# BUILD SPECIFICATIONS

##### MODEL

The chassis shall be a Panther 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 2024 model year.

##### COUNTRY OF SERVICE

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

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

##### CAB AND CHASSIS LABELING LANGUAGE

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

##### 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 FRONT AXLE WEIGHT RATINGS

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

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

##### GROSS AXLE WEIGHT RATINGS REAR

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

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

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

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

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

The exterior width of the cab shall be 94.00 inches wide with a minimum interior width of 88.00 inches. The overall cab length shall be 131.10 inches with 54.00 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 in the non- raised roof area 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 51.88 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 gea**r**. 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 gea**r**. 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 plate which shall be an integral part of the cab.

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

The front cab fascia shall include two (2) 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. Two (2) chrome plated bezels shall be provided on each side around each set of two lamps.

##### FRONT GRILLE

The front cab fascia shall include a Kovatch Mobile Equipment (KME) specific style, 304 stainless steel front grille.

##### CAB UNDERCOAT

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

##### CAB SIDE DRIP RAIL

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

##### CAB PAINT EXTERIOR

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

##### CAB PAINT PROCESS/MANUFACTURER

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

All metal surfaces on the cab shall be mechanically etched by sanding disc to remove any surface oxidation or surface debris which may hinder the paint adhesion. Once all imperfections on the exterior surfaces are removed and sanded smooth, body fillers shall be applied to the cab on all surfaces that require a critically aesthetic finish and sanded smooth.

The entire cab shall then be coated with a high quality base primer that is designed to fill any minor surface defects, provide an adhesive bond between the primer and the paint and improve the color and gloss retention of the color. The finish to this procedure shall be sanding the cab to a smooth finish followed by sealing the seams with an automotive seam sealer. The minimum thickness of the primer coat after sanding shall be 2.50 mils with a maximum thickness of 5.00 mils.

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

##### CAB PAINT PRIMARY/LOWER COLOR

The lower paint color shall be Sikkens FLNA 32528 Red.

##### CAB PAINT WARRANTY

Purchaser shall receive a Paint and Finish (Exterior Clear coated) Ten (10) Years limited warranty in accordance with, and subject to, warranty certificate RFW0710. The warranty certificate is incorporated by reference into this proposal, and included with this proposal or available upon request.

##### CAB PAINT INTERIOR

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

##### CAB ENTRY DOORS

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

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

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

##### CAB ENTRY DOOR TYPE

All cab entry doors shall be 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 a nonwoven polyester fiber insulation. The insulation shall act as a barrier absorbing noise as well as assisting in sustaining the desired climate within the cab interior.

##### CAB STRUCTURAL WARRANTY

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

**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.

##### VEHICLE DISPLAY

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

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

##### MULTIPLEX DISPLAY SPECIAL LAYOUT

The Vista display and control screen shall be configured specifically for the vista dimmer control screen to have two dimmer settings. The dimmer settings shall be labeled “DAY” (Normal) and “NIGHT”.

This shall omit the additional default settings “MAX” and “DIM”.

##### LOAD MANAGEMENT SYSTEM

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

##### DATA RECORDING SYSTEM

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

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

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

##### ACCESSORY POWER

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

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

##### EXTERIOR ELECTRICAL TERMINAL COATING

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

##### ELECTRICAL SYSTEM WARRANTY

Purchaser shall receive an Electrical System One (1) Year or 18,000 Miles limited warranty in accordance with, and subject to, warranty certificate RFW0201. The warranty certificate is incorporated by reference into this proposal, and included with this proposal or available upon request.

##### ENGINE

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

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

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

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

##### CAB ENGINE TUNNEL

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

**DIESEL PARTICULATE FILTER CONTROLS**

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

##### ENGINE PROGRAMMING HIGH IDLE SPEED

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

##### ENGINE HIGH IDLE CONTROL

The vehicle shall be equipped with a virtual button on the vehicle display and control screen, 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 vehicle display and control screen for the high idle speed control.

##### ENGINE PROGRAMMING ROAD SPEED GOVERNOR

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

##### AUXILIARY ENGINE BRAKE

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

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

##### AUXILIARY ENGINE BRAKE CONTROL

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

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

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

##### ELECTRONIC ENGINE OIL LEVEL INDICATOR

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

##### FLUID FILLS

The 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.

##### ENGINE WARRANTY

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

##### REMOTE THROTTLE HARNESS

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

##### ENGINE PROGRAMMING REMOTE THROTTLE

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

##### ENGINE PROGRAMMING IDLE SPEED

The engine low idle speed will be programmed at 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 cover shall be provided on the housing, reducing the chance of contaminating the air intake system during air filter service.

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

##### ENGINE FAN DRIVE

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

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

##### ENGINE COOLING SYSTEM

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

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

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

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

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

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

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

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

##### ENGINE COOLING SYSTEM PROTECTION

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

##### ENGINE COOLANT

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

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

##### ELECTRONIC COOLANT LEVEL INDICATOR

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

##### 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 filter (DPF), urea dosing module (UL2), and a selective catalytic reduction (SCR) catalyst to meet current EPA standards. The selective catalytic reduction catalyst utilizes a diesel exhaust fluid solution consisting of urea and purified water to convert NOx into nitrogen, water, and trace amounts of carbon dioxide. The solution shall be mixed and injected into the system through the DPF and SCR.

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

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

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

##### DIESEL EXHAUST FLUID TANK

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

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

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

##### ENGINE EXHAUST ACCESSORIES

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

The tail pipe shall have a drop in it to allow additional clearance from the body.

##### ENGINE EXHAUST WRAP

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

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

##### EMISSIONS SYSTEMS WARRANTY

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

**TRANSMISSION**

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

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

The transmission gear ratios shall be:

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

##### TRANSMISSION MODE PROGRAMMING

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

##### TRANSMISSION FEATURE PROGRAMMING

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

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

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

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

##### TRANSMISSION SHIFT SELECTOR

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

##### ELECTRONIC TRANSMISSION OIL LEVEL INDICATOR

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

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

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

##### TRANSMISSION COOLING SYSTEM

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

##### TRANSMISSION DRAIN PLUG

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

##### TRANSMISSION WARRANTY

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

##### PTO LOCATION

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

##### DRIVELINE

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

##### MIDSHIP PUMP / GEARBOX

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

See PDF for specific hole pattern.

##### MIDSHIP PUMP / GEARBOX MODEL

The midship pump/gearbox provisions shall be for a Waterous CXSC20 or C22 pump.

##### MIDSHIP PUMP GEARBOX DROP

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

##### MIDSHIP PUMP RATIO

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

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

The midship pump shall be located so the dimension from the centerline of the suction to the centerline of the rear axle is 101.50 inches.

##### PUMP SHIFT CONTROLS

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

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

##### PUMP SHIFT CONTROL PLUMBING

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

##### FUEL FILTER / WATER SEPARATOR

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

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

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

##### FUEL LINES

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

##### FUEL SHUTOFF VALVE

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

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

##### ELECTRIC FUEL PRIMER

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

##### FUEL COOLER

A fuel cooler shall be provided to lower fuel temperature allowing the vehicle to operate at higher ambient temperatures. The fuel cooler shall include an electrical fan and temperature-controlled relay switch.

##### 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-curved pencil hardness of H-2H. The direct impact resistance test per ASTM D2794, results to be 5B minimum.

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

##### FUEL TANK STRAP MATERIAL

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

##### FUEL TANK FILL PORT

The fuel tank fill ports shall be 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.

A 1.25 inch diameter hole shall be provided in the left and right frame rails for vent hose routing provisions. The holes shall be located adjacent to the fuel tank and 5.13 inches up from the bottom of each rail.

##### FUEL TANK SERVICEABILTY PROVISIONS

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

##### FUEL TANK DRAIN PLUG

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

##### FRONT AXLE

The front axle shall be a Hendrickson STEERTEK Non-drive front axle, NXT Fire/Rescue model. The axle shall include a 3.74 inch drop and a 70.87 inch king pin intersection (KPI). The axle shall be a box- shaped fabricated beam with integrated suspension. The axle shall include a conventional style hub with a standard knuckle. The weight capacity for the axle shall be rated to 22,000 pounds.

##### FRONT WHEEL BEARING LUBRICATION

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

##### FRONT SHOCK ABSORBERS

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

##### FRONT SUSPENSION

The front suspension shall include a parabolic leaf spring pack integrated into the Hendrickson STEERTEK NXT axle consisting of 58.40 inches long and 4.00 inches wide tapered leaf springs and shall feature a military double wrapped front eye. Spring eyes shall have Hendrickson’s proprietary threaded pin bushings to increase roll stiffness. The spring capacity shall be rated specifically to the axle configuration from 18,000 and up to 24,000 pounds.

##### STEERING COLUMN/ WHEEL

The cab shall include a Douglas Autotech steering column which shall include a seven (7) position tilt, a

2.25 inch telescopic adjustment, and an 18.00 inch, four (4) spoke steering wheel located at the driver’s position. The steering wheel shall be covered with black polyurethane foam padding.

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

##### ELECTRONIC POWER STEERING FLUID LEVEL INDICATOR

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

##### POWER STEERING PUMP

The hydraulic power steering pump shall be a TRW PS and shall be gear driven from the engine. The pump shall be a balanced, positive displacement, sliding vane type. 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 85 with an assist cylinder.

##### CHASSIS ALIGNMENT

The chassis frame rails shall be measured to ensure 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 synthetic oil.

##### 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.

##### REAR WHEEL BEARING LUBRICATION

The rear axle wheel bearings shall be lubricated with synthetic oil.

##### VEHICLE TOP SPEED

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

##### REAR SUSPENSION

The single rear axle shall feature a Reyco 79KB vari-rate, self-leveling captive slipper type 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 Michelin 385/65R22.5 “L” tubeless radial X Multi HL Z regional tread.

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

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

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

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

##### REAR TIRE

The rear tires shall be Michelin 12R-22.5 16PR "H" tubeless radial XDN2 all-weather 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 Michelin Intermittent Service Rating maximum load capacity shall be 29,020 pounds per axle with a maximum speed of 75 miles per hour when properly inflated to 120 pounds per square inch.

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

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

##### REAR AXLE RATIO

The rear axle ratio shall be 5.38:1.

##### TIRE PRESSURE INDICATOR

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

##### FRONT WHEEL

The front wheels shall be Alcoa hub piloted, 22.50 inch X 12.25 inch aluminum wheels. The outer face of the wheels shall feature Alcoa’s Dura-Bright® finish as an integral part of the wheel surface. Alcoa Dura-Bright® wheels keep their shine without polishing. Brake dust, grime and road debris are easily

removed by simply cleaning the wheels with soap and water. The hub piloted mounting system shall provide easy installation and shall include two-piece flange nuts.

