water tank fill tower, forming a storage area that is separated from the hose bed. The rear face of the bulkhead shall serve as a mounting surface for the hose bed dividers, resulting in the ability to move any hose bed divider across the entire width of the hose bed.

The floor of the dunnage area shall be constructed of non-slip .188 inch (4.76 mm) embossed aluminum diamond plate. The floor shall be slotted to allow drainage through the tank cavity to the ground below. The area shall be free of sharp edges to protect equipment when loading and unloading.

**POLYPRENE TANK**

The booster tank shall be constructed of .50 inch (12.70 mm), .75 inch (19.05 mm), and 1.00 inch (25.40 mm) thick polypropylene sheet stock which is a non-corrosive stress relieved thermoplastic. It shall be designed to be completely independent of the body and compartments. All joints and seams are extrusion welded and/or contain the "Bent Edge" and tested for maximum strength and integrity. The top of the booster tank is fitted with lifting eyes designed with a 3 to 1 safety factor to facilitate tank removal.

**COVER**

The tank cover shall be constructed of .75 inch (19.05 mm) thick Polyprene and shall be recessed. A minimum of two lifting dowels shall be drilled and tapped .50 inch (12.70 mm) x 2.00 inch (50.80 mm) to accommodate the lifting eyes.

**BAFFLES**

The swash partitions are manufactured of .50 inch (12.70 mm) Polyprene. All partitions are equipped with vent and air holes to permit movement of air and water between compartments to provide to provide maximum water flow. All swash partitions interlock and are welded to one another as well as to the walls of the tank.

# METRO FIRE APPARATUS

**MOUNTING**

The tank shall rest on the sub-frame cross members with an unsupported area not to exceed 530 square inches (.34 square meters) on tanks up to 40.00 inches (1016.00 mm) in height. On tanks over 40.00 inches (1016.00 mm) in height, an unsupported area of not more than 400 square inches (.26 square meters) must be maintained.

All tanks shall be isolated from those cross members with a minimum of 2.00 inch (50.80 mm) x .25 inch (6.35 mm) hard rubber strips that are 60 durometer in hardness. The tank shall sit cradle mounted in the under body sub-frame and shall be completely removable without disturbing the body side panels.

**TANK CAPACITY**

The tank shall be 1000 gallons (3785 liters) in capacity.

**FILL TOWER**

The fill opening shall be approximately 14.00 inches (355.00 mm) x 14.00 inches (355.00 mm).

The tower will have a .25 inch (6.35 mm) thick removable poly material screen and hinged type cover that will open if the tank is filled at an excess rate. There shall be a removable .25 inch (6.35 mm) thick poly material screen to prevent debris from falling into the tank.

The fill tower shall have a 6.00 inch (150.00 mm) overflow that will discharge underneath the tank, behind the rear wheels. The overflow shall terminate above the tank water level when filled to the rated capacity.

**LADDER STORAGE**

The ground ladders shall be stored within a compartment installed on the right side of the apparatus booster tank, with ladders lying on their side. There shall be storage for two (2) standard head pike poles and a slot for a back board integrated into the compartment. There shall be a non-metal ladder stop to prevent metal to metal contact. There shall be non-metallic guides installed for ladders to slide on.

All items shall be stored in their own independent section to allow one item to be removed without disturbing another.

The compartment and door shall be fabricated of .125 inch (3.18 mm) smooth aluminum.

The door shall be vertically hinged on the outboard edge (right side) and provided with two push button style latches and a chrome handle centered between the push button latches. The door shall have retro-reflective striping in a chevron pattern.

If the door is not properly closed and the parking brake is released, it shall activate the hazard light in the cab to alert the crew.

**GROUND LADDERS**

The following ground ladders shall be provided by the manufacturer:

-One (1) Duo-Safety 24 foot (7 m) two (2) section aluminum extension ladder, model 900A.

-One (1) Duo-Safety 14 foot (4 m) aluminum roof ladder with folding hooks, model 775A.

-One (1) Duo-Safety 10 foot (3 m) aluminum attic ladder, model 585A.

# METRO FIRE APPARATUS

## BODY OVERLAYS – FRONT/REAR

The entire front face of the apparatus body shall have aluminum diamond plate overlays installed. The entire rear face of the apparatus body shall have raw aluminum overlays installed for the installation of chevron striping.

