

Invader Custom Pumper Demo

PAYMENT TERMS

Full payment shall be made upon delivery and acceptance of the apparatus. The vehicle(s) shall not be released to the BUYER until payment is made. If the selling price is subject to any taxes, the taxes added will be that which are prevailing at the time of delivery.

Payment shall be made directly to Contractor. Payment shall be made in United States Currency. No checks or any other form of payment shall be made to any sales representatives, dealer, agents, etc.

If these payment terms are not strictly adhered to, Contractor shall assess a daily interest charge based on an annual percentage rate of 18% on the unpaid balance. If more than one vehicle is covered by this contract and the vehicles are shipped on different dates, the terms stated above shall apply to each vehicle.

SINGLE SOURCE MANUFACTURER

To provide the customer with a single point of contact for service, warranty, and parts, proposals shall only be accepted from manufacturers who assemble the complete apparatus in their own facility.

PRINCIPAL DIMENSIONS

The apparatus shall have the following dimensions:

Overall Length: 32' 4-5/8"

Overall Height: 9' 7-1/4"

Wheelbase: 187"

Cab to Axle: 127"

CERTIFIED WELDERS

The manufacturer shall employ individuals that are certified aluminum and stainless steel welders. The welders shall be certified by an outside testing laboratory. The certifications shall be available for viewing through the Human Resources office upon request.

BODY WEIGHT DOCUMENTATION

The manufacturer shall weigh each body prior to mounting on the chassis. The information shall be included in the documentation of the finished vehicle. Each body produced by the manufacturer shall be weighed, not just one body per model.

DRAWING, PROPOSAL

There shall be a proposal drawing submitted to the Fire Department. This drawing shall be a visual interpretation of the apparatus proposed.

DRAWING, APPROVAL

Prior to construction, the contractor shall provide three-(3) approval drawings of the apparatus for the fire department's review. The drawings shall show such items as the chassis being utilized, lights, horns, sirens, pump panels, and all compartment locations and dimensions. The blueprint shall be a visual interpretation of the unit as it is to be constructed. In the event of discrepancies on the print the specifications shall prevail. The buying authority shall sign all drawings.

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One-(1) print shall be retained by the Fire Department, the dealer/sales representative shall retain one-(1) print, and one-(1) print shall be returned to the manufacturer.

TRANSPORTATION

To insure proper break-in of all components while still under warranty, the apparatus shall be delivered over the road under its own power (Rail and/or truck freight shall not be acceptable).

The Fire Department shall be responsible for driving the completed apparatus back to the station.

DELIVERY TIME

The apparatus shall be delivered within One Hundred Eighty (180) calendar days after receipt of the approved signed off pre construction changes.

The manufacturer shall not be held liable for changes arising from its failure to make or delay in making delivery because of fire, flood, strike, riot, chassis shortage, accidents, acts of God, or any circumstances beyond our control.

VEHICLE FAMILIARIZATION & DEMONSTRATION

Familiarization and demonstration of the vehicle shall be by a competent and qualified person as defined in the current standard of NFPA 1901 standard.

Familiarization of the vehicle shall include the following:

How to locate gauges or indicators and check all fluid levels and operational issues of the vehicle

How to tilt the chassis cab or hood assembly for access to the engine, fire pump, or aerial control, or any other device to allow access to fluids or for required maintenance

Interior cab controls, instruments, mirrors, safety devices or alarms, brake operations, transmission control, pump controls, exhaust regeneration (if provided), seat adjustments, warning light engagement, and other operational equipment

If the apparatus is provided with a fire pump system, the following minimum instructions:

- a) Setting of parking brake, proper transmission gear, and fire pump engagement operations
- b) Throttle control
- c) Primer and tank-to-pump operation
- d) Use of pressure control devices
- e) Tank refilling operations
- f) Proper operation of discharge controls
- g) Proper shutdown and draining of system

If the apparatus is provided with a generator, the following minimum instructions

- a) Proper engagement if driven by the chassis
- b) Startup, operation, and shutdown of generator
- c) Monitoring of controls and instruments

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If the apparatus is provided with a foam system, the following minimum instructions:

- a) Startup, operation, and shutdown of foam system
- b) Setting of foam percentages and other operational settings
- c) Proper flushing and draining of the system

If the apparatus is provided with a water tower or aerial device, the following minimum instructions:

- a) Positioning and locating the vehicle for safe operations
- b) Chassis parking brakes and engagement of hydraulic system
- c) Deployment of stabilization devices and use of ground pads
- d) Operation of elevation, extension, and rotation of the aerial device
- e) Operation of waterway, nozzle, and other firefighting devices of aerial device
- f) Operation and use of breathing air system (if provided)
- g) Specific aerial device maintenance and service areas for operators
- h) Shutdown and return to service operations
- i) Operation of tip controls and platform controls
- j) General familiarization and demonstration of aerial device
- k) Review of all safety devices, interlocks, and operational Hazards

MANUFACTURER SERVICE CONTACTS

The manufacturer must have a 24 hour/ 7 day a week, toll-free emergency hot line. The manufacturer must be capable of providing both in-house and on-site service for the apparatus. The service technicians shall be EVT certified in compliance with NFPA 1071 classifications F2 through F6. On-site service and maintenance shall be the primary function, to eliminate the vehicle having to leave the fire department jurisdiction. Copies of the certifications shall be made available through the Human Resources office.

SERVICE VEHICLES

The manufacturer shall have a minimum of 10 full time, company owned, service vehicles. The vehicles shall be available 24 hours a day, seven days a week to respond to customer needs. The Service Vehicles shall be operated by full time EVT Certified Technicians.

REPLACEMENT PARTS

Replacement parts shall be available directly from the manufacturer, as well as the dealer and or service centers.

CUSTOM CHASSIS

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

MODEL YEAR

The chassis shall have a vehicle identification number that reflects a 2022 model year.

COUNTRY OF SERVICE

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

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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. Ferrara Fire Apparatus, Inc. is not responsible for compliance to state, regional, or local regulations. Dealers should identify those regulations and order any necessary optional equipment from Ferrara Fire Apparatus, Inc. 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 Tag, including any additional labels selected in the 2907- subcat
- 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

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- 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 20,000 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

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The rear gross axle weight rating (GAWR) of the chassis shall be 27,000 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.

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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.

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 four (4) 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.

FRONT GRILLE

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

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

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

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

CAB PAINT MANUFACTURER

The cab shall be painted with PPG Industries paint.

CAB PAINT PRIMARY/LOWER COLOR

The primary/lower paint color shall be:

CAB PAINT INTERIOR

The visible interior cab structure surfaces shall be painted with an easy-to-clean gray texture finish.

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CAB ENTRY DOORS

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

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

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

CAB ENTRY DOOR TYPE

All cab entry doors shall be full length in design to fully enclose the lower cab steps. Entry doors shall include Pollak mechanical plunger style switches for electrical component activation.

CAB INSULATION

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

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

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

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

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.

ACCESSORY POWER

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

AUXILIARY ACCESSORY POWER

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An auxiliary six (6) position Blue Sea Systems 5025 blade type fuse panel shall be installed vertically behind the officers seat on the side of the engine tunnel. The fuse panel shall be protected by a 100 amp fuse located at the batteries. The panel shall be capable of carrying up to a maximum 100 amp battery direct load.

EXTERIOR ELECTRICAL TERMINAL COATING

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

ENGINE

The chassis engine shall be a Cummins L9 engine. The L9 engine shall be an in-line six (6) cylinder, four cycle diesel powered engine. The engine shall offer a rating of 380 horse power at 2200 RPM and shall be governed at 2200 RPM. The torque rating shall feature 1150 foot pounds of torque at 1200 RPM with 543 cubic inches (8.9 liters) of displacement.

The L9 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

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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 through an on/off switch and a low/medium/high selector switch.

ELECTRONIC ENGINE OIL LEVEL INDICATOR

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

FLUID FILLS

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

ENGINE DRAIN PLUG

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

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REMOTE THROTTLE CONTROL

A Fire Research Pump Boss 400 governor with dual pressure sensors shall be provided for the electronic engine. It shall include a remote mountable control head.

The Pump Boss 400 shall regulate the pump pressure and monitor all essential engine parameters.

LED readouts shall display RPM, PSI, pump discharge and intake pressure, engine oil pressure, engine temperature, transmission temperature, and battery voltage. An audible alarm shall also be part of the system.

REMOTE THROTTLE HARNESS

An apparatus interface wiring harness for the engine shall be supplied with the chassis. The harness shall include a connector for connection to the chassis harness which shall terminate in the left frame rail behind the cab for reconnection by the apparatus builder. The harness shall contain connectors for a FRC Pump Boss pressure governor and a multiplexed gauge. Separate circuits shall be included for pump controls, "Pump Engaged" and "OK to Pump" indicator lights, open compartment ground, start signal, park brake ground, ignition signal, master power, customer ignition, air horn solenoid switch, high idle switch and high idle indication 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. The harness shall be designed for a side mount pump panel.

An apparatus interface wiring harness shall also be included which shall be wired to the cab harness interface connectors and shall incorporate circuits with relays to control pump functions. This harness shall control the inputs for the transmission lock up circuits, governor/hand throttle controls and dash display which shall incorporate "Pump Engaged" and "OK to Pump" indicator lights. The harness shall contain circuits for the apparatus builder to wire in a pump switch.

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 700 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

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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 clutch fan shall override the thermostatic variable speed and function as full on automatically in pump mode.

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.

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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.

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.

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 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

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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.

ENGINE EXHAUST WRAP

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

TRANSMISSION

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

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

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The transmission gear ratios shall be:

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

TRANSMISSION MODE PROGRAMMING

The transmission, upon start-up, will automatically select a four (4) speed operation. The fifth speed over drive shall be available with the activation of the mode button on the shifting pad.

TRANSMISSION FEATURE PROGRAMMING

The Allison Gen V-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-E transmission shall include prognostic diagnostic capabilities. These capabilities shall include the monitoring of the fluid life, filter change indication, and transmission clutch maintenance.

<u>Function ID</u>	<u>Description</u>	<u>Wire assignment</u>
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

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.

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TRANSMISSION SHIFT SELECTOR

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

TRANSMISSION 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.

PTO LOCATION

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

DRIVELINE

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

MIDSHIP PUMP / GEARBOX

A temporary jackshaft driveline and pump mounting brackets shall be installed by the chassis manufacturer to accommodate the midship split shaft pump as specified by the apparatus manufacturer.

MIDSHIP PUMP / GEARBOX MODEL

The midship pump/gearbox provisions shall be for a Hale QMAX pump.

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MIDSHIP PUMP GEARBOX DROP

The Hale pump gearbox shall have an “L” (long) drop length.

MIDSHIP PUMP RATIO

The ratio for the midship pump shall be 2.28:1 (23).

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 80.00 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 Fleetguard FS20121 fuel filter/water separator as a primary filter. The fuel filter shall have a drain valve.

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

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

FUEL LINES

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

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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 fifty (50) gallons and shall measure 35.00 inches in width X 15.00 inches in height X 24.00 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-cured 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 offset with the left fill port located in the rearward position and the right fill port located in the middle position on the fuel tank.

FUEL TANK DRAIN PLUG

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

FRONT AXLE

The front axle shall be a Meritor Easy Steer Non drive front axle, model number MFS-20. The axle shall include a 3.74 inch drop and a 71.00 inch king pin intersection (KPI). The axle shall include a conventional style hub with a standard knuckle.

FRONT WHEEL BEARING LUBRICATION

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

FRONT SHOCK ABSORBERS

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

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

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

FRONT SUSPENSION

The front suspension shall include a ten (10) leaf spring pack in which the longest leaf measures 54.00 inch long and 4.00 inches wide and shall include a military double wrapped front eye. Both spring eyes shall have a case hardened threaded bushing installed with lubrication counter bore and lubrication land off cross bore with grease fitting. The spring capacity shall be rated at 21,500 pounds.

STEERING COLUMN/ WHEEL

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

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

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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 44-degrees to the right.

POWER STEERING GEAR

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

CHASSIS ALIGNMENT

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

REAR AXLE

The rear axle shall be a Meritor model RS-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.

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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 conventional multi-leaf spring suspension, with 57.50 inch X 3.00 inch springs. One (1) adjustable and one (1) fixed torque rod shall be provided.

The rear suspension capacity shall be rated from 21,000 to 31,500 pounds.

TIRE INTERMITTENT SERVICE RATING

The chassis shall be rated using Intermittent Service ratings provided to the emergency vehicle market by the tire manufacturers as the basis for determining the maximum vehicle load and speed.

FRONT TIRE

The front tires shall be Goodyear 385/65R-22.5 18PR "J" tubeless radial G296 MSA mixed service tread.

The front tire stamped load capacity shall be 18,740 pounds per axle with a nominal speed rating of 68 miles per hour when properly inflated to 120 pounds per square inch.

The Goodyear Intermittent Service Rating maximum load capacity shall be 20,050 pounds per axle with a speed rating of 68 miles per hour when properly inflated to 120 pounds per square inch.

The Goodyear Intermittent Service Rating maximum speed capacity shall be 18,740 pounds per axle with a speed rating of 75 miles per hour when properly inflated to 120 pounds per square inch.

The Goodyear 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 Goodyear 12R-22.5 16LR "H" tubeless radial G182 RSD regional service tread.

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

The Goodyear Intermittent Service Rating maximum load capacity shall match the stamped load rating.

The Goodyear Intermittent Service Rating maximum speed capacity shall match the nominal speed rating.

The Goodyear 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.

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REAR AXLE RATIO

The rear axle ratio shall be 5.13:1.

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 LvL One™ polished aluminum wheels. The hub piloted mounting system shall provide easy installation and shall include two-piece flange nuts. The wheels shall feature one-piece forged strength and a polished finish that lasts.

REAR WHEEL

The rear wheels shall be Alcoa hub piloted, heavy duty, 22.50 inches X 9.00 inches LvL One™ polished aluminum wheels. Each outer wheel shall have a clean buffed aluminum finish on the each wheel interior and exterior. The hub piloted mounting system shall provide easy installation and shall include two-piece flange nuts.

WHEEL TRIM

The front wheels shall include stainless steel lug nut covers and stainless steel baby moons. 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.

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.