##### REAR WHEEL

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

##### BALANCE WHEELS AND TIRES

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

##### WHEEL TRIM

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

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

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

##### BRAKE SYSTEM

A rapid build-up air brake system shall be provided. The air brakes shall include, at a minimum, a two

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

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

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

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

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

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

##### FRONT BRAKES

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

##### REAR BRAKES

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

##### REAR BRAKE SLACK ADJUSTERS

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

##### AIR DRYER

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

##### FRONT BRAKE CHAMBERS

The front brakes shall be provided with type 24 brake chambers as supplied with the Hendrickson STEERTEK NXT axle.

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

##### AIR GOVERNOR

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

##### MOISTURE EJECTORS

An automatic moisture ejector with a manual drain provision shall be installed on the wet tank of the air supply system. Manual pet-cock type drain valves shall be installed on all remaining 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.

Push to connect type fittings shall be used on the nylon tubing. All drop hoses shall include fiber reinforced neoprene covered hoses.

##### AIR TANK SPACERS

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

##### REAR AIR TANK MOUNTING

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

**WHEELBASE**

The chassis wheelbase shall be 206 inches.

##### REAR OVERHANG

The chassis rear overhang shall be 47 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.

##### REAR TOW DEVICE

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

##### FRAME PAINT

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

Main frame “C” channel or channels

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

Steering gear bracket

Front splayed rails and fish plates Bumper extensions

Cross members

Cross member gussets

Fuel tank mounting brackets

Fuel tank straps (unless material/finish is specified in 3130 subcat) Air tanks (unless color coded tanks are specified in 3205 subcat) Air tank mounting brackets

Exhaust mounting brackets Air cleaner skid plate Radiator skid plate

Battery supports, battery trays and battery covers

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

Suspension components Front and rear axles

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

##### FRAME ASSEMBLY STRUCTURAL

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

**FRAME RAIL CORROSION**

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

##### FRAME COMPONENTS CORROSION

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

##### 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 inches high and 99 inches wide.

##### FRONT BUMPER EXTENSION LENGTH

The front bumper shall be extended approximately 18 inches ahead of the cab.

##### FRONT BUMPER APRON

The 18 inch extended front bumper shall include an apron constructed of 0.19 inch thick embossed aluminum tread plate.

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

##### FRONT BUMPER COMPARTMENT CENTER

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

**FRONT BUMPER COMPARTMENT COVER HARDWARE**

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

##### AIR HORN

The front bumper shall include two (2) Hadley brand E-Tone air horns which shall measure 21 inches long with a 6 inch round flare. The air horns shall be trumpet style with a chrome finish on the exterior and a painted finish deep inside the trumpet.

##### AIR HORN LOCATION

The air horns shall be recess mounted in the front bumper face on the right side of the bumper in the inboard and outboard positions relative to the right 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) Whelen Engineering Inc. model SP123BMC, 100 watt cast aluminum speaker provided. The speaker shall measure 7.25 inches tall X 9.25 inches wide X 5.25 inches deep. The speaker shall include a chrome grille.

##### 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 tow hooks, painted to match the frame components, shall be installed in the rearward position out of the approach angle area, bolted directly to the side 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.

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

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

##### CAB TILT AUXILIARY PUMP

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

##### CAB TILT LIMIT SWITCH

A cab tilt limit switch shall be installed. The switch will effectively limit the travel of the cab when being tilted. The final adjustment of the switch shall be performed by the apparatus manufacturer to prevent damage to the cab or any bumper mounted option mounted in the cab tilt arc.

##### 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.

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 RIGHT REAR DOOR

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 RIGHT REAR DOOR

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

##### GLASS LEFT REAR DOOR

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 LEFT REAR DOOR

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

##### GLASS RIGHT SIDE MID

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 RIGHT SIDE MID

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

##### GLASS LEFT SIDE MID

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

##### GLASS TINT LEFT SIDE MID

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

##### CLIMATE CONTROL

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

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

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

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

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

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

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

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

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

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

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

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

##### CLIMATE CONTROL DRAIN

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

##### CLIMATE CONTROL ACTIVATION

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

##### HVAC OVERHEAD COVER PAINT

The overhead HVAC cover shall be painted with a multi-tone silver gray texture finish.

##### A/C CONDENSER LOCATION

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

##### A/C COMPRESSOR

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

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

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

Refrigerant Compressor displacement: 19.1 cubic inches per revolution.

##### UNDER CAB INSULATION

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

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

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

The insulation shall be cut precisely to fit each section and sealed for additional heat and sound deflection. The insulation shall be held in place by acrylic pressure sensitive adhesive. In addition, the insulation shall have a removable aluminum overlay installed to protect the insulation and assist in retaining the insulation tight against the engine tunnel surfaces.

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

##### INTERIOR TRIM FLOOR

The floor of the cab shall be covered with a multi-layer mat consisting of 0.25 inch thick sound absorbing closed cell foam with a 0.06 inch thick non-slip vinyl surface with a pebble grain finish. The covering shall be held in place by a pressure sensitive adhesive and 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 bright finish aluminum tread plate.

##### 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.

##### LEFT DASH TRIM

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

##### RIGHT DASH TRIM

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.

##### STEP TRIM

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

##### UNDER CAB ACCESS DOOR

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

##### INTERIOR DOOR TRIM

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

**DOOR TRIM KICKPLATE**

The inner door panels shall include an aluminum tread kick plate which shall be fastened to the lower portion of the door panels.

##### CAB DOOR TRIM REFLECTIVE

The interior of each door shall include high visibility reflective tape. A white reflective tape shall be provided vertically along the outer rear edge of the door. The lowest portion of each door skin shall include a reflective tape chevron with red and yellow stripes. The chevron tape shall measure 6.00 inches in height.

##### 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.

##### INTERIOR SOFT TRIM COLOR

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

##### INTERIOR TRIM SUNVISOR

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

##### INTERIOR FLOOR MAT COLOR

The cab interior floor mat shall be gray in color.

##### CAB PAINT INTERIOR

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

##### HEADER TRIM INTERIOR PAINT

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

##### TRIM CENTER DASH INTERIOR PAINT

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

##### TRIM LEFT HAND DASH INTERIOR PAINT

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

##### TRIM RIGHT HAND DASH INTERIOR PAINT

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

##### DASH PANEL GROUP

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

##### SWITCHES CENTER PANEL

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

##### SWITCHES LEFT PANEL

The left dash panel shall include three (3) switches. Two (2) of the switches shall be rocker type and the left one (1) shall be the windshield wiper/washer control switch.

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 be six (6) rocker switch positions in a three (3) over three (3) switch configuration.

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

##### SEAT BELT WARNING

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

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

##### SEAT MATERIAL

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

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

##### 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 manufacturer’s logo. The logo shall be centered on the standard headrest of the seat back and on the left side of a split headrest.

##### DRIVER SEAT

The driver's seat shall be an H.O. Bostrom 500 Series Firefighter Sierra model seat. The seat shall feature eight-way electric positioning. The eight positions shall include up and down, fore and aft with

8.00 inches of travel, back angle adjustment and seat rake adjustment. The seat shall feature integral springs to isolate shock.

The seat shall feature an all belts to seat (ABTS) style of safety restraint. The ABTS feature shall include a three-point shoulder harness with the lap belt, automatic retractor and buckle as an integral

part of the seat assembly. The ABTS feature shall also include the RiteHite™ shoulder adjustment feature to provide enhanced comfort and safety by allowing customized seat belt fit.

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

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

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

##### DRIVER SEAT BACK

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

##### SEAT MOUNTING DRIVER

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

##### OFFICER SEAT

The officer's seat shall be an H.O. Bostrom 500 Series Sierra model seat. The seat shall feature two-way manual adjustment and shall include a tapered and padded seat cushion. The seat shall also feature integral springs to isolate shock.

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

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

This model of seat shall have successfully completed the static load tests by FMVSS 207, 209, 210 and 302 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 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.

##### OFFICER SEAT BACK

The officer’s seat shall feature a SecureAll™ SCBA locking system which shall be one bracket model and store most U.S. and International SCBA brands and sizes while in transit or for storage within the

seat back. The bracket shall be easily adjustable for all SCBA brands and cylinder diameters. All adjustment points shall utilize similar hardware and adjustments shall be made with one tool.

The bracket shall be adjustable to compensate for different cylinder lengths without the use of tools. The adjustment shall be made by raising a lever and moving the top clamp vertically**.**

The bracket system shall be free of straps and clamps that may interfere with auxiliary equipment on SCBA units. The center guide fork shall keep the SCBA tank in place for a safe and comfortable fit in the seat back cavity. The SCBA unit simply needs to be pushed against the pivot arm to engage the patented auto- locking system. Once the lock is engaged, the top clamp shall surround the top of the SCBA tank for a secure fit in all directions.

The SecureAll™ shall include a release handle which shall be integrated into the seat cushion for quick and easy release. This shall eliminate the need for straps or pull cords to interfere with other SCBA equipment.

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

##### SEAT MOUNTING OFFICER

The officer’s seat shall offer a special mounting position which is 4.00 inches rearward of the standard location offering increased leg room for the occupant.

##### POWER SEAT WIRING

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

##### SEAT BELT ORIENTATION CREW

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

##### OUTER REAR FACING SEAT LOCATIONS

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.

##### OUTER REAR FACING CREW SEATS

The crew area shall include a seat in the rear facing outboard position which shall be an H.O. Bostrom 500 Series Firefighter model seat. The seat shall feature a tapered and padded seat, and cushion. The seat shall be mounted in a fixed position.

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

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

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

##### OUTER REAR FACING SEAT BACKS

The rear facing outboard seat shall feature a Bostrom SecureAll™ self-contained breathing apparatus (SCBA) locking system which shall store most U.S. and International SCBA brands and bottle sizes while in transit or for storage within the seat back. The bracket shall be easily adjustable for all SCBA brands and cylinder diameters. All adjustment points shall utilize similar hardware and adjustments shall be made with one tool.

The bracket shall be adjustable to compensate for different cylinder lengths without the use of tools. The adjustment shall be made by raising a lever and moving the top clamp vertically**.**

The bracket system shall be free of straps that may interfere with auxiliary equipment on SCBA units. The center guide fork shall keep the SCBA tank in place for a safe and comfortable fit in the seat back cavity. The SCBA unit simply needs to be pushed against the pivot arm to engage the patented auto- locking system. Once the lock is engaged, the top clamp shall surround the top of the SCBA tank for a secure fit in all directions.