All overlay materials shall be coated with 3M adhesive sealant on the back portion to provide an insulating barrier between dissimilar metals.

## WHEEL WELL ROLL-OUT DRAWER

There shall be a roll-out drawer installed in the compartment located above the rear wheel on the left side of the body in the L-2 compartment. The slide assemblies shall incorporate cadmium plated ball bearing roller slides and a lock-in, lock-out front drawer release system (FDR).

The drawer shall be approximately 25.00 inch (635.00 mm) deep by 63.15 inch (1604.01 mm) wide with 2.75 inch (69.85 mm) tall sides and have a 300.00 pound (136.08 kg) capacity.

## SCBA COMPARTMENT BIN

There shall be an eight (8) place air bottle compartment bin provided in the lower portion of the compartment located above the wheel well area on the right side in the R-2 compartment.

The interior surface of each SCBA storage tube shall be lined with a finish matching the compartment interior. The finish application shall aid to minimize any damage caused to the canisters while stored in the holders.

The NFPA required SCBA bottle straps shall be mounted deeper in the compartment, so the bottles do not hit the door when the door is closed.

## OVERWHEEL SHELVING

One (1) shelf 66.25 inch (1682.75 mm) wide x 11.50 inch (292.10 mm) deep x 2.00 inch (50.80 mm) high shall be provided in the left side wheel well compartment.

The shelf shall be .19 inch (4.76 mm) smooth aluminum with a formed 2.00 inch (50.80 mm) lip on the front and back. The side mounting brackets shall be integral with the shelf to form the sides.

One (1) shelf 66.25 inch (1682.75 mm) wide x 11.50 inch (292.10 mm) deep x 2.00 inch (50.80 mm) high shall be provided in the right side wheel well compartment as part of the SCBA storage assembly.

The shelf shall be .19 inch (4.76 mm) smooth aluminum with a formed 2.00 inch (50.80 mm) lip on the front and back. The side mounting brackets shall be integral with the shelf to form the sides.

## COMPARTMENT UNISTRUT

Vertically mounted Unistrut shall be installed in ALL compartments of the apparatus body to accommodate mounting shelves, trays, and other miscellaneous equipment items as specified.

## SHELVING

The shelving shall be made out of .190 inch (4.83 mm) smooth aluminum sheet material with a formed 2.00 inch (50.80 mm) lip on the front and back.

The side mounting brackets shall be integral with the shelving to form the sides. The shelving shall be vertically adjustable.

The following shelving shall be provided:

**UPPER HALF DEPTH SHELVING**

A full width x half depth shelf shall be provided and installed in the upper compartment(s) specified.

There shall be a total quantity of three (3) provided.

One (1) shall be located in the L-3 compartment.

One (1) shall be located in the R-1 compartment.

One (1) shall be located in the R-3 compartment.

**SHELF DEPTH MODIFICATION**

The shelf specified above shall be reduced in depth by 1.00 inch (25.40 mm) for installation of wall mount tool boards.

**FULL DEPTH SHELVING**

A full width x full depth shelf shall be provided and installed in the compartment(s) as specified.

There shall be a total quantity of one (1) provided.

One (1) shall be located in the L-1 compartment.

**SHELF AND TRAY FINISH**

Any shelf or roll-out tray installed shall have a dual-action sanded finish applied on the front and side faces.

**WHEEL WELL PANELS**

The body panel area around the wheel well on each side of the body shall be painted the same color as the rest of the body

**SIDE RUB RAILS**

The bottom edge of the body compartments and pump compartment shall be protected with rub rails to absorb minor damage while protecting the body. The rear rub rails shall be full length to the end of the tailboard.

The rub rails shall be fabricated of brightly anodized aluminum channel. The rub rails shall be bolted in place with stainless steel bolts and shall be spaced away from the body with .50 inch (12.70 mm) nylon spacers to help prevent the collection of water and debris. Each rub rail section shall be easily removable and replaced should it become damaged.

**REAR RUB RAILS**

The rearward edge of the rear step shall be trimmed with rub rails to absorb minor damage while protecting the body.