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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 lose traction. The system shall scale the electronic engine throttle back to prevent wheel spin while accelerating on ice or wet surfaces.

A momentary rocker 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 and the light on the rocker switch shall blink continuously notifying the driver of activation. Pressing the switch again shall deactivate the mud/snow feature.

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

FRONT BRAKES

The front brakes shall be Meritor 16.50 inch x 6.00 inch S-cam drum type.

REAR BRAKES

The rear brakes shall be Meritor 16.50 inch X 7.00 inch S-cam drum type. The brakes shall feature a cast iron shoe.

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 system. The control shall be yellow in color.

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

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FRONT BRAKE SLACK ADJUSTERS

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

REAR BRAKE SLACK ADJUSTERS

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

AIR DRYER

The brake system shall include a Wabco System Saver 1200 air dryer with an integral 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 MGM type 30 brake chambers.

REAR BRAKE CHAMBERS

The rear axle shall include TSE 30/36 brake chambers which shall convert the energy of compressed air into mechanical force and motion. This shall actuate the brake camshaft, which in turn shall operate the foundational brake mechanism forcing the brake shoes against the brake drum. The TSE Type 36 brake chamber has a 36.00 square inch effective area.

AIR COMPRESSOR

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

AIR GOVERNOR

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

MOISTURE EJECTORS

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Manual pet-cock type drain valves shall be installed on all reservoirs of the air supply system.

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.

REAR AIR TANK MOUNTING

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

WHEELBASE

The chassis wheelbase shall be 187.00 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.

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

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

The frame and cross members shall carry a lifetime warranty to the original purchaser. A copy of the frame warranty shall be made available upon request.

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

FRAME PAINT

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

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

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

The chassis under carriage consisting of frame, axles, driveline running gear, air tanks and other chassis mounted components shall be painted with gloss black paint. Paint shall be applied prior to airline and electrical wiring installation.

FRONT BUMPER

A one piece, two (2) rib wrap-around style, polished stainless steel front bumper shall be provided. The material shall be 10 gauge 304 stainless steel, 12.00 inches high and 99.00 inches wide.

FRONT BUMPER EXTENSION LENGTH

The front bumper shall be extended approximately 24.00 inches ahead of the cab.

FRONT BUMPER APRON

The 24.00 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.

AIR HORN

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

AIR HORN LOCATION

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

AIR HORN RESERVOIR

One (1) air reservoir, with a 1200 cubic inch capacity, shall be installed on the chassis to act as a supply tank for operating air horns. The reservoir shall be isolated with a 90 PSI pressure protection valve on the reservoir supply side to prevent depletion of the air to the air brake system.

ELECTRONIC SIREN SPEAKER

There shall be one (1) Cast Products Inc. model SA4301, 100 watt speaker provided. The speaker shall measure 6.20 inches tall X 7.36 inches wide X 3.06 inches deep. The speaker shall include a flat mounting flange which shall be polished aluminum.

ELECTRONIC SIREN SPEAKER LOCATION

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

FRONT BUMPER TOW HOOKS

Two (2) heavy duty chrome plated tow hooks 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.

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.

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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 CONTROL RECEPTACLE

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

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

CAB 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 and right front door windows shall be controlled using a switch on each respective side inner door panel. The driver's door shall include a switch for each powered door window in the cab.

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

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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 have a standard green automotive tint which shall allow seventy-five percent (75%) light transmittance.

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 door shall include a standard green automotive tint which shall allow seventy-five percent (75%) light transmittance.

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 standard green automotive tint which shall allow seventy-five percent (75%) light transmittance.

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 standard green automotive tint which shall allow seventy-five percent (75%) light transmittance.

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

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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 standard green automotive tint which shall allow seventy-five percent (75%) light transmittance.

CLIMATE CONTROL

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

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

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

The air conditioner lines shall be a mixture of custom bend zinc coated steel fittings and Aeroquip flexible hose with Aeroquip EZ clip fittings.

CLIMATE CONTROL DRAIN

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

CLIMATE CONTROL ACTIVATION

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

A/C CONDENSER LOCATION

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

A/C COMPRESSOR

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

UNDER CAB INSULATION

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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 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.

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 aluminum trim molding. 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 aluminum sheet metal coated with a customer specified interior paint or protective coating.

HEADER TRIM

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

TRIM CENTER DASH

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

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break away technology to reduce rigidity in the event of a frontal crash. The left hand dash shall offer lower vertical surface area to the left and right of the steering column to accommodate control panels.

TRIM RH DASH

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

ENGINE TUNNEL TRIM

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

POWER POINT DASH MOUNT

The cab shall include two (2) 12 volt cigarette lighter type receptacles in the cab dash to provide a power source for 12 volt electrical equipment. The receptacles shall be wired battery direct.

The cab shall also include one (1) Dual universal serial bus (USB) charging receptacle in the cab dash rocker switch cutout to provide a power source for USB chargeable electrical equipment. The USB receptacle shall include one (1) USB port capable of a 5 Volt-2.4 amp output and one (1) USB port capable of a 5 Volt-2.4 amp output. The receptacles shall be wired battery direct and include a backlit legend.

STEP TRIM

Each cab entry door shall include a three step entry. The first step closest to the ground shall be constructed of polished 5052 H32 aluminum Grip Strut® grating with angled outer corners. The grating shall allow water and other debris to flow through rather than becoming trapped within the stepping surface. The lower step shall be mounted to a frame which is integral with the construction of the cab for rigidity and strength. The middle step shall be integral with the cab construction and shall be trimmed in 0.08 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 access door in the left crew step riser constructed of aluminum tread plate with a push and turn latch. The under cab access door shall provide access to the diesel exhaust fluid fill.

INTERIOR DOOR TRIM

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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.

DOOR TRIM CUSTOMER NAMEPLATE

The interior door trim on the front doors shall include a customer nameplate which states the vehicle was custom built for their Department.

CAB DOOR TRIM REFLECTIVE

The interior of each door shall include a white reflective tape installed vertically along the outer rear edge of the door. Also a 12.00 inch reflective octagon stop sign shall be installed on the inner door panel of each 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 textured black powder coat finish to assist personnel entering and exiting the cab.

INTERIOR GRAB HANDLE REAR DOOR

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

ADDITIONAL INTERIOR GRAB HANDLE REAR DOOR

Each rear door shall include one (1) additional grab handle. The handle shall be a 30.00 inch long one-piece cast aluminum grab handle. Each handle shall be mounted diagonally on the interior door trim panels. Each handle shall be textured and feature a black powder coat finish and shall assist personnel entering and exiting the cab.

INTERIOR SOFT TRIM COLOR

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

INTERIOR TRIM 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.

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INTERIOR FLOOR MAT COLOR

The cab interior floor mat shall be gray in color.

CAB PAINT INTERIOR DOOR TRIM

The inner door panel surfaces shall be painted with an easy clean-to-clean gray texture finish.

HEADER TRIM INTERIOR PAINT

The metal surfaces in the header area shall be coated with an easy-to-clean gray texture finish.

TRIM CENTER DASH INTERIOR PAINT

The entire center dash shall be coated with an easy-to-clean matte gray texture finish. Any accessory pods attached to the dash shall also be painted this color.

TRIM LH DASH INTERIOR PAINT

The left hand dash shall be painted with an easy-to-clean matte gray texture finish.

TRIM RIGHT HAND DASH INTERIOR PAINT

The right hand dash shall be painted with an easy-to-clean matte gray texture finish.

REAR WALL INTERIOR PAINT

The rear wall of the cab shall be trimmed with aluminum sheet metal coated with an easy-to-clean gray texture finish.

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 sixteen (16) rocker switch positions in a twelve (12) over four (4) configuration in the right portion of the panel.

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.

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SWITCHES LEFT PANEL

The left dash panel shall include five (5) switches. There shall be three (3) across the top of the panel with two (2) below. Two (2) of the top row of switches shall be rocker type and the left one (1) shall be the windshield wiper/washer control switch. The lower switches shall be a headlight switch left and a rocker type switch right.

A rocker switch with a blank legend installed directly above shall be provided for any position not designated by a specific option. The non-designated 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.

SWITCHES RIGHT PANEL

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

SEAT BELT WARNING

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

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

SEAT MATERIAL

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

SEAT COLOR

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

SEAT BACK LOGO

The seat back shall include the "Ferrara " 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 400 Series Sierra model seat with air suspension. The four-way seat shall feature 3.00 inch vertical travel air suspension and manual fore and aft adjustment with 5.00 inches of travel. The

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suspension control shall be located on the seat below the left front corner of the bottom cushion. The seat shall also feature integral springs to isolate shock.

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

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

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

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

SEAT BACK DRIVER

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

SEAT MOUNTING DRIVER

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

SEAT OFFICER

The officer's seat shall be a H.O. Bostrom Firefighter series. The seat shall feature a tapered and padded seat, and cushion. The seat shall be a non-adjustable type seat.

There shall be a three-point shoulder harness with lap belt and an automatic retractor attached to the cab and available to the seat. The buckle portion of the seat belt shall be mounted on a rigid or semi-rigid stalk such that the buckle remains positioned in an accessible location. The seat belt assembly anchorages shall conform to the Federal Safety Standard (FMVSS) No. 210, "Seat belt assembly anchorages".

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

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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 shall include a seat back incorporating the all belts to seat feature (ABTS). The seat back shall feature a blank cavity for a customer installed Self Contained Breathing Apparatus (SCBA) bracket. 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 be installed in an ergonomic position in relation to the cab dash.

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 REAR FACING OUTER LOCATION

The crew area shall include two (2) rear facing crew seats, which include one (1) located directly behind the left side front seat and one (1) located directly behind the right side front seat.

SEAT CREW REAR FACING OUTER

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

There shall be a three-point shoulder harness with lap belt and an automatic retractor attached to the cab and available to the seat. The buckle portion of the seat belt shall extend from the seat base towards the driver position within easy reach of the occupant. The seat belt assembly anchorages shall conform to the Federal Safety Standard (FMVSS) No. 210, "Seat belt assembly anchorages".

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.

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SEAT BACK REAR FACING OUTER

Each seat in the rear facing outer position shall include a seat back incorporating the all belts to seat feature (ABTS). The seat back shall feature a blank cavity for a customer installed Self Contained Breathing Apparatus (SCBA) bracket. The seat back shall include a removable padded cover which shall be provided over the SCBA cavity.

SEAT MOUNTING REAR FACING OUTER

The rear facing outer seats shall offer special mounting positions which shall be 2.00 inches towards the rear wall offering additional space between the front seats and the outer rear facing seats.

SEAT FORWARD FACING CENTER LOCATION

The crew area shall include two (2) forward facing center crew seats with both located at the center of the rear wall.

SEAT CREW FORWARD FACING CENTER

The crew area shall include a seat in the forward facing center position which shall be a H.O. Bostrom 400 Series Firefighter model seat. The seat shall feature a tapered and padded seat, and cushion. The seat shall be mounted in a fixed position.

There shall be a three-point shoulder harness with lap belt and an automatic retractor attached to the cab and available to the seat. The buckle portion of the seat belt shall extend from the seat base towards the driver position within easy reach of the occupant. The seat belt assembly anchorages shall conform to the Federal Motor Vehicle Safety Standard (FMVSS) No. 210, "Seat belt assembly anchorages".

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 CENTER

Each seat in the forward facing center position shall include a seat back incorporating the all belts to seat feature (ABTS). The seat back shall feature a blank cavity for a customer installed Self Contained Breathing Apparatus (SCBA) bracket. The seat back shall include a removable padded cover which shall be provided over the SCBA cavity.

SEAT FRAME FORWARD FACING

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The forward facing center seating positions shall include an enclosed seat frame located and installed on the rear wall. The seat frame shall measure 42.38 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 seat box shall be painted with the same color as the remaining interior.

SEAT FRAME FORWARD FACING STORAGE ACCESS

There shall be two (2) access points to the seat frame storage area, one (1) on each side of the seat frame. Each access point shall be covered by a hinged door which measures 15.00 inches in width X 10.63 inches in height.

SEAT MOUNTING FORWARD FACING CENTER

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

CAB FRONT UNDERSEAT STORAGE ACCESS

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

SEAT COMPARTMENT DOOR FINISH

All underseat storage compartment access doors shall have an easy-to-clean gray texture finish.

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.

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

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Each cab entry door shall include a manually operated door lock. Each door lock may be actuated from the inside of the cab by means of a red knob located on the paddle handle of the respective door or by using a TriMark key from the exterior. The door locks are designed to prevent accidental lock out.

GRAB HANDLES

The cab shall include one (1) 24.00 inch three-piece knurled stainless steel, anti-slip exterior assist handle, installed behind each cab entry door. The grab handle shall be made of stainless steel with a knurled finish to enable non-slip assistance with a gloved hand. Each end of the grab handle will include one (1) chrome plated stanchion that shall allow the grab handle to be fastened to the cab exterior.

REARVIEW MIRRORS

Velvac West Coast style mirrors model 713760 shall be provided and installed on the driver's and officer's doors. The mirrors shall be mounted to the cab doors with tubular stainless steel swing away arms and the mirror heads shall be center mounted on the arms to provide rigid mounting to reduce vibration.

The mirror heads shall measure 8.00 inches wide X 16.00 inches high. The flat mirrors shall be heated and remote controlled with horizontal actuation. The mirror control switches shall be located within easy reach of the driver. Manually adjustable convex mirrors which are 6.50 inches wide x 6.00 inches high shall be provided below the flat mirrors.

REARVIEW MIRROR HEAT SWITCH

The heat for the rearview mirrors shall be controlled through a rocker switch in the mirror control panel on the left side dash.

TRIM REAR WALL EXTERIOR

The exterior rear wall of the cab shall include an overlay of 3003-H22 aluminum tread plate which shall be 0.07 inches thick. This overlay shall cover the entire rear wall of the cab.

TRIM ROOF

The raised portion of the cab roof shall include 3003-H22 bright aluminum embossed tread plate which is 0.08 inches thick. This plate shall be intended for reinforcement value and shall start at the rear edge of the roof extending to the radius at the forward end of the raised roof, and shall be the full width of the flat portion of the roof left to right.

The tread plate shall be held in place using stainless steel fasteners and shall be sealed with silver silicone caulk around the perimeter of the tread plate and at each mounting screw.