The SecureAll™ shall include a release handle which shall be integrated into the center of the bottom seat cushion for easy access and to eliminate hooking the release handle with clothing or other equipment.

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

##### SEAT MOUNTING REAR FACING OUTER

The right hand rear facing outer seat shall offer a special mounting position which shall be 3.75 inches rearward of the standard mounting location offering additional room ahead of the seat.

##### CENTER FORWARD FACING CREW SEATS

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

##### CENTER FORWARD FACING CREW SEATS

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

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

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

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

##### CENTER FORWARD FACING CREW SEAT BACKS

The forward facing center seat shall feature a SecureAll™ self-contained breathing apparatus (SCBA) locking system which shall be one bracket model and store most U.S. and International SCBA brands and sizes while in transit or for storage within the seat back. The bracket shall be easily adjustable for all SCBA brands and cylinder diameters. All adjustment points shall utilize similar hardware and adjustments shall be made with one tool.

The bracket shall be adjustable to compensate for different cylinder lengths without the use of tools. The adjustment shall be made by raising a lever and moving the top clamp vertically**.**

The bracket system shall be free of straps and clamps that may interfere with auxiliary equipment on SCBA units. The center guide fork shall keep the SCBA tank in place for a safe and comfortable fit in the seat back cavity. The SCBA unit simply needs to be pushed against the pivot arm to engage the patented auto- locking system. Once the lock is engaged, the top clamp shall surround the top of the SCBA tank for a secure fit in all directions.

The SecureAll™ shall include a release handle which shall be integrated into the seat cushion for quick and easy release. This shall eliminate the need for straps or pull cords to interfere with other SCBA equipment.

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

##### SEAT FRAME FORWARD FACING

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 with an opening that measures 13.75 inches wide X 10.00 inches high.

##### FORWARD FACING CREW SEAT MOUNTING

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 under seat storage compartment access doors shall feature a medium gray spray on bedliner coating.

##### WINDSHIELD WIPER SYSTEM

The cab shall include a triple arm linkage wiper system which shall clear the windshield of water, ice and debris. There shall be two (2) windshield wipers; each shall be affixed to a radial arm. The wiper motor shall be activated by an intermittent wiper control located within easy reach of the driver’s position.

##### 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

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

##### REARVIEW MIRRORS

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

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

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

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

##### REARVIEW MIRROR HEAT SWITCH

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

##### EXTERIOR REAR WALL TRIM

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.

##### CAB FENDER

Wheel well liners shall be integrated into cab design and include a bed liner undercoat to limit road splash and enable easier cleaning. Each outer fenderette shall be 5.00 inches wide made of SAE 304 polished stainless steel.

##### CAB EXTERIOR FRONT & SIDE EMBLEMS

The cab shall include three (3) Kovatch Mobile equipment (KME) emblems. There shall be one (1) installed on the front grille and one (1) emblem on each of the cab sides. The emblems on the cab sides shall be centered horizontally on the B pillars of the cab and located vertically approximately halfway up the cab side front door windows.

##### IGNITION

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

##### BATTERY

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

##### BATTERY TRAY

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

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

##### BATTERY BOX COVER

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

##### BATTERY CABLE

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

##### BATTERY JUMPER STUD

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

##### ALTERNATOR

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

##### STARTER MOTOR

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

##### BATTERY CONDITIONER

A Kussmaul Auto Charge Chief 4012 battery conditioner shall be supplied. The battery conditioner shall provide a 40 amp output for the chassis batteries and a 20 amp output circuit for accessory loads. The battery conditioner shall be mounted in the cab in the LH rear facing outer seating position and shall include a battery temperature sensor.

##### BATTERY CONDITIONER DISPLAY

A Kussmaul universal status center battery conditioner display shall be supplied. The display shall indicate full charge, low charge, charging, and a three (3) digit voltage reading. The battery conditioner display shall be mounted in front of the left side door just below the windshield.

##### ELECTRICAL INLET LOCATION

An electrical inlet shall be installed on the left hand side of the cab ahead of the front door.

##### ELECTRICAL INLET

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

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

***Amp Draw Reference List:*** *Kussmaul 40 LPC Charger - 5 Amps Kussmaul 40/20 Charger - 8.5 Amps Kussmaul 80 LPC Charger - 13 Amps Kussmaul EV-40 - 6.2 Amps*

*Blue Sea P12 7532 - 7.5 Amps Iota DLS-45/IQ4 - 11 Amps 1000W Engine Heater - 8.33 Amps 1500W Engine Heater - 12.5 Amps 120V Air Compressor - 4.2 Amps 120V Dometic HVAC - 15 Amps*

##### ELECTRICAL INLET CONNECTION

The electrical inlet shall be connected to the battery conditioner.

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

**HEADLIGHT AND MARKER LIGHT ACTIVATION**

The headlights and marker lights shall be controlled via a virtual button on the Vista display. 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 when the ignition switch is in the "On" position and the parking brake is released.

##### INTERIOR OVERHEAD LIGHTS

The cab shall include an LED dome lamp located over each door. The lights shall include push switches on each lamp to activate both the clear and red portions of the light individually.

##### INTERIOR OVERHEAD LIGHTS ACTIVATION

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

##### AUXILIARY DOME LIGHT FRONT CENTER

The cab shall include an LED dome lamp as an auxiliary dome light. The auxiliary dome light shall be located over the engine tunnel. The light shall include push switches to activate both the clear and red portions of the light individually.

##### FRONT CREW AREA AUXILIARY DOME LIGHT

The cab shall include two (2) Whelen LED red/clear type auxiliary dome lights in the headliner inboard of the rear facing crew seat. They shall be rectangular shaped and measure approximately 7.00 inches in length X 3.00 inches in width, with a black colored bezel. The clear portion of each light shall be activated by the rear doors as well as a push button on each light. The red portion of each light shall be activated by a push button on each light only.

##### LIGHT BAR PROVISION

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

##### CAB FRONT LIGHT BAR 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.

##### LIGHT BAR SWITCH

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

##### FRONT SCENE LIGHTS

The front of the cab shall include a Whelen Pioneer model PCH2 contour roof mount scene light installed on the brow of the cab.

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

##### FRONT SCENE LIGHT LOCATION

There shall be one (1) scene light mounted center on the front brow of the cab.

##### FRONT SCENE LIGHTS ACTIVATION

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

##### SIDE SCENE LIGHTS

The cab shall include two (2) Whelen M9 LED scene lights, one (1) each side which shall be surface mounted. The Whelen lights shall provide directional lighting from twenty four (24) Super-LEDs and a clear gradient lens. The scene light shall have specialized TIR optics for ideal scene illumination.

##### SIDE SCENE LIGHT LOCATION

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

##### SIDE SCENE ACTIVATION

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

##### REAR SCENE LIGHTS

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

##### REAR SCENE LIGHT ACTIVATION

The rear scene lights shall be activated via a virtual button on the Vista display and control screen, a lighted momentary rocker switch on the dash labeled “REAR SCENE LTS”, and when the transmission is placed in reverse.

##### LED GROUND LIGHTS – CAB STEP

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

##### LED GROUND LIGHTING ACTIVATION

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

##### UNDER BUMPER LIGHTS

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

##### 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 the front doors shall include a TecNiq D06 LED light within a chrome housing. The front egress step lights shall provide visibility to the step well area for the first step exiting the vehicle. The Egress step lights shall activate with entry step lighting.

##### ENGINE COMPARTMENT LIGHT

There shall be a LED NFPA compliant light mounted under the engine tunnel for area work lighting on the engine. The light shall activate automatically when the cab is tilted.

##### DO NOT MOVE APPARATUS LIGHT

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

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

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

##### MASTER WARNING SWITCH

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

##### HEADLIGHT FLASHER

An alternating high beam headlight flashing system shall be installed into the high beam headlight circuit which shall allow the high beams to flash alternately from left to right.

Deliberate operator selection of high beams will override the flashing function until low beams are again selected. Per NFPA, these clear flashing lights will also be disabled “On Scene” when the park brake is applied.

##### HEADLIGHT FLASHER SWITCH

The flashing headlights shall be activated through a virtual button on the Vista display and control screen.

##### INBOARD FRONT WARNING LIGHTS

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

##### INBOARD FRONT WARNING LIGHTS COLOR

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

##### FRONT WARNING SWITCH

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

##### INTERSECTION WARNING LIGHTS

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

##### INTERSECTION WARNING LIGHTS COLOR

The intersection lights shall be red with a clear lens.

##### INTERSECTION WARNING LIGHTS LOCATION

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

##### SIDE WARNING LIGHTS

The cab sides shall include two (2) Whelen M6 Super LED warning lights, one (1) on each side. The lights shall feature multiple flash patterns including steady burn for solid colors and multiple flash

patterns for split colors. The lights shall be mounted to the sides of the cab within a chrome bezel. The light shall be programmed to emit the "Triple Flash 75” in/out flash pattern.

##### SIDE WARNING LIGHTS COLOR

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

##### SIDE WARNING LIGHTS LOCATION

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

##### SIDE AND INTERSECTION WARNING SWITCH

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

##### INTERIOR DOOR OPEN WARNING LIGHTS

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

##### SIREN CONTROL HEAD

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

##### STEERING WHEEL HORN BUTTON SELECTOR SWITCH

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

##### AIR HORN AUXILIARY ACTIVATION

The air horn activation shall be accomplished by a black momentary push button on the switch panel. An air horn activation circuit shall be provided to the chassis harness pump panel harness connector.

**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.

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 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 white LED backlighting.

##### RADIO

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

##### RADIO AUXILIARY INPUT

There shall be an auxiliary audio port with USB interface and 1/8” stereo input jack for use with smart phone or a portable electronic device. The auxiliary port shall be located within the center dash switch panels in a location chosen by the customer.

##### RADIO LOCATION

The radio shall be installed in the left hand overhead position above the driver.

##### AM/FM ANTENNA

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

##### RADIO SPEAKERS

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

##### REAR CAMERA

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

The camera system shall include a one-way communication device that shall be an integral part of the rear camera for the use of voice commands directly to the driver. The rear camera display shall activate when the vehicle’s transmission is placed in reverse.

##### CAMERA DISPLAY

The camera system shall be wired to a single vehicle display and control screen located on the driver’s side dash. The camera system display can be activated through the vehicle display and control screen.

**CAMERA SPEAKER**

The rear camera shall be wired to speaker(s) in the cab and shall audible to the driver and officer. There shall be a virtual button provided on the Vista display and control panel to deactivate the speaker(s).