The rub rails shall be fabricated of brightly anodized aluminum channel. The rub rails shall be bolted in place with stainless steel bolts and shall be spaced away from the body with .50 inch (12.70 mm) nylon spacers to help prevent the collection of water and debris. Each rub rail section shall be easily removable and replaced should it become damaged.

## RUB RAIL RETRO-REFLECTIVE STRIPING

One inch retro-reflective Diamond Grade striping shall be applied to the length of each rub rail section making the perimeter of the apparatus more readily visible.

## STRIPE COLOR

The reflective striping shall be red in color.

## DOOR SILL TRIM PLATES

Brushed stainless steel door sill plates shall be installed at the bottom of each body compartment door opening.

## VERTICAL OVERLAY TRIM PLATES

Full height brushed stainless steel vertical overlay trim plates shall be installed on the outer corners of the front and back body compartments.

## FENDERETTES

Two (2) polished aluminum fenderettes shall be provided and installed on body rear wheel well openings, one (1) each side. Rubber welting shall be provided between the body and the crown to seal the seam and restrict moisture from entering. A dielectric barrier shall be provided between the fender crown fasteners (screws) and the fender sheet metal to resist deterioration.

## REAR TAILBOARD

The rear tailboard shall be fabricated of the same materials as used in the apparatus body. The tailboard shall be an independent assembly fastened to the rear body structural framing to provide body protection and a solid rear stepping platform.

The rear of the apparatus body shall be vertical in design - otherwise known as a 'flat-back'. On the rear body surface, a sign shall be attached that states: "DO NOT RIDE ON REAR STEP, DEATH OR SERIOUS INJURY MAY RESULT."

The rear tailboard and body shall be constructed such that the angle of departure shall be no less than 8 degrees at the rear of the apparatus when fully loaded (Per NFPA, current edition).

## REAR TAILBOARD STEP

The rear tailboard shall be approximately seventeen and one half (17.50) inches (444.50 mm) deep and shall incorporate a .125 inch (3.175 mm) embossed aluminum diamond plate overlay.

The stepping area shall span the width of the apparatus, overlapping the perimeter of the structural tailboard framework.

The embossed diamond plate material shall meet the minimum NFPA standard requirements for slip resistance.

## INTERMEDIATE REAR STEP

The rear step shall be 53.38 inches (1355.73 mm) wide by 10.00 inches (254.00 mm) in depth. There shall be up to four (4) handhold cutouts provided in the top step surface measuring approximately 2.50 inches deep. There shall be one (1) full length aluminum non lit handrail integrated into the assembly.

The step shall be mounted on the flat back of the apparatus with gusset-type mounting and 5/16" bolts to provide sufficient support for loading hose and gaining access to the hose bed area.

The platform stepping surface shall be constructed of .188 inch (4.76 mm) embossed aluminum diamond plate materials.

**INTERMEDIATE STEP LIGHTING**

Two (2) Whelen OS lights shall be installed to illuminate the stepping area.

Additionally, there shall be one (1) On-Scene Access 38" LED tube light installed below the intermediate step to illuminate below the step.

**STEP LIGHT ACTIVATION**

The step lights shall be activated when the park brake is set.

**FOLDING STEPS**

Innovative Controls Inc. model #3004234 steps, made of high strength die cast aluminum, conforming to current NFPA requirements, shall be provided and installed on the apparatus as specified.

The steps shall include a molded gasket and drain at the bottom to allow any water to escape the assembly, preventing water ingress and keeping the mount from damaging painted surfaces.

The steps shall be mounted with 5/16" bolts.

The steps shall have a minimum of 46 sq. inches of surface area capable of sustaining a 1200 lb. static load. The steps shall be mounted no more than 18" inches between each step.

**ILLUMINATED FOLDING STEPS**

Three (3) illuminated folding steps shall be installed on the left front vertical face of the body.

**STEP LIGHT ACTIVATION**

The step lights shall be activated when the park brake is set.

**10" HANDRAILS**

One (1) handrail constructed of extruded aluminum with a knurled grip, full length red reflective strip and full length illuminated LED light strip shall be installed to assist in climbing the steps according to NFPA 1901, current edition. There shall be a 2.00 inch minimum clearance between the bracket and the body.