CAB FENDER

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

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MUD FLAPS FRONT

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

IGNITION

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

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

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

BATTERY

The single start electrical system shall include six (6) Harris BCI 31 925 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 be coated the same as the frame and 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.

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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.

BATTERY CONDITIONER

A Kussmaul Auto Charge 40 LPC battery conditioner shall be supplied. The battery conditioner shall provide a 40 amp output for the chassis batteries and a 15 amp output circuit for accessory loads. The battery conditioner shall be mounted in the cab in the LH rear facing outer seating position.

BATTERY CONDITIONER DISPLAY

A Kussmaul battery conditioner display shall be supplied. The battery conditioner display shall be mounted in the cab, viewable through the cab mid side window behind the left front door.

ELECTRICAL INLET LOCATION

An electrical inlet shall be installed on the left hand side of cab over the wheel well in the forward position rear of the grab handle and above the door entry key pad if applicable.

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 mirror finish stainless steel plate shall be installed around the receptacle to protect the cab finish.

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

ELECTRICAL INLET CONNECTION

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The electrical inlet shall be connected to the battery conditioner.

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 above 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 turn signals which shall be installed in an outboard position within the front fascia chrome bezel.

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) Whelen Series OS LED cab marker lamps designating identification, center and clearance provided. These lights shall be installed on the face of the cab within full view of other vehicles from ground level.

HEADLIGHT AND MARKER LIGHT ACTIVATION

The headlights and marker lights shall be controlled through a rocker switch within easy reach of the driver. 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 and daytime running lights shall turn off when the park brake is engaged. There shall be a virtual dimmer control on the Vista display to adjust the brightness of the dash lights. The headlamps shall be equipped with the "Daytime Running" light feature, which shall illuminate the headlights to 80% brilliance when the ignition switch is in the "On" position and the parking brake is released.

GROUND LIGHTS

The ground lighting shall be activated by the opening of the door on the respective cab side and a rocker switch in the dash panel.

GROUND LIGHTS

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Each door shall include a Whelen 20C0CDCR LED 4.00 inch 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.

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.

LIGHTBAR PROVISION

There shall be one (1) light bar installed on the cab roof. The light bar shall be provided and installed by Ferrara Fire Apparatus, Inc.. 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 model F4N72 light bar. The light bar shall be 72.00 inches in length and feature eighteen (18) customizable pods.

See the light bar layout for specific details.

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.

INTERIOR OVERHEAD LIGHTS

The cab shall include a Whelen brand 60CREGCS 6.00 inch diameter red/clear type round shaped LED dome lamp located over each door. The clear portion of each lamp shall be activated by opening the respective door and both the red and clear portion can be activated by individual switches on each lamp.

An additional Whelen brand 60CREGCS 6.00 inch diameter red/clear type round shaped LED dome lamp shall be provided over the engine tunnel which can be activated by individual switches on the lamp.

ENGINE COMPARTMENT LIGHT

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There shall be two (2) LED NFPA compliant lights mounted under the engine tunnel for area work lighting on the engine. The lights shall include a polycarbonate lens, a housing which is vibration welded and a bulb which shall be shock mounted for extended life. The lights shall activate automatically when the cab is tilted.

DO NOT MOVE APPARATUS LIGHT

The front headliner of the cab shall include a flashing red Whelen Ion 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.

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 for solid colors and multiple flash patterns for split colors. The lights shall be mounted to the front fascia of the cab within a chrome bezel

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.

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.

INTERSECTION WARNING LIGHTS COLOR

The intersection lights shall be red with a clear lens.

INTERSECTION WARNING LIGHTS LOCATION

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

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.

SIREN CONTROL HEAD

A Whelen 295HFS2 electronic siren control head with remote amplifier shall be provided and flush mounted in the switch panel with a location specific to the customer's needs. The siren shall feature 200-watt output, hands free mode and shall be in "standby" mode awaiting instruction. The siren shall offer radio broadcast, public address, wail, yelp, or piercer tones 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.

AUDIBLE WARNING LH FOOT SWITCH

A foot switch wired to actuate the air horn(s) shall be mounted in the front section of the cab for use by the driver.

AIR HORN FOOT SWITCH LH

The air horn foot switch shall be a Linemaster model 491-S.

AIR HORN FOOT SWITCH LH LOCATION

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

AIR HORN FOOT SWITCH LH POSITION

The air horn foot switch shall be positioned inboard 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.

AUDIBLE WARNING RH FOOT SWITCH

A foot switch wired to actuate the air horn(s) shall be mounted in the front section of the cab for use by the officer.

AIR HORN FOOT SWITCH RH

The air horn foot switch shall be a Linemaster model 491-S.

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AIR HORN FOOT SWITCH RH LOCATION

The air horn foot switch shall be temporarily tied up with a coiled wire drop at the firewall inboard for installation by the customer on the right hand side accessible to the officer.

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 1/8th 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.

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

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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
Seatbelt Indicator
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 red LED backlighting.

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 Ferrara Fire Apparatus, Inc.. 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 provided by Ferrara.

COMMUNICATION ANTENNA CABLE ROUTING

The antenna cable shall be routed from the antenna base mounted on the roof to the area behind and underneath the right hand front seat.

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 Ferrara Fire Apparatus, Inc.. The antenna base shall be provided by Ferrara.

AUXILIARY COMMUNICATION ANTENNA CABLE ROUTING

The auxiliary antenna cable shall be routed from the antenna base mounted on the roof to the area behind and underneath the right hand front seat.

{Bidder Comply}

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FIRE PUMP MOUNTING

Extra heavy-duty mounting brackets shall be bolted to the chassis frame rails for the installation of the fire pump. The mounting brackets shall be positioned aligning the pump insuring the angular velocity of the drive line joints are the same at each end allowing for full capacity performance with minimal vibration.

SAFETY SIGNS, GENERAL REQUIREMENTS

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

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

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

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

SAFETY SIGNS, BATTERY EXPLOSION

A safety sign(s) FAMA01, shall be provided near the battery location that warns of potential injury or death that could be caused by the batteries. The label shall also state precautions that should be taken while working on or around the batteries.

SAFETY SIGNS, ROTATING SHAFTS

Safety signs FAMA02, shall be provided on each side of the frame rail and in any other location(s) where rotating shaft hazards are apparent. The label shall warn of potential injury or death that could be caused by the movement of the shaft(s) as well as precautions that should be taken while working on or around them.

SAFETY SIGNS, HOT SURFACES

Safety sign(s) FAMA03, shall be provided near any hot surface that warns of potential injury or death that could be caused by contact with the surface. The label shall also state precautions that should be taken while working on or around the surface.

SAFETY SIGNS, HOT EXHAUST

A safety sign FAMA04, shall be provided near any hot exhaust surface that warns of potential injury or death that could be caused by contact with the surface. The label shall also state precautions that should be taken while working on or around the surface.

SAFETY SIGN, SPINNING FAN

A safety sign FAMA05, shall be provided on both sides of the engine fan. The label shall warn of potential injury or death that could be caused by the movement of the fan as well as precautions that should be taken while working on or around them.

SAFETY SIGNS, SEATED & BELTED

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

SAFETY SIGN, AIR CONDITIONING REFRIGERANT

If the apparatus is equipped with any type of air conditioning system, a safety sign FAMA09, shall be provided that is located in an area that would be visible to service personnel. The label shall state that the system contains R134A, the necessary precautions that should be taken and the dangers of working on or around the system.

SAFETY SIGN, CAB EQUIPMENT MOUNTING

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

SAFETY SIGN, FIRE SERVICE TIRE RATING

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

SAFETY SIGN, ELECTRONIC STABILITY CONTROL

If the apparatus is equipped with an electronic stability control system, a safety sign FAMA13, be provided inside of the cab in view of the driver warning of the dangers of improper operation of the apparatus and the importance of safe driving. The label shall also warn of potential injury or death that could be caused by improper operation of the apparatus.

SAFETY SIGN, CAB SEATING

A safety sign FAMA14 shall be located in the cab visible to the operator.

The sign shall read:

This vehicle has a seating capacity of 6 personnel.

Carrying additional personnel may result in death of serious injury.

SAFETY SIGNS, HELMET WORN IN CAB

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

SAFETY SIGN, VEHICLE BACKING

A safety sign FAMA17, shall be provided inside of the cab in view of the driver advising of proper procedures to following when the apparatus is in reverse motion. The label shall also warn of potential injury or death that be caused by failing to follow proper procedures.

SAFETY SIGNS, INTAKE/DISCHARGE CAP PRESSURES

If the apparatus is equipped with a pump system, safety signs FAMA18, shall be provided in all areas that intakes and discharges are capped. The label shall give instruction on how to properly remove the cap. The label shall also warn of potential dangers, injury or death that be caused by failing to follow proper cap removal procedures.

SAFETY SIGNS, HOSE RESTRAINT REQUIRED

A safety sign FAMA22, which warns of the need to secure hose, shall be visible to personnel at each hose storage area.

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SAFETY SIGNS, CLIMBING METHOD INSTRUCTION

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

SAFETY SIGNS, RIDING ON EXTERIOR

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

SAFETY SIGN, PUMP TRAINING

A safety sign FAMA25, which warns of the need for training prior to operating the apparatus, shall be located on the pump operator's panel.

SAFETY SIGNS, NO-STEP

Safety signs FAMA26, shall be provided in any horizontal location that a firefighter may feel tempted to use as a step but is not designed, constructed or intended to be a stepping, standing or walking surface. The label shall state that the surface is not intended for this purpose and indicate potential injury or death in doing so.

SAFETY SIGN, SIREN NOISE

A safety sign FAMA42, shall be provided inside the driver's door warning of potential injury that could be received from the noise of the siren. The label shall also state safety precautions that should be taken when the siren is in use.

SAFETY SIGN, APPARATUS MOVEMENT

A permanently affixed movement warning plate shall be installed near the door ajar light that reads:

"DO NOT MOVE APPARATUS WHEN LIGHT IS ON".

PLATE, FLUID CAPACITY

A permanently affixed fluid date plate shall be installed in the driving compartment to indicate the type and quantities of the following fluid used in the vehicle.

Engine Oil
Engine Coolant
Chassis Transmission Fluid
Pump Transmission Lubrication Fluid (if applicable)
Pump Primer Fluid (if applicable)
Drive Axle Lubrication Fluid
Air Conditioning Refrigerant
Air Conditioning Lubrication Oil
Power Steering Fluid
Cab Tilt Mechanism Fluid
Transfer Case Fluid
Equipment Rack Fluid
Air Compressor System Lubricant
Generator System Lubricant
Front Tire Pressure - Cold

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Rear Tire Pressure - Cold

The following information shall also be supplied on the Fluid Data Plate:

Chassis Manufacturer

Production Number

Paint Number

Year Built

Date Shipped

Vehicle Identification Number

PLATE, OVERALL HEIGHT/LENGTH/WEIGHT

An Overall Height/Length/Weight information plate shall be installed that can be clearly identified and visible to the driver while in the seated position showing the apparatus completed overall height, length, (in feet and inches) and gross vehicle weight (in tons) current to the apparatus manufactured date.

If changes to the vehicle occur while in service, the department must revise the overall height-length-weight plate.

PUMP ENCLOSURE, SIDE CONTROL

The pump enclosure superstructure shall be constructed of aluminum tubing, channel, angle, and break-formed components. The framework shall be formed by beveled aluminum alloy extrusions and electrically seam welded both internally and externally at each joint using 5356 aluminum alloy welding wire. The main, frame work shall be constructed of 3.00 x 3.50, 6063-T6 aluminum extrusions. The break-formed components shall be constructed from 3/16" (1.875) aluminum.

The cross members support the substructure and the exterior panels independently from the cab and body. The cross members shall be isolated from the frame rails using torsion mounts. The pump enclosure shall be supported at the top of the frame rails, in a minimum of four-(4) places. The module shall be secured with angle brackets bolted to both the pump enclosure support cross rails and the side of the chassis frame rails. This design is required to eliminate shifting and stress on the pump enclosure, pump panels, and running boards.

The front of the pump module shall be covered with aluminum tread plate to keep road debris from the front of the pump.

The pump enclosure provides an area above the pump for the installation of crosslays or dunnage area.

Any pump enclosure constructed using any material other than aluminum or utilizing any other mounting method is not acceptable.

SEPARATE PUMP MODULE

The pump module will be a self-supported structure mounted independently from the body and chassis cab. The pump module will be constructed entirely of extrusions and aluminum plate and shall be bolted to the chassis frame rails. The framework will be formed from beveled aluminum alloy extrusions and electrically seam welded both internally and externally at each joint using 5356 aluminum alloy welding wire. The main framework shall be 3.00 x 3.50, 6063-T6 aluminum extrusion. Aluminum angle will be welded such that a recessed pump panel can be mounted inside the extrusion perimeter. The module shall be mounted to the chassis frame rails utilizing a "U" bolt spring mounting system.

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The pump module design must allow normal frame deflection without imposing stress on the pump module structure or side running boards.

DUNNAGE AREA W/TREADPLATE WALLS

The open area above the pump enclosure shall be provided for additional equipment storage shall be trimmed with 1/8" (.125) aluminum tread plate on all vertical interior walls and shall have slotted aluminum floors.

PUMP PANELS

The operator's controls and gauges shall be mounted on pump panels constructed of 1/8" (.125) black anodized, non-glare aluminum. No vinyl coverings shall be acceptable as these surfaces are subjected to rough service and vinyl is susceptible to tearing.

The operator's master gauge panel shall be vertically hinged with push style latch for access to gauges and auxiliary controls.

The operator's control panel shall be located below the master gauge panel and constructed of 1/8" (.125) black anodized, non-glare aluminum.

All gauges and controls shall be properly identified with color-coded metal tags. The tags shall be affixed with 3M brand industrial adhesive. The gauges shall be functionally grouped above each control.

The right side upper panel shall be vertically hinged with double doors and push style latches for pump compartment access. The doors shall be constructed of .125" aluminum tread plate.

The right side lower panel shall be removable for serviceability. The panel shall be constructed of 1/8" (.125) black anodized, non-glare aluminum.

All instruments and controls shall be provided and installed as a group at the pump panel. The central midpoint or centerline of any valve control shall be no more than 72" vertically above the ground or platform that is designed to serve as the operator's standing position. The instruments shall be placed to keep the pump operator as far as practical from all discharge and intake connections and in a location where they are readily visible and operationally functional while the operator remains stationary.