##### CAB EXTERIOR PROTECTION

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

##### FIRE EXTINGUISHER

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

##### DOOR KEYS

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

##### WARRANTY

Purchaser shall receive a Custom Chassis One (1) Year or 18,000 Miles limited warranty in accordance with, and subject to, warranty certificate RFW0101. The warranty certificate is incorporated by reference into this proposal, and included with this proposal or available upon request.

##### CHASSIS OPERATION MANUAL

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

##### ENGINE AND TRANSMISSION OPERATION MANUALS

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

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

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

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

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

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

**LIABILITY INSURANCE COVERAGE**

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

**GENERAL WARRANTY**

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

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

**STRUCTURAL BODY WARRANTY**

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

**PAINT WARRANTY**

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

**PUMP WARRANTY**

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

**PLUMBING WARRANTY**

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

**TANK WARRANTY**

A lifetime tank warranty shall be provided by the tank manufacturer, Pro Poly.

**MULTI-PLEXED ELECTRICAL WARRANTY**

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

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

**PUMP CERTIFICATION AND TESTING**

The apparatus upon completion will be tested and certified by Underwriters Laboratories, LLC. The certification tests will follow the guidelines outlined in (NFPA) 1901, Standard for Automotive Fire Apparatus.

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

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

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

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

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

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

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

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

**Pumping Test:**

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

Tests shall be performed when conditions are as follows:

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

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

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

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

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

(1) Foam pump

(2) Winch

(3) Windshield wipers

(4) Four-way hazard flashers

(5) Compressed air foam system (CAFS) compressor

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

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

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

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

**Pumping Engine Overload Test:**

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

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

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

**Pressure Control System Test:**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

**Priming System Tests:**

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

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

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

**Vacuum Test:**

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

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

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

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

**Water Tank–to–Pump Flow Test:**

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

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

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

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

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

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

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

(7) The discharge pressure shall be recorded.

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

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

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

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

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

**Volume Discharge Calculation:**

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

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

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

**Engine Speed Advancement Interlock Test**

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

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

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

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

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

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

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

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

1. The chassis transmission is in neutral, the transfer case is in neutral, the parking brake is off, and the pump shift in the driving compartment is in the road position.
2. The chassis transmission is in neutral, the transfer case is engaged, the parking brake is off, and the pump shift in the driving compartment is in the road position.
3. The chassis transmission has been placed in the position for pumping as indicated on the label provided in the driving compartment, the parking brake is on, and the pump shift in the driving compartment is in the road position.

**LOW-VOLTAGE ELECTRICAL SYSTEM PERFORMANCE TESTING**

The apparatus low-voltage electrical system will be tested and certified. Tests shall be performed when the air temperature is between 0°F and 110°F (–18°C and 43°C). The three tests defined in NFPA shall be performed in the order in which they appear. Before each test, the batteries shall be fully charged until the voltage stabilizes at the voltage regulator set point and the lowest charge current is maintained for 10 minutes. Failure of any of these tests shall require a repeat of the sequence.

**Reserve Capacity Test:**

The engine shall be started and kept running until the engine and engine compartment temperatures are stabilized at normal operating temperatures and the battery system is fully charged.

The engine shall be shut off and the minimum continuous electrical load shall be activated for 10 minutes.

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

**Alternator Performance Test at Idle:**

The minimum continuous electrical load shall be activated with the engine running at idle speed.

The engine temperature shall be stabilized at normal operating temperature.

The battery system shall be tested to detect the presence of battery discharge current. The detection of battery discharge current shall be considered a test failure.

**Alternator Performance Test at Full Load:**

The total continuous electrical load shall be activated with the engine running up to the engine manufacturer’s governed speed.

The test duration shall be a minimum of 2 hours.

Activation of the load management system shall be permitted during this test.

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

**Low Voltage Alarm Test:**

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

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

The battery voltage shall be measured at the battery terminals.

The test shall be considered a failure if the alarm has not yet sounded 140 seconds after the voltage drops to 11.70V for a 12 V nominal system or 23.4 V for a 24 V nominal system.

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

**Certification Documentation:**

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

(1) Documentation of the electrical system performance tests.

(2) A written electrical load analysis, including the following:

(a) The nameplate rating of the alternator.

(b) The alternator rating under the conditions specified above.

(c) Each of the component loads specified that make up the minimum continuous electrical load.

(d) Additional electrical loads that, when added to the minimum continuous electrical load, determine the total continuous electrical load.

(e) Each individual intermittent electrical load.

**WARNING AND INFORMATION LABELS**

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

**MAXIMUM OVERALL LENGTH REQUIREMENT**

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

**MAXIMUM OVERALL HEIGHT REQUIREMENT**

The Apparatus specified shall be constructed as detailed and shall NOT exceed a Maximum Overall Height of 9 feet 8 inches.

**MAXIMUM WHEEL BASE REQUIREMENT**

The Apparatus specified shall be constructed as detailed and shall NOT exceed a Maximum Wheel Base of 206 inches.

**CHASSIS REQUIRED LABELING**

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

They shall be visible from each seating position.

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

- Engine oil

- Engine Coolant

- Transmission Fluid

- Pump Transmission Lubrication Fluid

- Drive Axle Lubrication Fluid

- Generator Lubrication Fluid (where applicable)

- Tire Pressures

**APPARATUS INFORMATION LABEL**

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

The label shall indicate the following specified information.

Overall Height (feet and inches)

Overall Length (feet and inches)

Overall GVWR (tons or metric tons)

**APPARATUS STABILITY (CG) CALCULATED STABILITY**

Vehicle stability or roll stability shall be presented by methods of calculations or measurements per (NFPA) 1901, Standard for Automotive Fire Apparatus. The calculated or measured center of gravity (CG) shall be no higher than 80 percent of the rear axle track width.

The manufacture shall utilize supplied documents and information detailing specific equipment and locations for purposes of calculating CG. If no such information is supplied the manufacture shall estimate approximate equipment loads based upon the vehicle configuration for such calculations in correspondence with (NFPA) 1901, Standard for Automotive Fire Apparatus, required loadings.

Upon acceptance of the vehicle, a signed manufacture written certification shall be supplied with the fire apparatus before delivery.

**HELMET RESTRAINTS**

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

**MUD FLAPS**

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

**CAB TILT PENDANT CONTROL**

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

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

**HEAT EXCHANGER**

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

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

**FUEL FILL DOOR**

There shall be an aluminum fuel fill assembly located on the apparatus body accessing the chassis supplied fuel tank. The fuel fill shall be located in the upper rear area of the driver side wheel well, behind the axle.

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

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

**TOP MOUNT PUMP CONTROL MODULE**

The top mount pump operator's control module shall be a console style operated control panel with the operator facing the rear of the apparatus while using the controls. Access to the top mount control panel shall be provided from either side of the apparatus through a walkway support structure. The operator control area shall span the entire width of the pump control module.

The top mount pump control module shall be a self-supported structure mounted independently from the body and chassis cab. The pump module frame shall be constructed entirely of 6061-T6 aluminum extrusions and 5052-H32 aluminum plate.

The pump module design shall allow normal frame deflection through isolation mounts without imposing stress on the pump module structure, walkway area, or side running boards. The pump module support shall bolt directly to the chassis frame web.

**VIBRA-TORQUE™ PUMP MODULE MOUNTING SYSTEM**

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

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

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

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

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

**PUMP COMPARTMENT WORK LIGHT**

One (1) 24.00 inch (61.00 cm) OnScene Solutions "Access" series tube light shall be installed inside the pump compartment module to illuminate the plumbing and piping components.

The work light shall activate with the same rocker switch as the pump panel lights.

**PUMP MODULE PANELS**

The panels shall be an integral part of the pump module structure. The driver’s and officer's side panels shall consist of a fixed diamond plate panel and a removable full height panel. The panels shall provide ease of access for service and maintenance. The panels shall be attached to the module frame utilizing mechanical latching devices.

**OPERATOR’S GAUGE PANEL**

The top operator's gauge panel shall include an integrated formed light shield at the top edge. The gauge panel shall span the entire width of the pump control module. The panel shall be designed to pivot forward and allow access to the backside of the components installed in the panel. Cable hold-open straps shall be mounted on the gauge panel and module structure to prevent the panel from being completely detached from the pump module.

**PUMP PANEL & OPERATOR'S PANEL FINISH**

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

**TOP MOUNT PUMP PANEL LIGHTING**

Illumination shall be provided for viewing controls, switches, gauges and instructional labels necessary for proper operation of the apparatus and equipment installed.

The top operator's control panel shall be illuminated by two (2) 24.00 inch (61.00 cm) OnScene "Access" lights mounted outboard, and one (1) 10.00 inch (24.50 cm) OnScene "Access" LED tube light center mounted within the control panel's integrated light shield.

The side pump panels shall be illuminated by OnScene "Access" LED tube lights installed within gusseted reinforced embossed aluminum diamond plate steps. One (1) mounted on the driver's side and one (1) on the officer's side directly above the main pump access panels. The steps shall serve as light sheilds being a minimum of 8" deep and have a handrail incorporated into the step. The steps shall be mounted with 3/8" bolts. One (1) mounted on the driver's side and one (1) on the officer's side directly above the main pump access panels.

**PUMP PANEL SWITCHING**

There shall be a rocker switch located on the operator's pump panel to turn the driver’s and officer’s side panel lights and the top panel lights on or off.

**ROCKER SWITCH PANEL**

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

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

**WALKWAY**

An embossed aluminum diamond plate walkway shall be provided at the front of the top operator's module and shall be approximately 20.00 inches wide.

The walkway shall be integral to the pump compartment module.

**WALKWAY STEPS**

Two (2) steps shall be installed between the running board and operator walkway surface, one (1) each side.

Each surface of the step shall be manufactured of a fixed formed embossed aluminum diamond plate and be capable of sustaining a 500 pound static load.

**WALKWAY LIGHTING**

Two (2) OnScene 9.00 inch "Access Pro" LED strip lights with an aluminum bezel shall be installed to illuminate the top mount walkway stepping areas, one (1) each side at the front of the pump compartment module.

Two (2) OnScene 9.00 inch "Access Pro" LED strip lights with an aluminum bezel shall be installed to illuminate the side stepping areas, one (1) each side under the fixed step.

The lights shall be directed towards and positioned to illuminate the stepping surfaces.

**WALKWAY LIGHTING ACTIVATION**

The walkway step lights shall be activated when the park brake is set.

**HANDRAILS**

Two (2) 1.25-inch (31.75 mm) diameter handrail constructed of extruded aluminum with 18.00 inches of grip surface shall be installed one (1) each side of the pump compartment module to assist in climbing the steps according to (NFPA) 1901, Standard for Automotive Fire Apparatus. The handrails shall use off-set stanchions angling them toward the walkway.