Location: Front edge of catwalk, angled at approximately 30 degrees.

**ILLUMINATED FOLDING STEPS**

Three (3) illuminated folding steps shall be installed on the right front vertical face of the body.

**STEP LIGHT ACTIVATION**

The step lights shall be activated when the park brake is set.

**10" HANDRAILS**

One (1) handrail constructed of extruded aluminum with a knurled grip, full length red reflective strip and full length illuminated LED light strip shall be installed to assist in climbing the steps according to NFPA 1901, current edition. There shall be a 2.00 inch minimum clearance between the bracket and the body.

Location: Front edge of catwalk, angled at approximately 30 degrees.

**ILLUMINATED FOLDING STEPS**

Three (3) illuminated folding steps shall be installed on the right rear vertical face of the body.

**STEP LIGHT ACTIVATION**

The step lights shall be activated when the park brake is set.

**HANDRAILS KNURLED ALUMINUM ILLUMINATED**

Handrails shall be 1.25 inches in diameter, constructed of extruded aluminum with a knurled grip, full length red reflective strip and full length illuminated LED light strip.

There shall be a 2.00 inch minimum clearance between the handrail and the body. The light shall illuminate an area adjacent to the handrail and in accordance with (NFPA) 1901, Standard for Automotive Fire Apparatus, standard requirements.

Each handrail LED light strip specified shall be white/clear in color.

The following handrails shall be installed at the approximate lengths noted:

**REAR HANDRAIL LOCATION**

Two (2) full height vertical handrails shall be mounted, one (1) on each side of the rear center compartment area at the rear of the apparatus. The vertical rear of body handrails shall be mounted with offset stanchions.

**PUMP MODULE HAND RAILS**

Two (2) 20" handrails shall be installed parallel to the body on top the pump house, rear of the crosslays, one (1) each side.

**REAR TOW EYES**

There shall be two (2) rear tow eyes installed on the rear sub frame support structure, one each side. The location of the tow eyes shall be below the rear center compartment. The tow eyes shall be manufactured of 1.00 inch plate steel that is bolted to the chassis frame rail with a minimum of 6 grade 8 bolts.

**PAINT SPECIFICATIONS**

All bright metal fittings, if unavailable in stainless steel, shall be heavily chrome plated.

Critical body and sub-frame area which cannot be primed after assembly shall be pre-painted.

All welded metal surfaces shall be ground to a smooth surface prior to a degreasing and high pressure, high temperature phosphatizing process. The entire surface shall be sprayed with a non-chromate sealing compound to prevent formulation of stains or flash rust on previously phosphatized parts.

The paint applied to the apparatus shall be Akzo Nobel, Sikkens brand, LVBT650 basecoat, applied throughout a multi-step process including at least two coats of each color and clear coat finish.

The coating shall be an infra-red, baked air dried. The coatings shall provide full gloss finished suitable for application by high-pressure airless or conventional low pressure air atomizing spray.

The coatings shall not contain lead, cadmium or arsenic. The polyisocyanate component shall consist of only aliphatic isocyanates, with no portion being aromatic isocyanates in character. The solvents used in all components and products shall not contain ethylene glycol mono-ethyl ethers or their acetates (commercially recognized as cello solves), nor shall they contain any chlorinated hydrocarbons. The products shall have no adverse effects on the health or nor present any unusual hazard to personnel when used according to manufacturer's recommendations for handling and proper protective safety equipment, and for its intended use.

The coating system, as supplied and recommended for application, shall meet all applicable federal, state and local laws and regulations now in force or at any time during the courses of the bid.

The manufacturer shall supply (upon request) for each product and component of the system, a properly complete OSHA "Safety Data Sheet".

The following documents of the issue in effect on the date of the invitation to quote form a part of this document to the extent specified herein:

Federal Standards: Number 141A and 141B paint, varnish, lacquer and related material: methods of inspection, sampling, and testing.

Military Standard: MIL-C 83486B Coating, Urethane, Aliphatic Isocyanates, for Aerospace applications.

Industry Methods and Standards: ASTM Method of Analysis (American Society for testing and Materials). BMS 10-72A (Boeing Material Specifications).