A safety sign FAMA25, which warns of the need for training prior to operating the apparatus, shall be located on the pump operator's panel.

PUMP PANEL LIGHT, LEFT SIDE

One-(1) individual OnScene Access LED pump panel light with on/off switch shall be mounted under the light shield left side. For optimum visibility during nighttime operations, the light shall be mounted as high as possible.

PUMP PANEL LIGHT, RIGHT SIDE

One-(1) individual OnScene Access LED pump panel light with on/off switch shall be mounted under the light shield right side. For optimum visibility during nighttime operations, the light shall be mounted as high as possible.

LIGHT, PUMP COMPARTMENT

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One-(1) LED compartment light shall be installed in the pump compartment for inspection or routine maintenance. The light shall be wired to the pump panel light switch.

RUNNING BOARDS, LEFT & RIGHT SIDE

Running board shall be provided on the left and right side of pump module constructed of anodized slotted aluminum extrusion. The extrusions shall be punched and raised to provide superior traction during inclement weather operations. The running boards shall be bolted to the pump module substructure and shall be spaced out 1/4" from the module for additional run off.

The running board stepping surfaces shall comply with the latest version of NFPA 1901.

MASTER GAUGES, 4-1/2"

Two compound 4-1/2" master gauges shall be provided and installed on the pump operator's panel. The intake and discharge gauges are liquid filled with a solution to assure visual readings and reduce inner lens condensation. The body of the gauges shall be constructed of Zytel nylon with chrome-plated bezels. The face of the gauges shall be Spun Metal with black background and white markings accurate within 1%.

The pressure gauges shall maintain performance of all features and be free from defects in material and workmanship which includes fluid fill leakage and discoloration for seven years.

PRESSURE GOVERNOR and ENGINE MONITORING DISPLAY

Fire Research PumpBoss series PBA400-A00 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 6 3/4" high by 4 5/8". The control knob shall be 2" 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 3/4" from the front of the control module. Inputs for monitored engine 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. Inputs from the pump discharge and intake pressure sensors shall be electrical.

The following continuous displays shall be provided:

- Engine RPM; shown with four daylight bright LED digits more than 1/2" high
- Check engine and stop engine warning LEDs
- Engine 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
- Pressure and RPM operating mode LEDs
- Pressure / RPM setting; shown on a dot matrix message display
- Throttle ready LED.

A 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 night time operation.

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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 located on the front of the control module. There shall be a USB port located at the rear of the control module to upload future firmware enhancements.

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.

The pressure governor and monitoring pressure display shall be programmed at installation for a specific engine.

PRESSURE GAUGES, 2-1/2"

The discharges shall be provided with 2-1/2" pressure gauges. The discharge gauges shall be liquid filled with a solution to assure visual readings and reduce inner lens condensation. The body of the gauges shall be constructed of Zytel nylon with chrome-plated bezels. The face of the gauges shall be Spun Metal with black background and white markings reading from zero to 400 PSI.

The gauges shall be installed at each discharge control on the pump operator's panel. On side mount pump applications with push pull handles each gauge shall incorporate a Thuemling Instrument Group 1-piece module assembly consisting of the gauge, push-pull and trim bezel.

The pressure gauges shall maintain performance of all features and be free from defects in material and workmanship which includes fluid fill leakage and discoloration for seven years.

GAUGE BEZELS, COLOR CODED

The pump panel master and pressure gauge bezels shall be color coded.

PUMP PANEL TAGS

All discharges, gauges, and controls will be properly identified by color-coded metal tags. The metal tags will be affixed with 3M industrial adhesive.

PUMP SYSTEM, HALE QMAX SINGLE STAGE

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PUMP ASSEMBLY

The entire pump shall be cast, manufactured, and tested at the pump manufacturer's factory.

The pump shall be driven by a drive line from the truck transmission. The engine shall provide sufficient horsepower and RPM to enable pump to meet and exceed its rated performance.

The entire pump, both suction and discharge passages, shall be hydrostatically tested to a pressure of 600 PSI. The pump shall be fully tested at the pump manufacturer's factory to the performance specs as outlined by the latest NFPA Pamphlet No. 1901. The pump shall be free from objectionable pulsation and vibration.

The pump body and related parts shall be of fine grain, cast iron alloy, with a minimum tensile strength of 30,000 PSI. All moving parts in contact with water shall be of high quality bronze or stainless steel. Pump utilizing castings made of lower tensile strength cast iron not acceptable.

Pump body shall be horizontally split, on a single plane, in two sections, for easy removal of entire impeller assembly including wear rings and bearings from beneath the pump without disturbing piping or the mounting of the pump in chassis.

The pump shall have one double suction impeller. The pump body shall have two opposed discharge volute cutwaters to eliminate radial unbalance.

Pump shaft to be rigidly supported by three bearings for minimum deflection. One high lead bronze sleeve bearing shall be located immediately adjacent to the impeller (on side opposite the drive unit). The sleeve bearing is to be lubricated by a force-fed, automatic oil lubricated design, pressure balanced to exclude foreign material. The remaining bearings shall be heavy-duty, deep groove ball bearings in the gearbox and they shall be splash lubricated.

The pump impeller shall be hard, fine grain bronze of the mixed flow design; accurately machined, hand-ground and individually balanced. The vanes of the impeller intake eyes shall be hand ground and polished to a sharp edge, and be of sufficient size and design to provide ample reserve capacity utilizing minimum horsepower.

The impeller clearance rings shall be bronze, easily renewable without replacing impeller or pump volute body, and of wraparound double labyrinth design for maximum efficiency.

The pump shaft shall be heat-treated, electric furnace, corrosion resistant, stainless steel, to be super-finished under packing with galvanic corrosion (zinc separators in packing) protection for longer shaft life. Pump shaft must be sealed with double lip oil seal to keep road dirt and water out of drive unit.

DRIVE UNIT

The drive unit shall be cast and completely manufactured and tested at the pump manufacturer's factory.

Pump drive unit shall be of sufficient size to withstand up to 16,000 ft. Lbs. Torque of the engine in both road and pump operating conditions. The drive unit is designed with ample capacity for lubrication reserve to maintain proper operating temperature.

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The gearbox drive shafts shall be of heat-treated chrome nickel steel and at least 2-3/4" in diameter, on both the input and output drive shafts. They shall withstand the full torque of the engine in both road and pump operating conditions.

All gears drive and pump, shall be of highest quality electric furnace, chrome nickel steel. Bores shall be ground to size and teeth integrated, crown-shaved and hardened, to give an extremely accurate gear for long life, smooth, quiet running, and higher load carrying capability. An accurately cut spur design shall be provided to eliminate all possible end thrusts.

The pump ratio shall be selected by the apparatus manufacturer to give maximum performance with the engine and transmission selected.

If drive unit is equipped with a power shift, the shifting mechanism shall be a heat-treated, hard-anodized aluminum power cylinder, with stainless steel shaft. An in-cab control for rapid shift shall be provided that locks in road or pump.

Three warning lights with plates shall be provided to alert the operator when the drive unit has fully shifted from road to pump position. Two lights shall be located on the cabs instrument panel and the other on the pump panel adjacent to the throttle.

A 3" clapper check valve shall be installed between the suction side of the pump and the tank-to-pump valve. This 3" clapper valve shall remove the possibility of a water surge expanding the booster tank.

Pump system shall have an integral discharge manifold system that allows a direct flow of water to all discharge valves.

PACKING GLANDS

The pump shaft shall have only one packing gland located on the inlet side of the pump. It shall be of split design for ease of repacking. The packing gland must be a full circle threaded design to exert uniform pressure on packing and to prevent "cocking" and uneven packing load when it is tightened. It shall be easily adjusted by hand with rod or screwdriver, with no special tools or wrenches required. The packing rings shall be of a unique, permanently lubricated, long life graphite composition and have sacrificial zinc foil separators to protect the pump shaft from galvanic corrosion.

PUMP SHIFT

An air operated pump shift shall be installed in the chassis cab to engage the fire pump. Provisions shall be made for placing the pump drive system in operation using controls and switches that are clearly identified and within convenient reach of the operator while in the cab.

A green indicator light shall be installed on the cab dash and labeled "Pump Engaged".

Where an automatic chassis transmission is provided, a green indicator light in the driving compartment and a green indicator light located at the pump operator's position shall be provided and shall be energized when both the pump shift has been completed and the chassis transmission is engaged in pump gear.

The light in the driving compartment shall be labeled "OK TO PUMP". The light on the pump operator shall be positioned adjacent to and preferably above the throttle control and shall be labeled "Warning: DO NOT OPEN THROTTLE UNLESS LIGHT IS ON". The green light on the pump operator's panel shall be energized when the pump is engaged, the transmission is in drive, and the parking brake is set.

PRIMING SYSTEM, PUMP

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A Hale model ESP 12 volt positive displacement vane primer shall be installed. The primer shall be electrically driven and conform to the standards outlined in the current NFPA Pamphlet. The system is an oil-less system and environmentally safe. It contains an electric rotary vane type positive displacement primer that operates off 12V or 24V power. The primer motor is totally enclosed to prevent dust, dirt and water from penetrating. The unit is constructed of heat-treated anodized aluminum, specially coated for wear and corrosion resistance. The control shall be pump panel mounted to operate the priming valve and start the priming motor.

VALVE, MASTER DRAIN

There shall be a master drain valve recessed mounted below the pump module under the side running board, connecting all drain lines, with the capacity to discharge water simultaneously from all locations to below the chassis frame rails.

VALVE, INDIVIDUAL DRAIN

All lines shall drain through the master drain valve or shall be equipped with individual drain valves, easily accessible and labeled.

One-(1) individual quarter turn drain valve shall be furnished for each 1-1/2" or larger discharge port and each 2-1/2" gated auxiliary suction.

The drain/bleeder valves shall be located at the bottom of the side pump module panels.

All drains and bleeders shall discharge below the running boards.

PUMP TEST POINTS

Two-(2) test plugs shall be pump panel mounted for testing of vacuum and pressures. In addition, An engine speed counter shall be located on the pump panel to provide a means to certify the tachometer.

PUMP CERTIFICATION, 1500 GPM

The pump when dry, shall be capable of taking suction and discharging water in accordance with current NFPA 1901. The pump shall be tested at the manufacturer's facility by an independent, third party testing service. The conditions of the pump test shall be as outlined in current NFPA 1901. The tests shall include, at minimum, the pump test, the pumping engine overload test, the pressure control system test, the priming device tests, the vacuum test, and the water tank to pump flow test as outlined in current NFPA 1901.

A Piping hydrostatic test shall be performed as outlined in current NFPA 1901.

The pump shall meet and perform the following test to receive certification:

100% of rated capacities at 150 PSI net pump pressure

100% of rated capacities at 165 PSI net pump pressure

70% of rated capacities at 200 PSI net pump pressure

50% of rated capacities at 250 PSI net pump pressure

PUMP TEST CERTIFICATION PLATE

A permanently affixed plate shall be installed at the pump operator's panel. It shall provide the rated discharge and pressures together with the speed of the engine as determined by the certification test for each unit. It shall also provide

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the position of the parallel/series pump used and the no load governed speed of the engine as stated by the engine manufacturer on a certified brake horsepower curve.

A label shall be provided on the pump operator's panel that states the following:

"Warning: Death or serious injury might occur if proper operating procedures are not followed". The pump operator as well as individuals connecting supply or discharge hoses to the apparatus must be familiar with water hydraulics hazards and component limitations.

STEAMER INLETS, 6"

A 6" NST steamer inlet with removable screen and long handle cap shall be provided on the left and right side pump panels.

INTAKE RELIEF VALVE

There shall be an Akron model 53 suction side relief valve provided in the pump system. The relief valve is adjustable from 50-250 psi and set at the factory at 125 psi.

TANK TO PUMP

The booster tank shall be connected to the intake side of the pump with a check valve. The 3" tank to pump line shall run from a bottom sump into the 3" valve. To prevent damage due to chassis flexing or vibration, a short 3" flexible rubber hose coupling shall be used to connect the tank to the intake valve.

The tank to pump valve shall be a quarter turn fixed pivot design. The valve shall be controlled by a chrome push/pull locking "T" handle installed at the pump operator's panel.

TANK FILL

A 2" tank fill line shall be provided, using a quarter turn full flow ball valve and high-pressure flexible hose. The valve shall be push pull controlled from the pump operator's panel.

ENGINE COOLER

The engine cooler shall be installed in-line from the discharge side of the pump, and installed in the engine cooling system. There shall be a 1/2", quarter turn valve installed thru the pump panel and shall be clearly labeled.

PUMP COOLER

The pump shall have a 3/8" line installed from the pump discharge, to the water tank to cool the pump during long periods of pumping when water is not being discharged. The pump cooler shall be controlled from the pump operators panel by a 3/8" valve consisting of a cast bronze body with 1/4 turn chrome plated bronze ball, reinforced Teflon seals, and blow-out-proof stem rated to 600 PSI.

The valve shall be installed thru the pump panel and clearly labeled.

PLUMBING SYSTEM

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All inlet and outlet lines shall be plumbed with either, stainless steel pipe, flexible polypropylene tubing or synthetic rubber hose reinforced with hi-tensile polyester braid. All hoses shall be equipped with stainless steel couplings. All stainless steel hard plumbing shall be a minimum of a schedule 10 wall thickness. Where vibration or chassis flexing may damage or loosen piping or where a coupling is required for servicing, the piping shall be equipped with Victaulic or rubber couplings. Plumbing manifold bodies shall be ductile cast iron or stainless steel. All piping lines are to be drained through a master drain valve or shall be equipped with individual drain valves. All drain lines shall be extended with a hose to drain below the chassis frame. All water carrying gauge lines shall be of flexible polypropylene tubing. All piping, hose and fittings shall have a minimum of a 500 PSI hydrodynamic pressure rating.

PLUMBING FINISH

The plumbing shall be natural finish and shall not be painted.

APPARATUS VALVES, AKRON

The apparatus valves (unless otherwise specified) shall be Akron heavy-duty swing out 8000 series brass body with flow optimizing stainless steel ball, and dual polymer seats. The valve shall be capable of dual directional flow while incorporating a self-locking ball feature using an automatic friction lock design and specially designed flow optimizing stainless steel ball. The valve shall not require the lubrication of seats or any other internal waterway parts, and be capable of swinging out of the waterway for maintenance by the removal of six bolts. The valve shall have a 10-year warranty covered by Akron Brass.