There shall be a 2.00 inch (50.80 mm) minimum clearance between the bracket and the body.

**VALVE CONTROL – TOP MOUNT ASSEMBLY**

Unless specified otherwise, the valves shall be controlled from a top mounted locking valve actuation control assembly that shall be installed on the specified discharge and suction. The Class 1 assembly shall have a round chrome plated handle with an ergonomically designed surface to allow for a secure grip to turn and lock the handle. The assembly shall have a name plate insertion recess area. A brass bushing and stainless steel rod shall never require lubrication. The valve operating mechanism will indicate the position of the valve at all times.

**RUNNING BOARDS**

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

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

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

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

**RUNNING BOARD HOSE WELL**

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

**HOSE RESTRAINTS**

There shall be two (2) Velcro straps installed at the top of the hose well. The straps shall be used to hold the hose in place during transit.

**APPARATUS PLUMBING LABELING**

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

**PRESSURE GOVERNOR AND MONITORING DISPLAY**

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

The following continuous displays shall be provided:

* Pump discharge; shown with four daylight bright LED digits more than 1/2" high
* Pump Intake; shown with four daylight bright LED digits more than 1/2" high
* Pressure / RPM setting; shown on a dot matrix message display
* Pressure and RPM operating mode LEDs
* Throttle ready LED
* Engine RPM; shown with four daylight bright LED digits more than 1/2" high
* Check engine and stop engine warning LEDs
* Oil pressure; shown on a dual color (green/red) LED bar graph display
* Engine coolant temperature; shown on a dual color (green/red) LED bar graph display
* Transmission Temperature: shown on a dual color (green/red) LED bar graph display
* Battery voltage; shown on a dual color (green/red) LED bar graph display.

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

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

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

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

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

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

**PRESSURE RELIEF VALVE**

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

For corrosion resistance the cast aluminum valve shall be a hard coat anodized with a powder coat interior and exterior finish. The valve shall meet (NFPA) 1901, Standard for Automotive Fire Apparatus, requirements for pump inlet relief valves. The unit shall be covered by a five year warranty. The valve shall be preset at 125 PSI (860 kPa) suction inlet pressure. The valve shall be installed inside the pump compartment where it will be easily accessible for future adjustment. The excess water shall be plumbed to the atmosphere via the unloader pipe and shall dump on the opposite side of the pump operator.

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

**UL TEST PORTS**

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

**WATER TANK LEVEL GAUGE**

One (1) Innovative Controls SL Plus Tank Level Monitor System shall be provided on the pump operator's control panel. The system shall include one (1) electronic display module, a stainless steel pressure transducer sending unit, and wiring with water-tight plug terminations not requiring sealing grease. The display shall include a decorative chrome-plated panel-mounting bezel.

The master display module shall show the tank level using 16 super-bright easy-to-see LEDs. Tank level indication shall be achieved by the appropriate illumination of 4 horizontal rows of LEDs, with 4 LEDs per row. Full and near-full levels shall be indicated by the illumination of all 4 rows of LEDs, tank levels between 1/2 and 3/4 full shall be indicated by the illumination of the bottom 3 rows of LEDs, tank levels between 1/4 and 1/2 full shall be indicated by the illumination of the bottom 2 rows of LEDs, and tank levels between 1/4 full and near empty shall be indicated by the illumination of the bottom row of 4 red LEDs only. Tank levels between near empty and empty shall be indicated by flashing the bottom row of 4 red LEDs.

The master display shall have a backlit area at the top with an illuminated water icon and bezel.

**PUMP COMPARTMENT TOP OVERLAY**

The top of the pump compartment shall be overlaid with .188 inch embossed aluminum diamond plate.

There shall be yellow reflective tape installed on the top of the pump module to meet NFPA 1901.

**MIDSHIP PUMP**

There shall be a Waterous 1500 GPM single stage pump, model CXS with the following specifications provided and installed with the apparatus.

**PUMP CASING**

Two-piece; vertically split high-tensile close-grained gray iron.

**IMPELLER**

Bronze impeller specifically designed for the fire service, Double hub bed to eliminate axial thrust, and accurately balanced for vibration-free running.

**WEAR RINGS**

Replaceable bronze wear rings to increase pump life and keep maintenance costs at a minimum.

**IMPELLER SHAFT**

Stainless steel, heat treated, precisely ground to size, and polished under shaft seal. Supported by oil-lubricated ball bearings.

**BEARINGS**

All bearings are oil or grease lubricated, ball-type, located outside the pump casting to accurately align and support the impeller shaft assembly. Bearings are deep groove type designed to carry both radial and axial thrust.

**CERTIFICATION**

The pump will perform and meet the following tests:

100% rated capacity @150 PSI

100% rated capacity @ 165 PSI

70% rated capacity @ 200 PSI

50% rated capacity @ 250 PSI

**PUMP HOUSE WIDTH**

The width of the pump house shall be 64.00 inches from front to back.

**PUMP SEALS**

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

**AIR PRIMER SYSTEM**

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

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

The primer shall be mounted above the pump impeller so that the priming line will automatically drain back to the pump. The primer shall also automatically drain when the panel control actuator is not in operation. The inlet side of the primer shall include a brass ‘wye’ type strainer with removable stainless steel fine mesh strainer to prevent entry of debris into the primer body.

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

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

**6" STEAMER INLETS**

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

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

**PUMP COOLING LINE**

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

**PUMP ANODES**

Two (2) pump anodes shall be installed in plumping system of the apparatus, to prevent damage from galvanic corrosion within the pump system. There shall be one (1) anode on the intake side and one (1) on the discharge side.

**MASTER PUMP DRAIN**

The pump shall be equipped with a Master Pump drain to allow draining of the lower pump cavities, volute and selected water carrying lines and accessories. The drain shall have an all brass body.

The drain valve control shall be panel mounted and identified as MASTER DRAIN.

**DRAIN VALVES**

An Innovative Controls 3/4" quarter turn drain valve shall be included on each discharge, gated intake, and steamer valve (if applicable). A side stem, long stroke chrome plated lift handle shall be provided on the drain valve to facilitate use with a gloved hand. The drain valve shall have an ergonomically designed handle with a recessed verbiage tag area easily read by the operator before opening.

The drain valve shall be connected to the valve with a flexible hose that is routed in such a manner as to assure complete drainage to below the apparatus.

**VALVES**

All valves, unless otherwise stated, shall be of a heavy duty design capable of bi-directional flow and incorporate a self-locking ball feature and full flow optimizing characteristics that reduce the operational force required for actuation.

The valves shall be Akron 8000 series.

The valves shall be of a self-adjusting dual seat design requiring no lubrication or regular maintenance. The valve shall meet or exceed NFPA standard requirements.

**PLUMBING**

All plumbing and piping shall be of 304 stainless steel or flexible type piping. All inlet and outlet plumbing 3.00 inch (77 mm) and smaller shall be plumbed with either stainless steel piping or synthetic reinforced rubber hose blended with high tensile strength cord for maximum performance in tight bend applications.

Secondary plumbing such as small diameter drain lines shall be stainless steel, brass or hose. Where chassis and module flexing or vibration may damage or loosen piping or where a coupling is required for servicing, the piping shall be equipped with Victaulic or rubber type couplings. All lines shall drain through the master drain valve or shall be equipped with individual drain valves. All individual drain lines for discharges shall be extended to the point where they shall drain below the chassis frame rails. All water carrying drain lines shall be of flexible polypropylene type tubing.

**MANIFOLDS**

Plumbing manifold bodies shall be ductile cast iron or stainless steel. The suction inlets shall include removable die cast zinc screens designed to provide cathodic protection for the pump, therefore reducing deterioration within the pump.

**TANK FILL**

One (1) 2.00 inch (50 mm) pump to tank fill line shall be installed from the pump directly to the booster tank.

**TANK TO PUMP**

One (1) 3.00 inch (77 mm) valve shall be installed between the water tank and the pump with flow recommendations as set forth by (NFPA) 1901, Standard for Automotive Fire Apparatus, and shall be tested to those standards when the pump is being certified.

**TANK TO PUMP CHECK VALVE**

There shall be a tank to pump check valve, conforming to NFPA standard requirements to prevent water from back flowing at an excessive rate if the pump is being supplied from a pressurized source.

The check valve shall be mounted as an integral part of the pump suction extension. A hole up to .25 inch (6.35 mm) is allowable in the check valve to release steam or other pressure buildup so that the void between the valve and check valve may drain of water that could be subject to freezing.

**2.5" LEFT SIDE INLET**

There shall be one (1) 2.50 inch (65 mm) gated suction inlet with .75 inch (19 mm) bleeder installed on the left side of the apparatus, rearward of the steamer.

**INTAKE PLUMBING**

The plumbing shall consist of 2.50 inch (65 mm) piping and shall incorporate a manual drain control installed below the pump area for ease of access.

**INTAKE TERMINATION**

The termination shall include the following components:

One (1) 2.50 inch (65 mm) NST swivel female straight adapter with screen.

One (1) 2.50 inch (65 mm) self-venting plug, secured by a cable.

**2.5" LEFT SIDE DISCHARGE**

There shall be a 2.50 inch (65 mm) gated discharge installed on the left side of the apparatus in the rearward position.

**2.5" SIDE DISCHARGE PLUMBING**

The plumbing shall consist of 2.50 inch (65 mm) piping and shall incorporate a manual drain control installed below the pump area for ease of access.

**DISCHARGE TERMINATION**

The discharge termination shall include the following components:

One (1) 2.50 inch (65 mm) Male NST adapter

One (1) 2.50 inch (65 mm) NST female swivel by male with 30 degree polished elbow

One (1) 2.50 inch (65 mm) female self-venting cap, secured by a cable

**2.5" RIGHT SIDE DISCHARGE**

There shall be one (1) 2.50 inch (65 mm) gated discharge installed on the right side of the apparatus in the forward position.

**2.5" SIDE DISCHARGE PLUMBING**

The plumbing shall consist of 2.50 inch (65 mm) piping and shall incorporate a manual drain control installed below the pump area for ease of access.

**DISCHARGE TERMINATION**

The discharge termination shall include the following components:

One (1) 2.50 inch (65 mm) Male NST adapter

One (1) 2.50 inch (65 mm) NST female swivel by male with 30 degree polished elbow

One (1) 2.50 inch (65 mm) female self-venting cap, secured by a cable

**4" RIGHT SIDE DISCHARGE WITH 3.0" VALVE**

There shall be one (1) gated 4.00 inch (100 mm) discharge with a 3.00 inch ball valve installed on the right side of the apparatus.