The entire exterior body structure (excluding roll-up doors) shall receive the primer coats and the finish coats. The apparatus body will be painted in a down draft type paint booth to reduce dust, dirt or impurities in the finish paint. The painted surfaces shall have a finish with no runs, sags, craters, pinholes or other defects. The coating will meet the following test performance properties as a minimum standard.

The apparatus shall be painted Sikkens FLNA 32528 Red

**SPEEDLINER COMPARTMENT FINISH**

The compartment interiors shall be coated with bed liner type spray.

**COMPARTMENT FINISH COLOR**

The Superliner Color shall be Medium Gray.

**LOW-VOLTAGE ELECTRICAL SYSTEM**

The apparatus shall be equipped with a Weldon Logic Controlled, Low-Voltage (12v) Electrical System compliant with the latest revision of the NFPA 1901 guideline.

The system shall be capable of performing total load management, load management sequencing, and load shedding via continuous monitoring of the low-voltage electrical system. In addition, the system shall be capable of switching loads (like operating as an emergency warning lamp flasher) eliminating the dependency on many archaic electrical components such as conventional flasher modules. The system shall also incorporate provisions for future expansion or modification.

The low-voltage electrical system shall be designed to distribute the placement of electrical system hardware throughout the apparatus thereby enabling a smaller, optimized wire harness. The programmable, logic controlled system shall eliminate redundant electrical hardware such as harnesses, circuit boards, relays, circuit breakers, and separate electrical or interlock subsystems and associated electronics for controlling various electrical loads and inputs.

As-built electrical system drawings and a vehicle-specific reference of I/O shall be furnished in the delivery manuals. These drawings shall show the electrical system broken down into separate functions, or small groups of related functions. Drawings shall depict circuit numbers, electrical components and connectors from beginning to end. A single drawing for all electrical circuits installed by the apparatus builder shall not be accepted.

**LED PERIMETER LIGHTS**

There shall be six (6) LED TecNiq model T44 series, 4.00 inch round, 8 diode LED lights installed on the apparatus. One (1) under each side at the front of the body, one (1) under each side at the rear of the body and one (1) each side under the rear tailboard. The lights shall be positioned to provide illumination to the immediate ground area around the unit.

**PERIMETER LIGHTS ACTIVATION**

The underbody perimeter lights shall be activated with activation of the chassis ground lights.

**LED DOT LIGHTING**

There shall be seven (7) lights located on the rear of the vehicle. Three (3) of the lights shall be mounted on the upper rear face of the body just below the hosebed area in a cluster for use as identification lamps. Two (2) lights shall be located outboard on the upper rear, one each side for use as clearance lamps and two (2) lights in the rearmost position of the side rubrail on the tailboard facing the side for use as rear side marker lamps

The lights shall be TecNiq brand S17 series LED red markers

**DOT ADDITIONAL MARKER LIGHTS**

There shall be two (2) amber LED intermediate marker lights/intermediate turn signals installed in the rub rail, forward of the rear wheel well, one (1) each side.

The lights shall be TecNiq brand S17 series LED amber markers/turn.

**INTERMEDIATE MARKER LIGHTS**

The intermediate amber side marker lights installed in the rub rail, forward of the rear wheel well, shall flash when their respective side turn signal is activated. The lights shall return to steady burn when turn signal is deactivated.

**UPPER LIGHTING PACKAGE**

The following NFPA lighting package, manufactured by Whelen, shall be supplied and installed in the upper areas of the vehicle.

The body shall have the warning light dimming feature when the chassis is equipped with it. If the dimming feature is not provided on the chassis, the body WILL NOT be equipped.

**UPPER ZONE C:**

There shall be two (2) Whelen model L31H beacons with 360 degree LED lights, provided and installed on the apparatus.

One (1) each side on the rear upper outboard corners of the apparatus.

**REAR WARNING LIGHTS COLOR**

The upper warning lights mounted at the rear shall be red with clear lenses.

**AUXILIARY UPPER ZONE C:**

There shall be two (2) Whelen model M6 series LED lights with chrome bezels, one (1) each side, provided and installed on the back of the fabricated tread plate scene light box.