SUCTION(S), 2-1/2" LEFT PANEL

One (1) 2-1/2" swing operated ball valve(s) shall be installed on the left side pump panel plumbed to the suction side of the pump with 2-1/2" piping. The suction(s) shall be equipped with a 2-1/2" FNST chrome inlet swivel, brass inlet strainer, chrome plug with chain and 3/4" drain valve. The control handle shall be located at the valve.

A warning plate permanently affixed in close proximity of the suction inlet shall be installed stating:

"WARNING - SERIOUS INJURY OR DEATH COULD OCCUR IF INLET IS SUPPLIED BY A PRESSURIZED SOURCE WHEN THE VALVE IS CLOSED".

DISCHARGE ELBOWS

All 2-1/2" side discharge outlets shall terminate with chrome-plated 30-Degree elbows with 2-1/2" MNST threads and chrome vented caps/chains.

The caps shall automatically release pressure in the discharge outlet before the threads are completely disengaged unless the outlet and the cap are equipped with drains or bleeder valves.

CROSSLAYS, 1-3/4" DOUBLE LAY

Two-(2) pre-connected crosslay compartments shall be provided above the pump module. Each crosslay bed shall accommodate 200' of 1-3/4" double jacket hose. Stainless steel nylon guide rollers shall be installed at each end with stainless steel scuff plates around the perimeter to protect the painted surface.

One-(1) 2" ball valve with 90-degree mechanical swivel shall be installed for each crosslay. The valve shall be plumbed to the crosslay with 2" high-pressure flexible hose and stainless steel couplings. The high pressure hose shall be tested to 1200 PSI. The crosslays shall be push pull controlled at the pump operator's panel.

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The crosslays shall be equipped with a 3/4 quarter-turn drain valve.

A safety sign FAMA22, which warns of the need to secure hose, shall be visible to personnel at the hose storage area.

CROSSLAY COVER, HYPALON

There shall be a Hypalon crosslay cover provided with the apparatus secured by twist-lock connectors along the top protecting the crosslay hose. The cover prevents hose from inadvertently deploying during normal operations meeting the current NFPA requirements.

A safety sign FAMA22, which warns of the need to secure hose, shall be visible to personnel at the hose storage area. The Hypalon end flaps shall be secured at the bottom using pushpins. The cover prevents hose from inadvertently deploying during normal operations meeting the current NFPA requirements.

The cover and/or end flaps shall be red in color.

DISCHARGES, 2-1/2" LEFT SIDE

There shall be two-(2) discharge outlets with a 2-1/2" valve on the left side pump panel. The outlets shall be push pull controlled from the operator's panel and terminate with 2-1/2" MNST threads.

DISCHARGES, 2-1/2" RIGHT SIDE

There shall be two-(2) discharge outlets with a 2-1/2" valve on the right side pump panel. The outlets shall be push pull controlled from the operator's panel and terminate with 2-1/2" MNST threads.

DECK GUN PLUMBING, 3"

A 3" deck pipe shall be installed above the pump in such a manner that a monitor can be mounted and used effectively. The piping shall be installed securely so no movement develops when the line is charged. The piping shall terminate with 3" NPT threads and a 4-bolt flange for mounting a monitor. The 3" valve shall be push pull controlled from the operator's panel.

DISCHARGE, 2-1/2" LEFT REAR

There shall be one-(1) discharge outlet with a 2-1/2" valve plumbed to the left rear of the apparatus. The outlet shall be push pull controlled from the operator's panel and terminate with 2-1/2" MNST adapter.

30 DEGREE ELBOW(S) - 2-1/2" FNST X 2-1/2" MNST

There shall be one (1) Trident model 01.010.0 2-1/2" FNST x 2-1/2" MNST chrome plated elbow(s) supplied with the apparatus. The elbow(s) shall have a 30 degree turn down.

FILL SUBSURFACE/RETURN LINE

There shall be one-(1) subsurface/return line installed in the booster tank. The subsurface/return line shall prevent aeration of the water in the booster tank under low water conditions. The subsurface/return line piping shall be of the same size as the "Tank Fill".

WATER TANK

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The tank shall have a capacity of 1000 U.S. gallons and shall be constructed of PT3™ polypropylene material. This material shall be a non-corrosive stress relieved thermoplastic and UV stabilized for maximum protection. Tank shell thickness may vary depending on the application and may range from ½ to 1” as required. Internal baffles are generally 3/8” in thickness.

ISO CERTIFICATION

The tank must be "T" shaped in design and fabricated by a tank manufacturer that is ISO 9001:2008 certified in each of its locations. The ISO certification must be to the current standard in effect at the time of the design and fabrication of the tank.

DESIGN

Each tank is designed to the customer's specification and/or drawing submittal. An approval drawing is sent to the customer prior to commencing manufacturing. Upon receipt of the signed approval drawing, the tank is scheduled for production.

CONSTRUCTION

The booster and/or foam tank shall be of a specific configuration and is so designed to be completely independent of the body and compartments. Joints and seams shall be fused using nitrogen gas as required and tested for maximum strength and integrity. The tank construction shall include PolyProSeal™ technology wherein a sealant shall be installed between the plastic components prior to being fusion welded. This sealing method shall provide a liquid barrier offering leak protection in the event of a weld compromise. The top of the booster tank is fitted with removable lifting assembly designed to facilitate tank removal. The transverse and longitudinal swash partitions shall be manufactured of a minimum of 3/8" PT3™ polypropylene. All partitions shall be equipped with vent and air holes to permit movement of air and water between compartments. The partitions shall be designed to provide maximum water flow.

All swash partitions interlock with one another and are completely fused to each other as well as to the walls of the tank. All partitions and spacing shall comply with NFPA 1901. The walls shall be welded to the floor of the tank providing maximum strength as part of the tank's unique Full Floor Design™. Tolerances in design allow for a maximum variation of 1/8” on all dimensions.

WATER FILL TOWER AND COVER

The tank shall have a combination vent and manual fill tower. The fill tower shall be constructed of 1/2" PT3™ polypropylene and shall be a minimum dimension of 8" x 8" outer perimeter. The fill tower shall be blue in color indicating that it is a water-only fill tower. The tower shall be located in the left front corner of the tank unless otherwise specified by the tank manufacturer to the purchaser. The tower shall have a 1/4" thick removable polypropylene screen and a PT3™ polypropylene hinged cover. The capacity of the tank shall be engraved on the top of the fill tower lid. Inside the fill tower there shall be a combination vent/overflow pipe. The vent overflow shall be a minimum of schedule 40 polypropylene pipe with a minimum I.D. of 4" that is designed to run through the tank, and shall be piped to discharge water behind the rear wheels as required in NFPA 1901 so as to not interfere with rear tire traction.

The tank cover shall be constructed of 1/2" thick PT3™ polypropylene and UV stabilized, to incorporate a multi-piece locking design, which allows for individual removal and inspection if necessary. The tank cover(s) shall be flush or recessed 3/8" from the top of the tank and shall be fused to the tank walls and longitudinal partitions for maximum

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integrity. Each one of the covers shall have hold downs consisting of 2" minimum polypropylene dowels spaced a maximum of 40" apart. These dowels shall extend through the covers and shall assist in keeping the covers rigid under fast filling conditions. A minimum of two lifting dowels shall accommodate the necessary lifting hardware.

SUMP

There shall be one (1) sump standard per tank. The sump shall be constructed of a minimum of 1/2" PT3™ polypropylene and be located in the left front quarter of the tank, unless specified otherwise. On all tanks that require a front suction, a 3" schedule 40 polypropylene pipe shall be installed that shall incorporate a dip tube from the front of the tank to the sump location. The sump shall have a minimum 3" NPT threaded outlet on the bottom for a drain plug per NFPA. This shall be used as a combination clean-out and drain. All tanks shall have an anti-swirl plate located approximately 3" above the inside floor.

OUTLETS

There shall be two (2) standard tank outlets: one for the tank-to-pump suction line, which shall be sized to provide adequate water flow to the pump; and, one for tank fill line, which shall be sized according to the NFPA minimum size chart for booster tanks. All tank fill couplings shall be backed with flow deflectors to break up the stream of water entering the tank, and be capable of withstanding sustained fill rates of up to 1000 GPM. The addition of rear suction fittings, nurse valve fittings, dump valve fittings, and through-the-tank sleeves to accommodate rear discharge piping must be specified. All auxiliary outlets and inlets must meet all NFPA guidelines in effect at the time of manufacture.

MOUNTING

The UPF Poly-Tank® III shall rest on the body cross members in conjunction with such additional cross members, spaced at a distance that would not allow for more than 530 square inches of unsupported area under the tank floor. In cases where overall height of the tank exceeds 40 inches, cross member spacing must be decreased to allow for not more than 400 square inches of unsupported area. The tank must be isolated from the cross members through the use of hard rubber strips with a minimum thickness and width dimension of 1/4" x 1" and a Shore A Hardness of approximately 60 durometer. The rubber must be installed so it shall not become dislodged during normal operation of the vehicle. Additionally, the tank must be supported around the entire bottom outside perimeter and captured both in the front and rear as well as side to side to prevent tank from shifting during vehicle operation. A picture frame type cradle mount with a minimum of 2" x 2" x 1/4" mild steel, stainless steel, or aluminum angle shall be provided or the use of corner angles having a minimum dimension of 4" x 4" x 1/4" by 6" high are permitted for the purpose of capturing the tank. Although the tank is designed on a free floating suspension principle, it is required that the tank have adequate vertical hold down restraints to minimize movement during vehicle operation. If proper retention has not been incorporated into the apparatus hose floor structure, an optional mounting restraint system shall be located on top of the tank, half way between the front and the rear on each side of the tank. These stops can be constructed of steel, stainless steel or aluminum angle having minimum dimensions of 3" x 3" x 1/4" and shall be approximately 6" to 12" long. These brackets must incorporate rubber isolating pads with a minimum thickness of 1/4" inch and a hardness of 60 durometer affixed on the underside of the angle. The angle should then be bolted to the body side walls of the vehicle while extending down to rest on the top outside edge of the upper side wall of the tank. Hose beds floors must be so designed that the floor slat supports extend full width from side wall to side wall and are not permitted to drop off the edge of the tank or in any way come in contact with the individual covers where a puncture could occur. Tank top must be capable of supporting loads up to 200 lbs. per sq. foot when evenly distributed. Other equipment such as generators, portable pumps, etc. must not be

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mounted directly to the tank top unless provisions have been designed into the Poly-Tank® III for that purpose. The tank shall be completely removable without disturbing or dismantling the apparatus structure.

CAPACITY CERTIFICATION

All water and foam tanks shall be tested and certified as to capacity on a calibrated and certified tilting scale. Each tank shall be weighed empty and full to provide precise fluid capacity. Each Poly-Tank® III is delivered with a Certificate of Capacity delineating the weight empty and full and the resultant capacity based on weight. Engineering estimates for capacity calculations shall not be permitted for capacity certification.

TANKNOLOGY™ TAG

A tag shall be installed on the apparatus in a convenient location and contain pertinent information including a QR code readable by commercially available smart phones. The information contained on the tag shall include the capacity of the water and foam (s), the maximum fill and pressure rates, the serial number of the tank, the date of manufacture, the tank manufacturer, and contact information. The QR code shall allow the user to connect with the tank manufacturer for additional information and assistance.

WATER TANK SIZE CERTIFICATION

The manufacturer shall certify the capacity of the water tank prior to the delivery of the apparatus. This capacity shall be recorded on the manufacturer's record of construction and the certification shall be provided when the apparatus is delivered.

GAUGE, WATER LEVEL

A Fire Research TankVision Pro model WLA300-A00 tank indicator kit shall be installed on the pump operator's panel. The kit shall include an electronic indicator module, a pressure sensor, and a 10' sensor cable. The indicator shall show the volume of water 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 blue 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.

APPARATUS BODY, 96" WIDE

The 96" wide apparatus body and sub frame shall be constructed entirely of marine grade aluminum plate and extrusions.

BODY SUBFRAME

The main body support cross member extrusions shall be 3" x 4" 6061T6 aluminum alloy, double "I" beam with a wall thickness of 7/16" (.438"). These cross members shall extend the full width of the body to support the compartment framing. The cross members shall be welded to a 3/4" (.750") x 3" solid aluminum, 6061T6 aluminum (alloy frame rail) extrusion. The frame rail extrusion shall be shaped in contour with the chassis frame rails. The frame rail extrusion shall be mounted over a 1/2" (.5") thickness, reinforced rubber cushion to isolate the aluminum sub frame from the chassis steel frame rails. The apparatus body structure shall be securely fastened to the chassis frame rails with a minimum of

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six-(6) 5/8" (.625") cross member OD, steel U-bolts. The main body support cross member shall have a gusset above and below each cross member. The gussets shall be constructed of 2.0" x 4.0" 6063T6 aluminum alloy extrusion with a .190" wall thickness. The gussets shall be continuously welded with 5356 aluminum alloy welding wire to add support to the body sidewalls. The main body supports and the longitudinal double "I" beam supports shall have a "C" shaped rubber tank cushion installed on the top of each member. This rubber extrusion shall conform to the shape of the double "I" beam extrusion to keep the tank cushion in place. This method is used to prevent damage to the tank.

Absolutely no pop-rivets, screws or any other hardware shall be used to hold the rubber tank cushion in place.

BODY CONSTRUCTION

The complete apparatus body structure shall be an all welded construction and be free from nuts, bolts and other fasteners. Upon completion of the weldments, the body shall be completely sanded and deburred for removal of all sharp edges.

The body framework shall be formed from beveled aluminum alloy extrusions and electrically seam welded at each joint using 5356 aluminum alloy welding wire. Body sides shall be formed from 5052 H-32 (marine grade) smooth aluminum plates. The horizontal surfaces above the compartment tops shall be constructed from aluminum tread plate.