**4" SIDE DISCHARGE PLUMBING**

The plumbing shall consist of 4.00 inch (100 mm) piping and shall incorporate a manual drain control installed below the pump area for ease of access.

**DISCHARGE TERMINATION**

The discharge termination shall include the following components:

One (1) 4.00 inch (100 mm) NST adapter

One (1) 4.00 inch (100 mm) NST female by 5.00 inch (125 mm) Storz with 30 degree elbow

One (1) 5.00 inch (125 mm) Storz cap, secured by a cable

**2.5" RIGHT REAR DISCHARGE**

There shall be one (1) 2.50 inch (65 mm) discharge located on the right side at the rear of the vehicle.

**REAR DISCHARGE PLUMBING**

The plumbing shall consist of 2.50 inch (65 mm) piping and shall incorporate a manual drain control installed below the pump area for ease of access.

**DISCHARGE TERMINATION**

The discharge termination shall include the following components:

One (1) 2.50 inch (65 mm) Male NST adapter

One (1) 2.50 inch (65 mm) NST female swivel by male with 30 degree polished elbow

One (1) 2.50 inch (65 mm) female self-venting cap, secured by a cable.

**3" DECK GUN DISCHARGE**

There shall be a 3.00 inch (77 mm) deck gun discharge provided.

**DECK GUN PIPING**

The deluge waterway shall be plumbed with 3.00 inch (77 mm) piping that terminates at the top of the pump compartment module.

The plumbing shall be drained with an auto-drain located at the lowest point of the waterway plumbing if required.

**EXTEND-A-GUN**

There will be a Task Force Tips 18.00 inch (457 mm) manual Extend-a-Gun installed on the deluge pipe.

If the Extend-a-Gun is not properly stowed and the parking brake is released, it shall activate the hazard light in the cab to alert the crew.

**PUMP COMPARTMENT SPEEDLAYS**

Two (2) 1.75 inch (45 mm) vertically stacked speedlays shall be installed in the front of the pump compartment module, under the top control panel.

There shall be a cutout on the front face of the pump compartment to access each speedlay hose storage area.

**SPEEDLAY CAPACITY**

The two (2) speedlays shall each have capacity for 200 feet of 1.75 inch (45 mm) double jacket fire hose.

**DISCHARGE PLUMBING**

The plumbing shall consist of 2.00 inch (50 mm) piping and shall incorporate a manual drain control installed below the pump area for ease of access.

**DISCHARGE TERMINATION**

The discharge termination shall include the following components:

One (1) 2.00 inch (50 mm) NPT x 1.50 inch (38 mm) NST chrome plated brass chicksan swivel

The use of a swivel shall allow hose payout to either side of the pump compartment.

**SPEEDLAY COVER**

A fixed .188 inch (4.76 mm) aluminum diamond plate speedlay cover shall be provided at the top of the speedlay area.

The sides of the speedlay bay openings shall have a vinyl cover installed. Each cover shall be held in place by Velcro on two (2) sides. A nylon grab strap shall be provided on the bottom of each side cover for quick access.

**SPEEDLAY COVER COLOR**

The speedlay hose bed covers shall be red in color.

**FRONT BUMPER DISCHARGE**

One (1) 1.50 inch (38 mm) front bumper discharge outlet shall be provided.

**FRONT BUMPER DISCHARGE PLUMBING**

The front bumper discharge plumbing shall consist of 2.00 inch (50 mm) piping and shall incorporate a manual drain control installed below the pump area for ease of access.

Auto-drain(s) shall be installed in the discharge piping at the lowest point of the plumbed system.

**FRONT BUMPER DISCHARGE TERMINATION**

The discharge termination shall include the following components:

One (1) 2.00 inch (50 mm) NPT x 1.50 inch (38 mm) NST polished chicksan swivel.

The use of a swivel shall allow hose payout to either side of the apparatus.

The front bumper discharge shall be mounted on top of the gravel shield of the front bumper extension. The discharge shall be placed to the right of the hose well.

**DISCHARGE GAUGES**

An (Innovative Controls) TC 3010xxxx Series nominal 2.50 inch gauge shall be supplied for reading the pressure of each discharge greater than 1.50 inches (38 mm) in diameter, unless otherwise specified.

A KEM-X socket saver diaphragm, located in the stem, eliminates freeze-up by preventing water from entering and/or clogging the gauge internals while containing a low temperature instrument oil that fills and protects the socket and the bourdon tube.

The molded glass-filled Nylon 66 case will not corrode and includes a scratch-resistant molded polycarbonate lens with O-ring seal. The gauge shall withstand pressures up to 100psi over gauge range with operation from –40° F to +160°F.

**GAUGE SCALE**

Each gauge shall be marked for reading a discharge pressure of 0-400 PSI.

**GAUGE FACE COLOR**

Each gauge shall have black markings on a white face.

**BEZELS FOR 2.5" DISCHARGE GAUGES**

There shall be a deluxe metal bezel supplied around each of the 2.50 inch (65 mm) discharge pressure gauges. The bezels shall be constructed from chrome-plated zinc with large, easily identifiable recessed labels for color-coding and verbiage.

**FOAM TANK**

There shall be one (1) 20 gallon foam tank with square hinged lid, equipped with a hold down device, installed and plumbed with non-corrosive piping to the foam system. The fill tower shall be approximately 10.00 inches by 10.00 inches.

A label shall be affixed to the foam tank fill indicating: “WARNING” Class A (or B) foam tank fill, do not mix brands or types of foam.

Foam tank shall be integral with the booster water tank provided

**SYSTEM PLUMBED TO 1 TANK**

The system shall be supplied by a single foam tank.

**SHUTOFF VALVE**

There shall be a 1/4 turn valve installed at the foam tank to shut off the flow from the supply line.

**SINGLE 1" TANK DRAIN**

There shall be a 1.00 inch quarter turn drain valve installed for drainage of the foam tank. The valve shall be installed in the pump house with a drain line extended to the side running board.

**VIBRA-TORQUE™ BODY MOUNTING SYSTEM**

The entire body module assembly shall be mounted to the chassis frame rails exclusively with Vibra-Torq™ torsion isolator assemblies to reduce the vibration and stress providing an extremely durable body mount.

The body substructure shall be mounted above the frame to allow independent flexing to occur between the body and the chassis. Two (2) assemblies shall be mounted to the chassis frame rails with steel, gusseted mounting brackets. Each bracket shall be painted for corrosion resistance. Each body mount bracket shall be mounted to the side chassis frame flange with two 5/8”-UNC Grade 5 HHCS.

The rear assemblies shall have a two-part rubber vibration isolator. Certain assemblies shall also incorporate a torsion spring. Helical coil springs shall be incorporated into specific mounts in tandem with the rubber isolators to minimize the stress absorbed by the body caused from chassis frame rail flexing.

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

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

**COMPARTMENT VENTILATION**

To allow for proper air circulation and flow, each compartment shall have a venting route. The venting locations shall be determined by "best-fit" locations for each body style configuration. The vents will be a chrome louvered and mounted appropriately on the compartment interior walls.

**COMPARTMENTATION**

The following compartments shall be supplied on the apparatus:

Compartment "L1"

There shall be one (1) full height compartment ahead of the rear wheels on the left side of the apparatus with interior dimensions of the following:

The upper portion shall be approximately 49.75 inches (1263.65 mm) wide by 39.00 inches (990.60 mm) high by 12.50 inches (317.50 mm) deep.

The lower portion shall be approximately 49.75 inches (1263.65 mm) wide by 33.00 inches (838.20 mm) high by 26.00 inches (660.40 mm) deep.

Compartment "L2"

There shall be one (1) compartment over the rear wheels on the left side of the apparatus with interior dimensions of the following:

The upper portion shall be approximately 68.00 inches (1727.20 mm) wide by 39.00 inches (990.60 mm) high by 12.50 inches (317.50 mm) deep.

The lower portion shall be approximately 68.00 inches (1727.20 mm) wide by 8.00 inches (203.20 mm) high by 26.00 inches (660.40 mm) deep.

Compartment "L3"

There shall be one (1) full height compartment behind the rear wheels on the left side of the apparatus with interior dimensions of the following:

The upper portion shall be approximately 46.75 inches (1187.45 mm) wide by 39.00 inches (990.60 mm) high by 12.50 inches (317.50 mm) deep.

The lower portion shall be approximately 46.75 inches (1187.45 mm) wide by 33.00 inches (838.20 mm) high by 26.00 inches (660.40 mm) deep.

Compartment "R1"

There shall be one (1) full height compartment ahead of the rear wheels on the right side of the apparatus with interior dimensions of the following:

The upper portion shall be approximately 49.75 inches (1263.65 mm) wide by 39.00 inches (990.60 mm) high by 12.50 inches (317.50 mm) deep.

The lower portion shall be approximately 49.75 inches (1263.65 mm) wide by 33.00 inches (838.20 mm) high by 26.00 inches (660.40 mm) deep.

Compartment "R2"

There shall be one (1) compartment over the rear wheels on the right side of the apparatus with interior dimensions of the following:

The upper portion shall be approximately 68.00 inches (1727.20 mm) wide by 39.00 inches (990.60 mm) high by 12.50 inches (317.50 mm) deep.

The lower portion shall be approximately 68.00 inches (1727.20 mm) wide by 8.00 inches (203.20 mm) high by 26.00 inches (660.40 mm) deep.

Compartment "R3"

There shall be one (1) full height compartment behind the rear wheels on the right side of the apparatus with interior dimensions of the following:

The upper portion shall be approximately 46.75 inches (1187.45 mm) wide by 39.00 inches (990.60 mm) high by 12.50 inches (317.50 mm) deep.

The lower portion shall be approximately 46.75 inches (1187.45 mm) wide by 33.00 inches (838.20 mm) high by 26.00 inches (660.40 mm) deep.

**FORMED BODY DESIGN CONSTRUCTION**

The apparatus body shall be a formed sheet metal design, which serves as the compartment enclosures and supporting substructure of the body. The substructure and enclosures shall work in unison to provide maximum storage that supports and protect the contents contained within.

**BODY CONSTRUCTION**

The body substructure and compartments shall utilize a combination of huck bolting and welding methods.

The huck bolt systems utilized in either body or substructure shall be .3125 inch (7.94 mm) or .375 inch (9.53 mm) diameter stainless steel fasteners for maximum shear and tension strength. Other system of fasteners that do not consist of stainless steel shall NOT be acceptable.