**REAR WARNING LIGHTS FLASH**

The rear upper lights shall feature multiple flash patterns including steady burn for solid colors and multiple flash patterns for split colors. The lights shall be programmed to emit the "TripleFlash 75" in/out flash pattern.

**REAR WARNING LIGHTS COLOR**

The upper warning lights mounted at the rear shall be amber with a clear lens.

**UPPER REAR WARNING LIGHT SWITCH E-MASTER/VISTA**

The upper rear warning lights shall be controlled through the master warning switch and a secondary rear warning switch located on the Vista display control screen. The switches shall be clearly labeled for ease of identification.

**AUXILIARY UPPER WARNING LIGHTS**

There shall be four (4) Whelen WION lights with chrome bezels installed, two (2) on each side. One (1) light shall be located in the upper section of the side compartment header centered above the forward and rearmost compartments.

**SIDE WARNING LIGHTS FLASH**

The lights shall feature multiple flash patterns including steady burn for solid colors and multiple flash patterns for split colors.

**WARNING LIGHTS COLOR**

The warning lights shall be red with clear lenses.

**LOWER LED WARNING LIGHTING**

The following NFPA lighting package, manufactured by Whelen, shall be supplied and installed in the lower areas of the vehicle.

The body shall have the warning light dimming feature when the chassis is equipped with it. If the dimming feature is not provided on the chassis, the body WILL NOT be equipped.

**LOWER ZONE B&D:**

There shall be four (4) Whelen model M6 series LED lights with chrome bezels, two (2) each side, provided and installed with the apparatus.

**SIDE WARNING LIGHTS FLASH**

The lower side lights shall feature multiple flash patterns including steady burn for solid colors and multiple flash patterns for split colors. The lights shall be programmed to emit the "TripleFlash 75 in/out" solid flash pattern.

**SIDE WARNING LIGHTS COLOR**

The lower side warning lights mounted on the side positions shall be red with clear lenses.

# METRO FIRE APPARATUS

**SIDE WARNING LIGHTS LOCATION**

The warning lights on the side of the apparatus shall be mounted at the mid height in the forward area of the rear wheel well panel and at the rear tailboard location.

**LOWER ZONES B&D CAST ALUMINUM LIGHT HOUSING WITH PAINTED INSERT**

A cast aluminum light housing with painted outward facing inserts, shall be installed for the rearmost warning light in zones B&D. The housing will ensure the light is mounted as far rearward as possible.

The inserts shall be painted to color match the body.

**LOWER SIDE WARNING LIGHT SWITCH E-MASTER/VISTA**

The lower side warning lights shall be controlled through the master warning switch and a secondary side warning switch located on the Vista display control screen. The switches shall be clearly labeled for ease of identification.

**LOWER ZONE C:**

There shall be two (2) Whelen model M9 series Super-LED lights with chrome bezels, one (1) each side, on provided and installed on the rear of the body.

**REAR WARNING LIGHTS FLASH**

The lower rear lights shall feature multiple flash patterns including steady burn for solid colors and multiple flash patterns for split colors. The lights shall be programmed to emit the "Triple Flash 75 in/out" flash pattern.

**REAR WARNING LIGHTS COLOR**

The lower rear warning lights mounted at the rear shall be red with clear lenses.

**REAR WARNING  LIGHT ACTIVATION**

The rear lower warning lights shall be activated by the master warning switch, and individually switched by a virtual switch on the vista screen in the cab by a "lower rear warning lights" switch.

**LED REAR TAIL LIGHT ASSEMBLY**

There shall be Whelen M9-Series Super LED rear tail light assemblies provided and installed with the apparatus, one (1) each side at the rear.

The following shall be installed in the order as specified from top to bottom:

One (1) Warning light called out above
One (1) #M9BTT LED red brake light
One (1) #M9T LED series amber turn signal light
One (1) #M9 BUW LED clear backup light

**MOUNTING FLANGES**

There shall be individual chrome bezels provided for each light of the taillight assembly.

**BACKUP LIGHTS**

The backup lights shall illuminate when the apparatus is placed in reverse.

# METRO FIRE APPARATUS

**REAR DIRECTIONAL LIGHTBAR**

There shall be eight (8) rear directional lights provided and installed on the rear of the apparatus integrated to the rear face of hosebed cover vertical end cap.