The horizontal and vertical frame member extrusions shall be 2.0" x 4.0" with a .190" wall thickness. The extrusion shall be made from 6063T6 aluminum alloy. This extrusion shall have .190" outside radius corners. The longitudinal frame member, below the lower compartments shall be a 2.0" x 4.0" 6063T6 aluminum alloy extrusion with .190" radius corners. Each body corner shall be a 3.5" x 9-3/4" 6063T6 extruded aluminum section with .210" wall thickness, and shall be welded as an integral part of the body. This extrusion shall have a 1" corner radius.

COMPARTMENT CONSTRUCTION

The compartment sidewalls shall be of one-piece construction. The walls shall be formed from 3/16" (.1875") 5052 H-32 (marine grade) smooth aluminum plate. All compartment floors shall be formed from 3/16" (.1875") aluminum tread plate. The floors shall be welded in place with a continuous weld all around the perimeter to insure maximum strength.

The compartment seams shall be sealed with permanent pliable silicone caulking.

Each compartment shall be vented through a 3" wide x 15" high louver that is machined stamped in a panel located in each body corner extrusion. The panel shall be removable to provide access to service wiring and other mounted components.

COMPARTMENT TOPS/CATWALK

The external compartment tops shall be constructed of 1/8" (.125") aluminum tread plate. The tops shall have a formed edge, which serves as a drip rail for the compartments below. The compartment tops shall be secured with stainless steel screws to allow for ease of removal for access to the bodies wiring harnesses.

WHEEL WELL PANELS, ALUMINUM TREADPLATE

The wheel well shall be constructed from 2" x 4" x .190" wall thickness. The extrusion shall be made from 6063T6 aluminum alloy and have .190" outside radius corners. The extrusion shall be slotted the full length to permit an internal fit of 3/16" (.187") aluminum tread plate panels. The wheel well liners shall be constructed of 3003 H-14 smooth

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aluminum plates. They shall be bolted in place for ease of maintenance. The wheel well fenderettes shall be constructed of a #304 Stainless steel with a #7 polished finish.

A deflection shield shall be mounted to the body sub frame to keep road debris from entering the water tank area.

HOSEBED

The hose bed sides shall be constructed of 3/16" (.1875") 5052 H-32 (marine grade) smooth aluminum plate welded to the extruded framework. There shall be a 3" x 3.5" 6063T6 aluminum extrusion with .190" wall thickness running the entire length of the hose bed at the top for structural rigidity. The hose bed decking shall be constructed from anodized aluminum extrusions. The extrusions shall be 3/4" (.750") x 8.125" and have 3/4" (.750") x 3.00" hat channel attached to the underside to form a one-piece grid. The entire deck shall be removable, in one piece, to allow ease of serviceability to the tank. The hose bed shall include an extrusion across the front and rear of the compartment for the installation of adjustable hose bed dividers.

The fire apparatus hose body shall be 67-1/2" wide and shall contain a minimum of 79 cubic feet of storage.

A safety sign FAMA22, which warns of the need to secure hose, shall be visible to personnel at the hose storage area.

COMPARTMENTS, LEFT SIDE

L1

There shall be one-(1) left front compartment installed ahead of the rear axle. The interior dimensions shall be approximately 36" wide x 70" high x 25" deep in the lower section and 12" deep in the upper section.

L2

There shall be one-(1) compartment installed above the wheel well. The interior dimensions shall be approximately 58" wide x 38" high x 12" deep.

L3

There shall be one-(1) left rear compartment installed behind the rear axle. The interior dimensions shall be approximately 44" wide x 70" high x transverse in the lower section and 12" deep in the upper section.

L1

There shall be one-(1) left front compartment installed ahead of the rear axle. The interior dimensions shall be approximately 36" wide x 70" high x 25" deep in the lower section and 12" deep in the upper section.

L2

There shall be one-(1) compartment installed above the wheel well. The interior dimensions shall be approximately 58" wide x 38" high x 12" deep.

L3

There shall be one-(1) left rear compartment installed behind the rear axle. The interior dimensions shall be approximately 44" wide x 70" high x transverse in the lower section and 12" deep in the upper section.

COMPARTMENT DOORS, LEFT SIDE ROLL UP

R•O•M Series IV roll-up shutter doors shall be installed on the left side compartments of the apparatus as specified.

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Shutter slats will feature a double wall extrusion 0.315" thick with a concave interior surface to minimize loose equipment jamming the shutter door closed. Shutter slats will 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 will be such to prevent metal to metal contact while minimizing dirt and water from entering the compartment.

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

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

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

The shutter door assembly shall be manufactured and assembled in the United States.

There shall be an aluminum drip rail above each compartment door with a built in replaceable wiper seal. There shall be an anodized aluminum sill plate installed at the bottom of the compartment door.

The outside door shall have a natural finish.

COMPARTMENTS, RIGHT SIDE

R1

There shall be one-(1) right front compartment installed ahead of the rear axle. The interior dimensions shall be approximately 36" wide x 70" high x 25" deep in the lower section and 12" deep in the upper section.

R2

There shall be one-(1) compartment installed above the wheel well. The interior dimensions shall be approximately 58" wide x 38" high x 12" deep.

R3

There shall be one-(1) right rear compartment installed behind the rear axle. The interior dimensions shall be approximately 44" wide x 70" high x transverse in the lower section and 12" deep in the upper section.

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approximately 36" wide x 70" high x 25" deep in the lower section and 12" deep in the upper section.

R2

There shall be one-(1) compartment installed above the wheel well. The interior dimensions shall be approximately 58" wide x 38" high x 12" deep.

R3

There shall be one-(1) right rear compartment installed behind the rear axle. The interior dimensions shall be approximately 44" wide x 70" high x transverse in the lower section and 12" deep in the upper section.

COMPARTMENT DOORS, RIGHT SIDE ROLL UP

R•O•M Series IV roll-up shutter doors shall be installed on the right side compartments of the apparatus as specified.

Shutter slats will feature a double wall extrusion 0.315" thick with a concave interior surface to minimize loose equipment jamming the shutter door closed. Shutter slats will 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 will be such to prevent metal to metal contact while minimizing dirt and water from entering the compartment.

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

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

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

The shutter door assembly shall be manufactured and assembled in the United States.

There shall be an aluminum drip rail above each compartment door with a built in replaceable wiper seal. There shall be an anodized aluminum sill plate installed at the bottom of the compartment door.

The outside door shall have a natural finish.

COMPARTMENT, CENTER REAR

B1

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There shall be one-(1) compartment installed at the center rear of the apparatus. The compartment shall have an interior dimension of approximately 46" wide x 28" high.

B1

There shall be one-(1) compartment installed at the center rear of the apparatus. The compartment shall have an interior dimension of approximately 46" wide x 28" high.

COMPARTMENT DOOR, REAR ROLL UP

A R•O•M Series IV roll-up shutter doors shall be installed on the rear compartment of the apparatus.

Shutter slats will feature a double wall extrusion 0.315" thick with a concave interior surface to minimize loose equipment jamming the shutter door closed. Shutter slats will 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 will be such to prevent metal to metal contact while minimizing dirt and water from entering the compartment.

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

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

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

The shutter door assembly shall be manufactured and assembled in the United States.

There shall be an anodized aluminum sill plate installed at the bottom of the compartment door.

The outside door shall have a natural finish.

REAR BODY CONSTRUCTION, BEAVERTAILS

The rear of the apparatus shall be equipped with beavertails. The beavertails shall be constructed of 2" x 2" x .190" thickness, 6063T6 aluminum alloy extrusions with .190" radius corners. There shall be a removable panel on either side of the extrusion that is constructed of 1/8" (.125") aluminum tread plate.

REAR COMPARTMENT BLOUSE

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There shall be an extension of the rear compartment between the beavertails to increase the lower compartment 8" in depth.

VERTICAL LOAD TEST, APPARATUS BODY

The fire body shall exceed a vertical load testing. The vertical load test to the fire body shall follow the same strict and detailed requirements of the Economic Commission for Europe Structural Standard, ECE-29R as applied to the cab.

The fire body shall be placed under a vertical load test to show structural integrity. There shall be 65,979 lbs. (29.53 metric tons) applied to the fire body. There shall be no structure failures to the body and body compartments.

A complete photographic, video, data, and dimensional record of these tests shall be available and placed on record for customer evaluations.

COMPARTMENT, LADDER STORAGE

There shall be one-(1) equipment storage compartment installed beside the tank on the right side constructed of 1/8" (.125) smooth aluminum plate for the storing of NFPA required equipment. Individual internal compartments shall house one-(1) 24' extension ladder, one-(1) 14' roof ladder, one-(1) 10' folding ladder, and two-(2) pike poles with silencing pads made from Polypropylene installed on each compartment floor to assist in the loading and unloading of the required equipment.

The compartment shall have vertically hinged door constructed from 1/8" (.125) smooth aluminum plate with stainless steel piano hinge and paddle latch door open mechanism. The door shall be installed utilizing stainless steel nuts and bolts, other fastening device such as self-tapping screws or pop rivets shall not be acceptable.

STORAGE TUBES, PIKE POLE

Two-(2) aluminum tubes shall be installed on the apparatus for pike pole storage. One-(1) end shall be notched to allow the poles to be locked in place.

The tubes will be located in the ladder compartment.

TRAYS, SUCTION HOSE

Two-(2) aluminum suction hose storage trays shall be installed, one-(1) each side above the body compartments. Each tray shall hold one-(1) 10' section of the specified suction hose and have spring latches to hold hose in position.

BODY TRIM

The standard body trim shall include the following:

There shall be drip rail installed over the compartment door openings.

A drip rail shall be located over each compartment door. This drip rail shall form a lip over the exterior door pans to prevent water from running into a compartment.

The vertical rear face of the body shall be covered with smooth aluminum plate.

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Two-(2) handrails shall be located on the rear of the apparatus, one-(1) handrail per side. Each handrail shall be constructed of 1-1/4" knurled aluminum. The handrails shall be mounted with chrome plated end stanchions. Each handrail shall be sufficient in length to meet all standard requirements.

No rear stanchions shall be provided on this unit.

FUEL FILL, RECESSED WITH DOOR

There shall be a recessed fuel fill assembly with a non-locking door mounted on the left side of the apparatus body. The fuel fill assembly shall be equipped with a fuel fill cap, retention ring and hinged door. The assembly shall be properly labeled "DIESEL FUEL ONLY".

MUD FLAPS, REAR

The rear axle mud flaps shall be constructed from hard black rubber and installed at the rear of the body fenders.

RUBRAIL

There shall be an aluminum rub rail installed on both sides of the lower body compartments. The rub rail shall be constructed from "C" channel extrusion. The aluminum rub rail shall be bolted in place with stainless steel bolts, and spaced from the fire body to provide body protection. The solid rub rail shall serve as protection to the side doors when encountering close objects. Tread plate rub rails or welded on shall not be acceptable.

REAR STEP

The 20" rear step shall be constructed with an anodized aluminum extrusion. This extrusion shall be slotted punched and raised to provide superior traction during wet and cold weather operations. The rear step shall be a two-piece design. The rear step shall bolt on with stainless steel nuts and bolts for replacement. The rear step shall have a space of approximately 1/4" from the rear of the body to allow water runoff.

All running board and step surfaces shall comply with NFPA 1901.

CHROME FOLDING STEP(S), FRONT OF BODY

There shall be two (2) large chrome-folding step(s) with a minimum surface area of thirty-five (35) square inches. The step(s) shall be mounted on the front face of the forward compartment as directed by the customer.

There shall be an LED light installed above and below each step.

The steps will be located, one-(1) each side, on the front compartment face.

The lights will activated when the park brake is set.

STEPS, REAR FIXED W/LED LIGHT

There shall be four (4) rear lighted steps installed on the apparatus. The steps shall be a Cast Products step and have a minimum of thirty-five (35) square inches of surface area to conform to the NFPA 1901 standards. The step(s) shall include a 12-volt LED light to illuminate the area below.

The lights will activated when the park brake is set.

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TOW EYES, REAR

Two-(2) 1" thick rear tow eyes constructed of A-36 steel shall be mounted below the frame at the rear of the vehicle. The tow eyes shall be attached to steel weldments that are mounted to the apparatus. The eyes shall have a minimum dimension of three-(3) inches. The tow eyes shall be used for towing, not lifting the vehicle.

HANDRAIL, BELOW HOSE BED

There shall be an intermediate handrail installed on the apparatus below the hose bed. The handrail shall be constructed of 1-1/4" knurled aluminum. The handrail shall be mounted with chrome plated end stanchions.

HOSE BED DIVIDER(S)

One (1) hose bed divider(s) shall be manufactured from 1/4" (.250") smooth aluminum plate with an extruded aluminum base welded to the bottom. The divider shall have an extruded track to slide in to allow the hose bed to adjust for different hose capacities. One end of the divider shall have a 3" radius corner. The divider shall be sanded to prevent damage to hose.

HOSE BED COVER

A hose bed cover constructed of 16 oz. heavy-duty Hypalon shall be provided. Cover shall be fire retardant and installed over hose bed. The cover shall have chrome twist-locks and Velcro installed around the perimeter of the hose bed. The end of the hose bed cover shall be secured and cover the hose bed opening. The cover shall completely protect the hose in the hose bed and prevent hose from inadvertently deploying during normal operation.

A safety sign FAMA22, which warns of the need to secure hose, shall be visible to personnel at the hose storage area. The Hypalon end flap shall be secured at the bottom using pushpins. The cover prevents hose from inadvertently deploying during normal operations meeting the current NFPA requirements.

The cover shall meet the NFPA 1901 15.10.5 requirement.

The cover and/or end flaps shall be red in color.

HOSE BED CAPACITY

The hose bed shall have the capacity to hold the following:

No hose bed capacity was specified at the time of proposal completion. The overall height may increase due to the required hose load specified by the Fire Department.

A safety sign FAMA22, which warns of the need to secure hose, shall be visible to personnel at the hose storage area.

ELECTRICAL SYSTEM, BODY

The body electrical system shall be designed as an integrated electrical package specifically engineered for fire apparatus application. The integrated electrical system shall interface the body and chassis through an engineered system.

All body electrical equipment installed shall conform to current automotive electrical system standard, the latest Federal DOT standards, and the requirements of the applicable NFPA Apparatus Standard. Twisted pair shielded wire shall be provided within the electrical system for noise reduction.