In combination with the huck bolt system, strictly monitored welding procedures shall be instituted. To ensure maximum joint strength, any welding zones shall be welded together utilizing American Welding Standard (AWS), Certified welding procedures.

Due to the engineered combination of specifically chosen materials, no dissimilar metals shall be used in the body and its supporting substructure without being separated by a sufficient corrosion and electrolysis inhibitor. This shall consist of isolation pads and structural adhesives.

**ECK® ANTI-CORROSION PROCESS**

Absolutely no dissimilar metals shall be used in the body and its supporting substructure without being separated by Eck®, which prevents corrosion by providing a barrier between dissimilar metals, sealing out moisture and absorbing energy created by a dissimilar metal reaction.

**BODY STRUCTURE**

The supporting tank and compartment substructure shall be manufactured from corrosion resistant 304L stainless steel material or equivalent. The supporting material shall be engineered from 7 gauge stainless steel material to provide both high strength and corrosion resistance for longevity of the apparatus body. The use of black carbon steel materials that have been painted or coated to try to prevent corrosion shall not be acceptable.

**BODY COMPARTMENTS**

The formed sheet metal compartments shall utilize a 0.125 inch (3.18 mm) thick 5052-H32 aluminum alloy to provide maximum strength and durability. Each compartment sheet and enclosure shall be fabricated in a manor to provide proper sheet alignment and weld location application. The body shall consist of multiple pre-engineered compartment assemblies that shall be combined to create a series of body combinations. In the event of body damage, these assemblies shall allow for easier disassembly and assembly through the use of common tools and materials.

**COMPARTMENT TOPS AND EXTERIOR HOSE BED WALL**

The exterior compartment tops and outer hose bed walls shall consist of .125 inch (3.18 mm) embossed aluminum diamond plate material to provide both strength and pleasing appearance. The hose bed walls shall be embossed aluminum diamond plate to the outward face while incorporating an additional smooth aluminum interior wall sheet to form the hose bed area. The use of interior and exterior hose bed wall sheets shall provide an enclosed section for strength integrity, wire routing, etc. Single hose bed wall sheet construction shall NOT be acceptable.

**COMPARTMENT FLOORS**

The body compartments shall be enclosed with aluminum sheet metal as specified above. The compartment floors shall have a 1.00 inch (25.40 mm) lip downward at the door opening side of the compartment. This lip shall integrate with a structural member on the bottom edge and form a “sweep-out” compartment. This design shall also allow for a structural flush fitting door frame and a complete door/weather seal.

**COMPARTMENT LOAD CAPACITY**

Each compartment shall have a minimum of one additional structural compartment floor support hat section centered on the underside of the compartment floor. This additional member shall be integral with compartment assemblies of each area. Each compartment must be designed, and analyzed to carry a working load of:

Full depth side compartment: 500 pounds (226.80 kg) per compartment

Half depth side compartment: 375 pounds (170.10 kg) per compartment

Rear center compartment: 500 pounds (226.80 kg)

**FINITE ELEMENT ANALYSIS**

The proposed body design must have completed a review and analysis by an external engineering consultant. At a minimum, the consultant must have conducted a computer modeled finite element analysis of the proposed design. The analysis is to include real world working load scenarios. Analysis to cover both static and dynamic situations must be completed. The purpose of the finite element analysis is to ensure proper design of the apparatus body, and that it is capable of carrying the typical fire apparatus loads and those specified by NFPA for equipment. Strain Gauge testing must also have been completed.

**REAR COMPARTMENT**

The following compartment shall be supplied on the apparatus:

Compartment "B1":

There shall be one (1) compartment installed at the rear of the apparatus with a R·O·M Series IV roll up door.

The interior dimensions of this compartment shall be approximately 41.50 inches (1054.10 mm) wide by 39.50 inches (1003.30 mm) high by 33.25 inches (844.55 mm) deep.

**DOOR OPEN INDICATOR**

The rear compartment roll up door shall have an integral door open indicator magnet in the lift bar. If the bar is not properly closed and the parking brake is released, it shall activate the hazard light in the cab to alert the crew.

**ROLL-UP DOOR CONSTRUCTION**

All horizontal and vertical side compartment doors shall be roll-up style doors.

**REAR COMPARTMENT DOOR**

A R•O•M Corporation Series IV roll-up shutter door shall be installed. Each shutter slat, track, bottom rail, and drip rail shall be constructed from anodized 6063 T6 aluminum.

Shutter slats shall feature a double wall extrusion 0.315 inches thick with a concave interior surface to minimize loose equipment jamming the shutter door closed. Shutter slats shall feature an interlocking end shoe to prevent side to side binding of the shutter door during operation. Slats must have interlocking joints with an inverted locking flange. Slat inner seal shall be a one piece PVC extrusion; seal design shall be such to prevent metal to metal contact while minimizing dirt and water from entering the compartment.

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

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

Shutter door shall have an enclosed counterbalance system. Counterbalance system shall be 4.00 inches in diameter and held in place by 2 heavy duty 18 gauge zinc plated plates. Counterbalance system shall have 2 over-molded rubber guide wheels to provide a smooth transition from vertical track to counterbalance system.

**SATIN ALUMINUM FINISH**

The roll-up doors shall have a satin aluminum finish.

**ROLL-UP DOOR ASSIST STRAPS**

There shall be nylon straps installed on both the left and right side body side, 'high side' compartment doors, to assist in closing the door. The strap shall be attached to each door and shall be permanently mounted to the rearward wall with footman loops using Nut-serts, halfway between the top and bottom of the compartment.

**DOOR OPEN INDICATOR**

Each roll up door shall have an integral door open indicator magnet in the lift bar.

If the bar is not properly closed and the parking brake is released, it shall activate the hazard light in the cab to alert the crew.

**COMPARTMENT LIGHTING**

Two (2) OnScene Access Pro LED strip lights shall be installed in each body compartment.

The tube lights shall be centered vertically along each side of the door framing and shall be maximum length available to fit the opening.

The lights in each compartment shall be on a separate circuit, turning on only those lights that have open compartment doors.

**HOSE STORAGE**

A hose bed shall be provided that meets the minimum NFPA storage requirements. The hose bed shall have slotted .25 inch (6.35 mm) aluminum flooring installed to allow drainage through the tank cavity to the ground below.

The aluminum flooring shall be manufactured in discrete sections to allow for easy removal and outstanding stability. The area shall be free of sharp edges to protect the hose when loaded or distributed.

**HOSE BED WALL FINISH NATURAL**

The apparatus hose bed interior side walls shall be of a Natural unpainted metal finish.

**HOSE BED DIVIDER WITH HAND CUT-OUT**

There shall be a full height adjustable hose bed divider provided and installed in the hose bed area of the apparatus body.

The divider shall be fabricated of .25 inch (6.35 mm) thick aluminum plate with a double sided reinforcement and attached to the adjustable slide rails. The rear of the divider shall have a radius to provide a smooth corner and a hand cut out to aid in access to the hose bed area. Hose payout shall be unobstructed by the divider.

There shall be a total of two (2) provided and installed in the hose bed.

**HOSE BED RISER**

A 15.00 inch (381.00 mm) hosebed riser made from the same material as the body shall be provided in order to increase the hosebed capacity.

There shall be a red reflective stripe installed at the top of the hosebed riser sides.

**CATWALKS**

Catwalks shall be provided over the top of the compartments. The catwalks shall be manufactured with .125 inch (3.18 mm) embossed aluminum diamond plate material.

The outboard edge shall be bent downward at a 90 degree angle and over the compartments on both sides.

Catwalks shall not be an approved stepping surface, "Do not walk" labels to be installed

**VINYL COATED NYLON HOSE BED COVER**

The hose bed cover and attachment shall be dealer provided and installed.

**LED HOSE BED LIGHT**

There shall be one (1) 46.00 inch (116.84 cm) OnScene "Access" LED strip light installed on the hose bed dunnage wall. The tube light shall be mounted at the top to shine into the hose load.

**HOSE BED LIGHT ACTIVATION**

The hose bed light(s) shall be activated by a rocker switch on the pump panel.

**DUNNAGE AREA**

A vertical bulkhead shall be installed at the front of the hosebed area, just behind the water tank fill tower, forming a storage area that is separated from the hosebed. The rear face of the bulkhead shall serve as a mounting surface for the hosebed dividers, resulting in the ability to move any hosebed divider across the entire width of the hosebed.

There shall be one (1) dunnage area divider installed running from the forward portion of the dunnage area towards the rear portion of the dunnage area. This divider will keep the fill tower and foam tank in a seperate dunnage area than the generator.

**POLYPRENE TANK**

The booster tank shall be constructed of .50 inch (12.70 mm), .75 inch (19.05 mm), and 1.00 inch (25.40 mm) thick polypropylene sheet stock which is a non-corrosive stress relieved thermoplastic. It shall be designed to be completely independent of the body and compartments. All joints and seams are extrusion welded and/or contain the "Bent Edge" and tested for maximum strength and integrity. The top of the booster tank is fitted with lifting eyes designed with a 3 to 1 safety factor to facilitate tank removal.

**COVER**

The tank cover shall be constructed of .75 inch (19.05 mm) thick Polyprene and shall be recessed. A minimum of two lifting dowels shall be drilled and tapped .50 inch (12.70 mm) x 2.00 inch (50.80 mm) to accommodate the lifting eyes.

**BAFFLES**

The swash partitions are manufactured of .50 inch (12.70 mm) Polyprene. All partitions are equipped with vent and air holes to permit movement of air and water between compartments to provide to provide maximum water flow. All swash partitions interlock and are welded to one another as well as to the walls of the tank.

**MOUNTING**

The tank shall rest on the sub-frame cross members with an unsupported area not to exceed 530 square inches (.34 square meters) on tanks up to 40.00 inches (1016.00 mm) in height. On tanks over 40.00 inches (1016.00 mm) in height, an unsupported area of not more than 400 square inches (.26 square meters) must be maintained.

All tanks shall be isolated from those cross members with a minimum of 2.00 inch (50.80 mm) x .25 inch (6.35 mm) hard rubber strips that are 60 durometer in hardness. The tank shall sit cradle mounted in the under body sub-frame and shall be completely removable without disturbing the body side panels.

**TANK CAPACITY**

The tank shall be 1000 gallons in capacity.

**FILL TOWER**

The fill opening shall be approximately 13.00 inches (330.20 mm) x 12.00 inches (304.80 mm).

The tower will have a .25 inch (6.35 mm) thick removable poly material screen and hinged type cover that will open if the tank is filled at an excess rate. There shall be a removable .25 inch (6.35 mm) thick poly material screen to prevent debris from falling into the tank.