The lights shall be Whelen model #WIONSMCA LED ION amber lights with clear lenses and black bezels, and mounted equally spaced, four (4) lights on each end cap.

The back of the hose bed cap shall be boxed in to provide protection and strength for the lights. The back of the protection panel shall be angled to provide protection when hose is deployed in case of contact. This protection panel shall be constructed of smooth aluminum.

The controller shall be located and installed in the Chassis.

**RDL BLACK VINYL**

There shall be a non-reflective black vinyl provided around the perimeter of the rear directional lights. The vinyl shall be applied to a smooth surface material.

**REAR VIEW CAMERA SYSTEM**

The chassis provided camera shall be surface mounted under the intermediate step, on the center rear of the apparatus body for maximum viewing capability.

**SIDE SCENE LIGHTING**

Two (2) Whelen Pioneer PCH2 with flood and spotlight, housing shall be powder-coated white.

The scene lights shall be located on the side of the body, one (1) on each side, at the rear corner of the body side walls.

**SIDE SCENE LIGHT MOUNTING**

The Light shall be mounted in the side of the treadbrite box which also houses the upper rear warning light on the rear face of the box.

The treadplate box shall be as short as possible from the catwalk to the top of the scene light and shall be as wide as the catwalk.

**SIDE SCENE LIGHT ACTIVATION**

The side scene lights shall be activated by the two (2) virtual buttons on the Vista display control screen for the chassis side scene lights, one (1) chassis provided switch on the officer switch panel for the right scene only, and two (2) switches on the pump panel, one (1) labeled for each side of the body.

The switches shall be labeled as follows:

Left Scene

Right Scene

**REAR SCENE LIGHTING**

There shall be two (2) scene lights installed at the rear body panels, one (1) on each side.

The scene lights shall be Whelen model #M9LZC 12 volt scene lights with chrome bezels. The lights shall offer LED directional lighting from 2 to 40-degrees with internal and external optics.

The lights shall draw 6.0 amps and generate 6,500 lumens.

**REAR SCENE LIGHT ACTIVATION**

The rear scene lights shall be activated by one (1) virtual button on the Vista display control screen, one (1) switch on the officer switch panel, one (1) switch on the pump panel, and when the apparatus transmission is shifted into reverse.

The switch shall be labeled as follows:

Rear Scene

**REFLECTIVE STRIPING**

The reflective stripe applied to the outside perimeter of the chassis and apparatus by the Fire Department or the Dealership prior to the truck being placed into service.

**REAR RETRO-REFLECTIVE CHEVRON STRIPING**

The rear of body (excluding rear door) shall be equipped with Diamond Grade, retro-reflective striping in a chevron pattern, sloping downward and away from the centerline of the vehicle at an angle of 45-degrees.

The stripe shall be 6.00 inch (152.40 mm) wide alternating in colors in compliance with the current edition of (NFPA) 1901, Standard for Automotive Fire Apparatus.

**RETRO-REFLECTIVE CHEVRON STRIPING**

Diamond Grade retro-reflective chevron striping shall be applied to the front bumper.

**CHEVRON COLORS**

The retro-reflective chevron striping shall be red and fluorescent yellow-green in color.

**BODY LETTERING**

The lettering shall be provided and installed on each side of the apparatus body by the Fire Department or Dealership.

**LICENSE PLATE BRACKET**

A Cast Products, model LP0005-1-C, cast aluminum open bottom license plate bracket shall be installed on the apparatus.

The bracket shall incorporate a clear LED (WL0501) light to illuminate the license plate to meet DOT requirements.

**LICENSE PLATE BRACKET LOCATION**

The above specified license plate bracket shall be installed at the back of the apparatus on the right side. The bracket shall be mounted to meet all applicable DOT standards.

**WHEEL CHOCKS**

One (1) set of NFPA compliant wheel chocks shall be provided and installed by the Fire Department or Dealership

before the truck is placed into service.

**RECHARGEABLE FLASHLIGHTS**

All NFPA required portable hand lights will be supplied and installed by the Fire Department before the truck is placed into service.

**NFPA LOOSE EQUIPMENT**

The Fire Department shall be responsible to provide all NFPA loose equipment.