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The wiring harness shall conform to SAE J-1128 with GXL temperature properties. All exposed wiring shall be run in loom with a minimum 289 °F rating. All wiring looms shall be properly supported and attached to body members along the entire run. All wiring shall be mounted as to provide protection from water and heat. All connections shall be crimp type with heat shrink tubing with insulated shanks to resist moisture and foreign debris such as grease and road grime. Weather resistant connectors shall be provided throughout to ensure the integrity of the electrical system. Gold contacts shall be used where required for superior connectivity and improved performance. All wiring looms shall be properly supported and attached along the entire run. At any point where wire or looms must pass through metal, rubber grommets shall be installed to protect the wire from abrasion.

Wiring shall be individually and permanently numbered, function and color-coded using an indexing numbering system in which all circuits are categorized by function and shall be permanently marked every three (3) inches on the insulation to allow for easy identification.

All internal wire end terminals, including locking bulkhead connectors, shall be mechanically affixed to the wire ends by machine terminal crimping presses. No hand-crimped terminals shall be acceptable.

All internal splices shall be ultrasonically welded connections - no butt style connections shall be acceptable. All internal wiring shall be of the high temperature GXL type wire and shall be protected by wiring duct wherever possible.

The body shall have an in-vehicle networking system, to provide real time or current state diagnostic capability and reduce troubleshooting or down time.

An electrical harness quick disconnect shall be provided to facilitate removal of the body in the future. All circuit protection shall be integral of control modules. There shall not be automatic reset circuit breakers located in the body main harnessing and distribution system.

The system shall have the capability of delivering multiple signals via a data bus, utilizing specifications set forth by SAE J1939.

The body includes strategically located solid-state modules within the body. The modules are for the body lighting and controls.

The system shall consist of all solid-state components contained inside sealed aluminum extrusions and/or weatherproof Deutsch enclosures referred to as nodes. The system shall also incorporate, as needed, miniature nodes. The nodes shall not have special mounting requirements.

The system, at a minimum, shall be capable of performing the following functions:

- Load management and sequencing
- Switch loads
- Receive digital and analog signals
- Perform and report diagnostics
- Continuously report vehicle status
- System is expandable
- Power distribution outputs
- Switch input capability

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- Solid state circuitry
- Self-contained LED diagnostic indicators
- PWR for input power status (red)
- COM for communication status (green)
- The complete body electrical system shall be 100% documented and contain independent circuit diagrams with point to point wiring information, as shall as a general component diagram be included in the apparatus manua

The E2020 electrical system should marry up to the Weldon V-Mux system on the MetroStar chassis.

12-VOLT TESTING

The apparatus low voltage system shall be tested and certified. A copy of certification shall be provided to the purchaser with the apparatus.

Reserve Capacity Test

The unit shall be run until all engines, engine compartment temperatures are stabilized and the battery system is fully charged. The engine shall be shut off and the minimum continuous electrical load be activated for ten-(10) minutes. All electrical loads shall be shutoff after ten-(10) minutes and the battery system shall then be capable of restarting the engine.

Alternator Performance Test at Idle

Minimum continuous electrical loads shall be activated while the unit is at idle speed.

Alternator Performance Test at Full Load

The total continuous electrical load shall be activated with the engine running up to the manufacturer's governed speed. The test duration shall be a minimum of two-(2) hours. Activation of the load management system shall be permitted during the test. If however, an alarm is sounded by excessive battery discharge as detected by the system or a system voltage of less than 11.8 volts DC for a 12-volt nominal system for more than 120 seconds, shall be considered a test failure.

Low Voltage Alarm Test

The engine shall be shut off and the total continuous electrical load shall be activated and continue to be applied until the excessive battery discharge alarm activates. The test shall be considered a failure if the alarm has not sounded within 140 seconds after the voltage drops to 11.8 volts.

WIRING PROTECTION

All 12-volt wiring shall be run in high temperature, rated at a minimum of 275° F, split loom for easy access to wires when trouble shooting.

EMI/RFI PROTECTION

The apparatus shall be manufactured to incorporate the latest designs in the electrical system with components that are state of the art to insure electromagnetic interference (EMI) and radio frequency interference (RFI) emissions are suppressed at the source.

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The apparatus shall have the ability to operate in typical fire and rescue situations with no adverse effects from EMI and/or RFI.

The apparatus shall utilize components that are fully protected and wiring that utilizes shielding and loop backgrounds where required to control EMI/RFI susceptibility. The apparatus shall be bonded through ground straps. Relays and solenoids that are suspect to generating spurious electromagnetic radiation are diode and/or resistor protected to prevent transient voltage spikes.

In order to prevent the radio frequency interference completely the purchaser shall be requested to provide a listing of the type, power output, and frequencies of all radio and bio medical equipment that is proposed to be used on the apparatus.

LIGHT(S), LED COMPARTMENT

Seven (7) On Scene Solutions Access Series LED surface mount light(s) shall be provided as specified by the customer. Each light produces 400 lumens if light per 18" length. Each Access Series shall be capable of operating at a voltage of 9VDC to 14VDC. Each Access Series shall be cuttable in 2" increments and feature a high quality, impact resistant Lexan™ enclosure.

The light stick shall be waterproof and rated at 100,000 hours of service. Each light stick shall be provided with a 5 year free replacement warranty.

There will be one-(1) LED strip style light installed vertically within the door opening of each body compartment.

The lights will activated when the park brake is set.

DOOR AJAR SWITCHES

All apparatus body doors shall be provided with an auto door switch. These switches shall operate the compartment interior lights and activate the door ajar indicator on each side of apparatus body when the door is opened. There shall be a red door ajar light mounted in the cab, in view of the driver to indicate an unsecured door. There shall be a buzzer mounted in the cab that shall alert the driver.

LIGHTS, ZONE B/D UPPER REAR BODY

Two-(2) Whelen LINZ6 Series Super-LED model LINZ6R shall be installed, one-(1) each side of the upper rear corner of the body. The warning light shall incorporate six red Super-LEDs, a clear non-optic hard coated polycarbonate lens, clear optic collimator and utilize a metalized reflector for maximum output. The hard coated lens shall provide extended life/luster protection against UV and chemical stresses. The encapsulated lens/reflector assembly and conformal coated PC board shall provide additional protection against environmental elements. The solid state warning lights shall be vibration resistant. The self-contained flashing light shall have 69 Scan-Lock flash patterns including synchronize feature and steady burn. The warning light is covered by a five year factory warranty. The surface mount module includes a black flange and hardware for horizontal mounting.

LIGHTS, ZONE C UPPER OUTBOARD

Two-(2) Whelen LINZ6 Series Super-LED model LINZ6R shall be installed, one-(1) each side on the upper rear of the apparatus in the outboard position. The warning light shall incorporate six red Super-LEDs, a clear non-optic hard coated polycarbonate lens, clear optic collimator and utilize a metalized reflector for maximum output. The hard coated lens

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shall provide extended life/luster protection against UV and chemical stresses. The encapsulated lens/reflector assembly and conformal coated PC board shall provide additional protection against environmental elements. The solid state warning lights shall be vibration resistant. The self-contained flashing light shall have 69 Scan-Lock flash patterns including synchronize feature and steady burn. The warning light is covered by a five year factory warranty. The surface mount module includes a black flange and hardware for horizontal mounting.

LIGHT, ZONE C UPPER INBOARD

One-(1) Whelen LINZ6 Series Super-LED model LINZ6R shall be installed, center in the upper rear of the apparatus in the inboard position. The warning light shall incorporate six red Super-LEDs, a clear non-optic hard coated polycarbonate lens, clear optic collimator and utilize a metalized reflector for maximum output. The hard coated lens shall provide extended life/luster protection against UV and chemical stresses. The encapsulated lens/reflector assembly and conformal coated PC board shall provide additional protection against environmental elements. The solid state warning lights shall be vibration resistant. The self-contained flashing light shall have 69 Scan-Lock flash patterns including synchronize feature and steady burn. The warning light is covered by a five year factory warranty. The surface mount module includes a black flange and hardware for horizontal mounting.

LIGHTS, ZONE B/D MIDSHIP LOWER

Two-(2) Whelen LINZ6 Series Super-LED model LINZ6R lights shall be installed, one-(1) each side midship of the apparatus. The warning light shall incorporate six red Super-LEDs, a clear non-optic hard coated polycarbonate lens, clear optic collimator and utilize a metalized reflector for maximum output. The hard coated lens shall provide extended life/luster protection against UV and chemical stresses. The encapsulated lens/reflector assembly and conformal coated PC board shall provide additional protection against environmental elements. The solid state warning lights shall be vibration resistant. The self-contained flashing light shall have 69 Scan-Lock flash patterns including synchronize feature and steady burn. The warning light is covered by a five year factory warranty. The surface mount module includes a black flange and hardware for horizontal mounting.

The lights will be located, one-(1) each side, in the body wheel well area.

LIGHTS, ZONE B/D REAR LOWER

Two-(2) Whelen LINZ6 Series Super-LED model LINZ6R lights shall be installed, one-(1) each side rearward portion of the apparatus. The warning light shall incorporate six red Super-LEDs, a clear non-optic hard coated polycarbonate lens, clear optic collimator and utilize a metalized reflector for maximum output. The hard coated lens shall provide extended life/luster protection against UV and chemical stresses. The encapsulated lens/reflector assembly and conformal coated PC board shall provide additional protection against environmental elements. The solid state warning lights shall be vibration resistant. The self-contained flashing light shall have 69 Scan-Lock flash patterns including synchronize feature and steady burn. The warning light is covered by a five year factory warranty. The surface mount module includes a black flange and hardware for horizontal mounting.

The lights will be located, one-(1) each side, below compartments L3 / R3.

LIGHTS, ZONE C LOWER

Two-(2) Whelen M6 Series Super-LED model M6RC shall be installed, one-(1) each side on the lower rear of the apparatus. The warning light shall incorporate red Super-LEDs, a clear non-optic hard coated polycarbonate lens, clear optic collimator and utilize a metalized reflector for maximum output. The hard coated lens shall provide extended

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life/luster protection against UV and chemical stresses. The encapsulated lens/reflector assembly and conformal coated PC board shall provide additional protection against environmental elements. The solid state warning lights shall be vibration resistant. The self-contained flashing light shall have 164 Scan-Lock flash patterns including synchronize feature and steady burn. The warning light is covered by a five year factory warranty.

STOP, TURN AND BACK-UP LIGHTS

Stop, turn and backup lights shall be Whelen M6 Series, individual fixtures. The red stop (LED) light shall be model M6BTT, the turn light shall be a model M6T amber (LED) type with directional arrow, and the backup light shall be a white (LED) model M6BUW.

HOUSING, REAR TAIL LIGHT ASSEMBLY

The fixtures shall be mounted on each rear face of the body in a model M6FCV4, four-(4) light head chrome housing.

CLEARANCE LIGHTS AND REFLECTORS

Clearance lights and reflectors shall be LED lights, which include two-(2) red marker lights, four-(4) red rectangular reflectors, two-(2) amber rectangular reflectors and one-(1) red three light cluster recessed in the rear step.

LIGHTS, UNDERBODY

Six (6) Whelen LED underbody "Ground Effect" light(s) shall be installed at a location to be determined by the Fire Department. The underbody light(s) shall illuminate the ground beneath the apparatus.

The 12v steady burn light(s) shall incorporate 12 clear LED and a clear optic hard coated polycarbonate lens. The hard coated lens shall provide extended life/luster protection against UV and chemical stresses. The encapsulated coated PC board and lens fitted with foam in place gasket assembly shall provide additional protection against environmental elements. The solid state light shall be vibration resistant. The 20C0CDCD will contain 350 usable lumens. An installation kit including mounting hardware and rubber gasket shall be provided. The 20C0CDCD will contain a 12" terminated pigtail with a waterproof Deutsch® connector. The light is covered by a five year factory warranty.

The lights shall be controlled by a switch in the cab.

There will be one-(1) light located below compartment L1, compartment L3, compartment R1 and compartment R2.

There will be two-(2) evenly spaced beneath the rear tailboard.

The lights will activated when the park brake is set.

LIGHT, LICENSE PLATE

A Whelen OS Series LED model 0SC0EDCR shall be provided at the rear of the apparatus to illuminate the license plate. The steady burn illumination light shall incorporate three clear LED and a clear non-optic hard coated polycarbonate lens. The hard coated lens shall provide extended life/luster protection against UV and chemical stresses. The encapsulated assembly shall provide protection against environmental elements. The solid state illumination light shall be vibration resistant. An installation kit including mounting hardware, neoprene gasket and 45 degree angle chrome

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housing shall be provided for surface mounting. The 0AC0EDCR will contain a 12" non-terminated pigtail. The illumination light meets SAE J592 requirements and is covered by a five year factory warranty.

LIGHTS, 12-VOLT SURFACE MOUNT SCENE

One (1) pair of Whelen M6 Series Model M6ZC scene lights shall be provided and installed on the apparatus. The steady burn scene light shall incorporate Linear Super-LED® and Smart LED® technology. The M6ZC configuration shall consist of 12 clear gradient Super-LED's and a clear optic polycarbonate lens. The scene light, with the aid of two screws, shall have the ability to be installed as a surface mount scene light. The M6ZC shall meet KKK 1822F and AMD024 specifications.

The lens/reflector assembly shall be sealed and resistant to water, moisture, dust, and other environmental conditions. The hard coated lens shall provide extended life/luster protection against UV and chemical stresses. The light engine shall be installed at the rear of the unit and be vacuum tested to ensure proper sealing. The PC board shall be conformal coated for additional protection.

The scene lights shall be controlled by switch located in the cab.

The lights will be located, one-(1) each side, of the rear of the apparatus in the upper outboard corners.

The scene lights shall be controlled by switch located in the cab.

PAINT FINISH, BODY

The apparatus body shall be painted with AkzoNobel Sikkens brand paint. The paint process shall meet or exceed current state regulations concerning paint operations. Pollution control shall include measures to protect the atmosphere, water, and soil. Contractor shall, upon demand, provide evidence that the manufacturing facility is in compliance with State EPA rules and regulations.

The body exterior shall have no mounted components prior to painting to assure full coverage of metal treatments and paint to the exterior surfaces of the body. Any vertically or horizontally hinged smooth-plate compartment doors shall be painted separately to assure proper paint coverage on body, door jambs and door edges.

Paint process shall feature AkzoNobel Sikkens high solid BTLV products and be performed in the following steps:
Corrosion Protection - all aluminum surfaces shall be treated with the AkzoNobel Sikkens LV 260 Epoxy coating to provide superior corrosion resistance and excellent adhesion of the base coat.

AkzoNobel Sikkens Sealer/Primer BTLV - acrylic urethane sealer/primer shall be applied to guarantee excellent gloss hold-out, chip resistance and a uniform base color.

AkzoNobel Sikkens High Solid BTLV650 (Base coat) - a lead-free, chromate-free high solid polyurethane base coat shall be applied, providing excellent coverage and durability. A minimum of two-(2) coats shall be applied.

AkzoNobel Sikkens High Solid BTLV650 (Clear coat) - high solid LV clear coat shall be applied as the final step in order to ensure full gloss and color retention and durability. A minimum of two-(2) coats shall be applied.

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Any location where aluminum is penetrated after painting, for the purpose of mounting steps, hand rails, doors, lights, or other specified components shall be treated at the point of penetration with a corrosion inhibiting pre-treatment (ECK Corrosion Control). The pre-treatment shall be applied to the aluminum sheet metal or aluminum extrusions in all locations where the aluminum has been penetrated. All hardware used in mounting steps, hand rails, doors, lights, or other specified components shall be individually treated with the corrosion inhibiting pre-treatment.

After the paint process is complete, the gloss rating of the unit shall be tested with a 60 degree gloss meter. Coating thickness shall be measured with a digital MIL gauge and the orange peel with a digital wave scan device.

PAINT COLOR/CODE

The paint color/code shall be red FLNA 31979.

INTERIOR COMPARTMENT FINISH

The interior of the body compartments shall be a natural finish.

SCOTCHLITE STRIPE

There shall be a 4" wide Scotchlite stripe located on the apparatus cab and body. The stripe shall cover a minimum of fifty percent (50%) of the cab, body sides and of the rear of the apparatus. The stripe shall also cover twenty-five percent (25%) of the front of the apparatus. The stripe shall be installed to meet the current NFPA requirements.

The striping shall be white in color.

The reflective stripe shall run straight from the headlights to the rear of the body on each side of the apparatus.

STRIPE, REAR CHEVERON

A minimum of fifty percent of the rear vertical surface of the unit shall be overlaid with a reflective material, installed in an alternating "Chevron" pattern (sloping down and away from the centerline) at a 45-degree angle. Each stripe shall be 6" wide and the colors of striping shall be in compliance, with the current edition of NFPA 1901.

The Chevron striping shall be 3M red and lime green.

REFLECTIVE MATERIAL, DESIGNATED WALKING SURFACES

1" wide yellow perimeter marking consisting of individual Reflexite diamonds shall be applied to indicate the outside edge of designated standing and walking areas above 48" from the ground in compliance with 2016 NFPA 1901. Steps, ladders and areas with a railing or structure at least 12" high are excluded from this requirement.

LETTERING

There shall be a maximum of sixty-(60) 3" tall Spun Gold letters applied to the apparatus. The lettering shall also have a one color shade applied.

WARRANTY, BODY PARTS & LABOR

There shall be a two-(2) year body mechanical parts and labor warranty provided with the apparatus. The apparatus shall be free of defects in material and workmanship for a warranty period of two-(2) years after the date on which the apparatus is first delivered to the original purchaser.

WARRANTY, CAB PARTS & LABOR

Summary of Warranty Terms:

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

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

CAB STRUCTURAL WARRANTY

Summary of Warranty Terms:

THE FOLLOWING IS SUMMARY OF WARRANTY TERMS FOR INFORMATION ONLY. THE ACTUAL LIMITED WARRANTY TERMS CAN BE FOUND IN THE CHASSIS WARRANTY DOCUMENT, WHICH CONTAINS THE COMPLETE STATEMENT OF THE WARRANTY. FERRARA'S RESPONSIBILITY IS TO BE ACCORDING TO THE TERMS OF THE COMPLETE LIMITED WARRANTY DOCUMENT.

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

WARRANTY, BODY STRUCTURAL

There shall be a ten-(10) year body warranty on each new fire body/heavy-duty rescue apparatus. The bodies are to be free of structural failures caused by defective design or workmanship for a warranty period of ten-(10) years after the date on which the vehicle is first delivered to the original purchaser or 100,000 miles, whichever occurs first.

CAB PAINT WARRANTY

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

The warranty details can be found in the chassis warranty document.

WARRANTY, BODY PAINT/PERFORATION

The manufacturer shall warrant each new fire and rescue apparatus body during the warranty period, when used in normal and reasonable manner. All apparatus shall be warranted against peeling, cracking, blistering and corrosion. This warranty shall provide for repair or replacement at the manufacturer's option, any claim in accordance with the following terms and conditions.

WHAT IS COVERED

WARRANTY APPLIES - This warranty is for all new fire and rescue apparatus manufactured by the bidder and is extended only to the original user-purchaser. The warranty registration must be received by the manufacturer within 30 days of the in-service for the warranty to apply.

REPAIRS COVERED - The warranty covers repair or replacement at the manufacturer's option. Repairs shall be made at a factory owned service facility or another approved service facility.

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OBTAINING REPAIRS - The original user-purchaser must notify the manufacturer in writing within 30 days after any claimed defect has appeared. Transportation costs to and from the servicing center shall be the responsibility of the user-purchaser.

WARRANTY PERIOD - The warranty period shall begin upon delivery of the apparatus to the original user-purchaser. The warranty period shall be for **TEN YEARS**. Corrosion perforation is defined as **complete penetration** through the exterior metal of the apparatus. The following percentages apply:

Topcoat & Appearance (Gloss, Color Retention and Cracking):

0 to 72 months: 100%

73 to 120 months: 50%

Coating System, Adhesion & Corrosion (Includes Dissimilar Metal Corrosion, FLaking, Blistering and Bubbling)

0 to 36 months: 100%

37 to 84 months: 50%

85 to 120 months: 25%

NOTES:

**Under carriage, cab and body interiors are covered under our standard two-(2) year warranty.*

**Demonstration vehicles sold to an end user will have the full warranty, if sold within two-(2) years of demonstration service, and will be prorated if sold after the second year.*

WHAT IS NOT COVERED

*Any cab not manufactured by the bidder.

*Damage caused by fire, misuse, negligence or accident.

*Damage caused by theft, vandalism, riot or explosion.

*Damage caused by lightning, earthquake, windstorm, hail, flood or use in an acidic environment (such as de-icing compounds, road salts and acid rain).

*Any repairs, modifications, alterations or aftermarket parts added after manufacture without the authorization of the manufacturer.

*Damage from lack of, maintenance and cleaning (proper cleaning and maintenance procedures are detailed in the provided maintenance manual).

*Gold leaf or striping except that which is affected by repair (Gold Leaf or striping must have been installed during manufacturing to be covered under this limited warranty).

*Loss of time, loss of use of the product, inconvenience, lodging, food or other consequential or incidental loss that may result from a failure.

FRAME WARRANTY

Summary of Warranty Terms:

THE FOLLOWING IS SUMMARY OF WARRANTY TERMS FOR INFORMATION ONLY. THE ACTUAL LIMITED WARRANTY TERMS CAN BE FOUND IN THE CHASSIS WARRANTY DOCUMENT, WHICH CONTAINS THE COMPLETE STATEMENT OF THE WARRANTY. FERRARA'S RESPONSIBILITY IS TO BE ACCORDING TO THE TERMS OF THE COMPLETE LIMITED WARRANTY DOCUMENT.

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

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FRONT AXLE WARRANTY

The front axle shall be warranted by Meritor for five (5) years with unlimited miles under the general service application. Details of the Meritor warranty are provided on the PDF document attached to this option.

REAR AXLE WARRANTY

The rear axle shall be warranted by Meritor for five (5) years with unlimited miles under the general service application. Details of the Meritor warranty are provided on the PDF document attached to this option.

ENGINE WARRANTY

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

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.

WARRANTY, ANTI LOCK BRAKE SYSTEM

The ABS brake system shall be warranted for a period of three-(3) years/300,000 miles.

WARRANTY, HALE FIRE PUMP

EXPRESS WARRANTY

Hale Products, Incorporated (“Hale”) hereby warrants to the original buyer that products manufactured by Hale are free of defects in material and workmanship for a period of five-(5) years from the date the product is first placed into service or five and one-half (5-1/2) years from date of shipment by Hale, whichever period shall be first to expire. Within this warranty period Hale will cover parts and labor for the first two-(2) years and parts only for years three (3) through five (5).

LIMITATIONS

HALE’S obligation is expressly conditioned on the Product being:

- Subjected to normal use and service
- Properly installed and maintained in accordance with HALE’S Instruction Manual and Industry Standards as to recommended service and procedures
- Not damaged due to abuse, misuse, negligence, or accidental causes
- Not altered, modified, serviced (non-routine), or repaired other than by an Authorized Service facility
- Manufactured per design and specifications submitted by the original buyer
- Used with an appropriate engine as determined by the engine manufacturers published data
- Excluded are normal wear items identified as but not limited to packing, strainers, anodes, filters, light bulbs, intake screens, wear rings, mechanical seals, etc.

WARRANTY, PLUMBING SYSTEM

There shall be a ten-(10) year pump plumbing warranty provided. The warranty covers all plumbing components used in construction of the fire apparatus water/foam plumbing system against defects and workmanship, provided the apparatus

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is used in a normal and reasonable manner. The warranty is extended only to the original user-purchaser for a period of 10 years from the date of delivery.

WARRANTY, WATER TANK

The poly tank manufacturer warrants each tank to be free from manufacturing defects in material and workmanship for the service life of the original vehicle (vehicle must be actively used in fire suppression). The warrant is transferable, with written approval of the manufacturer. Each tank is inspected and tested for leaks prior to leaving the manufacturing facility. The tank shall be installed in the vehicle in accordance to the manufacture's guidelines.

There are no warranties, expressed or implied, which extend beyond the description of the face hereof. There is no expressed or implied warranty of merchantability or a warranty of fitness for a particular purpose. Additional, this warranty is in lieu of all other obligations or liabilities on the part of the Manufacturer.

CHASSIS OPERATION MANUAL

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

ENGINE AND TRANSMISSION OPERATION MANUALS

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

- (2) Hard copies of the Engine Operation and Maintenance manual digital copy.
- (2) Digital copies of the Transmission Operator's manual
- (2) Digital copies of the Engine Owner's manual

ENGINE SERVICE MANUALS

There shall be one (1) printed hard copy set of Cummins engine service reference manuals which shall be provided with the chassis.

TRANSMISSION SERVICE MANUALS

There shall be one (1) printed hard copy set of Allison 3000 transmission service manuals included with the chassis.

MANUALS, APPARATUS BODY

The contractor shall supply, at time of delivery, at two-(2) sets of complete operation and service documentation covering the completed apparatus as delivered and accepted.

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

MANUALS, FIRE PUMP

There shall be two-(2) copies of pump manuals provided to the department.

SAFETY GUIDE

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One-(1) copy of the latest edition of FAMA's Fire Apparatus Safety Guide shall be provided with the completed apparatus.

CAB/CHASSIS AS BUILT WIRING DIAGRAMS

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

WIRING DIAGRAMS, APPARATUS BODY

There will be a complete set of generic electrical schematics provided at the time of delivery. These schematics will have each circuit properly numbered and in color.

The schematic will show each connector in the circuitry and the position in which each circuit enters, exits, or terminates. The schematic will be drawn in such a manner as to allow individual circuitry to be followed throughout the apparatus.

These schematics will not have the circuitry condensed into a single line or sets of lines. Multiple sheets will be acceptable so long as each of the harnesses is properly identified to the connecting sheet and harness. There will be a border around the paper(s), which contain alpha and numeric characters for indexing coordinate reference. There will be an indexing or part reference document for quick location of items shown on the schematics.

This document will refer the user to the appropriate drawing and page number and to sections of the drawing(s) by the means of letter and number coordinates. The schematic will show all harnesses used in the apparatus cab, chassis and body that is supplied by the chassis and body manufacturer.

Modifications to the manufactured standard harnesses are to be documented and properly indexed for quick identification.

A complete wire number, color, and function listing will accompany the schematics.

NFPA REQUIRED EQUIPMENT, FD SUPPLIED

The loose equipment as outlined in NFPA 1901, 2016 edition, section 5.9 thru 5.9.4 shall be provided by the fire department unless it is listed in this proposal. All loose equipment shall be installed on the apparatus before placed in emergency service, unless the Fire Department authorized agent signs the State of Exception as listed in the NFPA 1901 Standard for Automotive Fire Apparatus sections 4.21 thru 4.21.2.

LADDER(S), 10' FOLDING

There shall be one (1) Alco-Lite Model FL-10, 10' folding ladder(s) provided with the apparatus. The ladder(s) shall be aluminum, single-section with rubber feet. The ladder(s) shall meet or exceed the latest NFPA standards.

The ladder will be located in the ladder compartment.

LADDER(S), 14' ROOF

There shall be one (1) Alco-Lite model PRL-14, 14' roof ladder(s) supplied with the apparatus. The ladder(s) shall be aluminum, single-section with folding steel roof hooks on one end and steel spikes at the other. The ladder(s) shall meet or exceed the latest NFPA standards.

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The ladder will be located in the ladder compartment.

LADDER(S), 24' 2-SECTION EXTENSION

There shall be one (1) Alco-Lite model PEL-24, 24' two-section ladder(s) supplied with the apparatus. The extension ladder(s) shall be aluminum with steel spurs on one end. The ladder(s) shall meet or exceed the latest NFPA standards.

The ladder will be located in the ladder compartment.

SUCTION HOSE, 6"

There shall be two-(2) 10' x 6" sections of Kochek PVC flexible suction hose supplied with the apparatus. Lightweight aluminum couplings shall be provided on the suction hose. A long handle female swivel shall be provided on one end and a rocker lug male shall be provided for the other end.

STRAINER, 6" BARREL

There shall be one-(1) Kochek BS60C, 6" chrome plated barrel strainer supplied with the apparatus. The strainer shall have a 6" NH female connection.

BRACKET, STRAINER

There shall be a Kochek model MM601C chrome plated bracket provided for the purpose of mounting a 6" strainer on the apparatus. The bracket shall have 6" male NH connection.