The fill tower shall have a 6.00 inch (150.00 mm) overflow that will discharge underneath the tank, behind the rear wheels. The overflow shall terminate above the tank water level when filled to the rated capacity.

**DIRECT TANK FILL**

There shall be one (1) external direct tank fill port installed on the rear of the apparatus.

**DIRECT TANK FILL VALVE & PIPING**

A 2.50 inch (64.00 mm) Akron Brass 8000 series swing-out valve with stainless steel ball shall be provided for the direct tank fill.

The valve shall be controlled with a 'swing-type' lever directly attached to the valve. The lever shall operate just over 90 degrees of travel to provide full open/full closed positioning of the valve.

The plumbing shall consist of 2.50 inch (64.00 mm) piping, and shall incorporate a manual drain control installed below the pump area for ease of access.

The valve is to be painted job color.

**DIRECT TANK FILL TERMINATION**

The direct tank fill termination shall include the following components:

One (1) 2.50 inch NST female swivel 30 degree elbow adapter

One (1) 2.50 inch NST male self-venting plug, secured by a cable to the outlet termination location.

**DIRECT TANK FILL LOCATION**

The direct tank fill shall be located on the left rear of the apparatus.

**LADDER STORAGE**

The ground ladders and up to three (3) pike poles shall be stored within a compartment installed on the right side of the apparatus beside the booster tank, with ladders lying on their side.

All items shall be stored in their own independent section to allow one item to be removed without disturbing another.

The compartment and door shall be fabricated of .125 inch (3.18 mm) smooth aluminum and will have chevron applied to match the rear body.

The door shall be vertically hinged on the inboard edge (left side) and provided with two push button style latches and a chrome handle centered between the push button latches. The door shall have retro-reflective striping in a chevron pattern.

If the door is not properly closed and the parking brake is released, it shall activate the hazard light in the cab to alert the crew.

**GROUND LADDERS**

The following ground ladders shall be provided by the manufacturer:

-One (1) Duo-Safety 24 foot (7 m) two (2) section aluminum extension ladder, model 900A.

-One (1) Duo-Safety 14 foot (4 m) aluminum roof ladder with folding hooks, model 775A.

-One (1) Duo-Safety 10 foot (3 m) aluminum attic ladder, model 585A.

**PIKE POLES**

The following pike poles shall be provided by the manufacturer:

There shall be a Duo-Safety 12 foot (3.5 m) pike pole with a fiberglass handle provided with the apparatus.

There shall be a total of one (1) provided.

There shall be a Duo-Safety 10 foot (3 m) pike pole with a fiberglass handle provided with the apparatus.

There shall be a total of one (1) provided.

**REAR ACCESSIBLE SUCTION HOSE AREA STORAGE**

There shall be a suction hose storage compartment installed on the left side beside booster tank, rear of the apparatus body.

The compartment shall accommodate two (2) vertically stacked suction hoses with barrel strainers and two (2) pike pole storage tubes.

The compartment and door shall be fabricated of .125 inch (3.18 mm) smooth aluminum and will have chevron applied to match the rear body.

The door shall be vertically hinged inboard and provided with two push button style latches and a chrome handle centered between the push button latches.

If the door is not properly closed and the parking brake is released, it shall activate the hazard light in the cab to alert the crew.

**SUCTION HOSE**

All NFPA required suction hose (20.00 feet or 6096.00 mm) will be supplied and installed by the Fire Department before the truck is placed into service.

**PIKE POLES**

All NFPA required pike poles will be supplied and installed by the Fire Department before the truck is placed into service.

**STRAINERS**

All NFPA required strainers for suction hose will be supplied and installed by the Fire Department before the truck is placed into service.

**FRONT / REAR BODY OVERLAYS**

The entire front face of the apparatus body shall have aluminum diamond plate overlays installed. The entire rear face of the apparatus body shall have raw aluminum overlays installed for the installation of chevron striping.

All overlay materials shall be coated with 3M adhesive sealant on the back portion to provide an insulating barrier between dissimilar metals.

**SCBA COMPARTMENT BIN**

There shall be an eight (8) place air bottle compartment bin provided in the lower portion of the compartment located above the wheel well area on the left side in the L-2 compartment.

The interior surface of each SCBA storage tube shall be lined with a finish matching the compartment interior. The finish application shall aid to minimize any damage caused to the canisters while stored in the holders.

The NFPA required SCBA bottle straps shall be mounted deeper in the compartment, so the bottles do not hit the door when the door is closed.

**OVER WHEEL SHELVING**

One (1) shelf 66.00 inch wide x 12.50 inch deep x 2.00 inch high shall be provided in the wheel well compartment as part of the assembly.

The shelf shall be .19 inch smooth aluminum with a formed 2.00 inch lip on the front and back. The side mounting brackets shall be integral with the shelving to form the sides.

**WHEEL WELL ROLL-OUT DRAWER**

There shall be a roll-out drawer installed in the compartment located above the rear wheel on the right side of the body in the R-2 compartment. The slide assemblies shall incorporate cadmium plated ball bearing roller slides and a lock-in, lock-out front drawer release system (FDR).

The drawer shall be approximately 25.00 inch deep by 59.00 inch wide and have a 220.00 pound (99.79 kg) capacity.

**OVERWHEEL SHELVING**

One (1) shelf 66.00 inch wide x 12.50 inch deep x 2.00 inch high shall be provided in the wheel well compartment as part of the assembly.

The shelf shall be .19 inch smooth aluminum with a formed 2.00 inch lip on the front and back. The side mounting brackets shall be integral with the shelving to form the sides.

**COMPARTMENT UNI-STRUT**

Vertically mounted Unistrut shall be installed in ALL compartments of the apparatus body to accommodate mounting shelves, trays, and other miscellaneous equipment items as specified.

**COMPARTMENT UNI-STRUT**

Two (2) horizontally mounted Unistrut tracks shall be provided on the back wall in each over wheel compartment.

**SHELVING**

The shelving shall be made out of .190 inch (4.83 mm) smooth aluminum sheet material with a formed 2.00 inch (50.80 mm) lip on the front and back. The side mounting brackets shall be integral with the shelving to form the sides. The shelving shall be vertically adjustable.

The following shelving shall be provided:

**UPPER HALF DEPTH SHELVING**

A full width x half depth shelf shall be provided and installed in the upper compartment(s) specified.

There shall be a total quantity of one (1) provided.

One (1) shall be located in the L-1 compartment.

One (1) shall be located in the L-3 compartment.

One (1) shall be located in the R-1 compartment.

One (1) shall be located in the R-3 compartment.

**FLOOR MOUNT ROLL-OUT TRAYS**

A full width floor mount slide out tray shall be secured to an Austin Hardware 24.00 inch long ball bearing "heavy duty" slide assembly. The slide assemblies shall incorporate cadmium plated ball bearing roller slides and a lock-in, lock-out front drawer release system (FDR).

The tray shall have a 300# capacity and 100% extension.

The roll-out system shall be bolted to the compartment floor for rigid and sturdy mounting to the compartment floor.

There shall be a total quantity of one (1) provided.

One (1) floor mount roll-out tray shall be located in the L-1 compartment.

One (1) floor mount roll-out tray shall be located in the R-1 compartment.

**FLOOR MOUNTED ROLL OUT TRAY REAR COMPARTMENT**

One (1) full width floor mount slide out tray shall be secured to an Austin Hardware 28.00 inch long ball bearing "heavy duty" slide assembly. The slide assemblies shall incorporate cadmium plated ball bearing roller slides and a lock-in, lock-out front drawer release system (FDR).

The tray shall have a 300# capacity and 100% extension.

The roll-out system shall be bolted to the compartment floor for rigid and sturdy mounting to the compartment floor.

**SHELF AND TRAY FINISH**

Any shelf or roll-out tray installed shall have a dual-action sanded finish applied on the front and side faces.

**PROTECTIVE MATTING**

There shall be VersaFlex protective matting provided and installed for a pleasing appearance and durability on all specified compartment shelves and roll-out trays.

**PROTECTIVE MATTING COLOR**

The matting shall be black in color.

**WHEEL WELL PANELS**

The body panel area around the wheel well on each side of the body shall be painted the same color as the rest of the body

**SIDE RUB RAILS**

The bottom edge of the body compartments and pump compartment shall be protected with rub rails to absorb minor damage while protecting the body. The rear rub rails shall be full length to the end of the tailboard.

The rub rails shall be fabricated of brightly anodized aluminum channel. The rub rails shall be bolted in place with stainless steel bolts and shall be spaced away from the body with .50 inch (12.70 mm) nylon spacers to help prevent the collection of water and debris. Each rub rail section shall be easily removable and replaced should it become damaged.

**REAR RUB RAILS**

The rearward edge of the rear step shall be trimmed with rub rails to absorb minor damage while protecting the body.

The rub rails shall be fabricated of brightly anodized aluminum channel. The rub rails shall be bolted in place with stainless steel bolts and shall be spaced away from the body with .50 inch (12.70 mm) nylon spacers to help prevent the collection of water and debris. Each rub rail section shall be easily removable and replaced should it become damaged.

**RUB RAIL RETRO-REFLECTIVE STRIPING**

One inch retro-reflective Diamond Grade striping shall be applied to the length of each rub rail section making the perimeter of the apparatus more readily visible.

**STRIPE COLOR**

The reflective striping shall be red in color.

**DOOR SILL TRIM PLATES**

Brushed stainless steel door sill plates shall be installed at the bottom of each body compartment door opening.

**VERTICAL OVERLAY TRIM PLATES**

Full height brushed stainless steel vertical overlay trim plates shall be installed on the outer corners of the front and back body compartments.

**FENDERETTES**

Two (2) polished aluminum fenderettes shall be provided and installed on body rear wheel well openings, one (1) each side. Rubber welting shall be provided between the body and the crown to seal the seam and restrict moisture from entering. A dielectric barrier shall be provided between the fender crown fasteners (screws) and the fender sheet metal to resist deterioration.

**REAR TAILBOARD**

The rear tailboard shall be fabricated of the same materials as used in the apparatus body. The tailboard shall be an independent assembly fastened to the rear body structural framing to provide body protection and a solid rear stepping platform.

The rear of the apparatus body shall be vertical in design - otherwise known as a 'flat-back'. On the rear body surface, a sign shall be attached that states: "DO NOT RIDE ON REAR STEP, DEATH OR SERIOUS INJURY MAY RESULT."

The rear tailboard and body shall be constructed such that the angle of departure shall be no less than 8 degrees at the rear of the apparatus when fully loaded (Per NFPA 1901, current edition).

**REAR TAILBOARD STEP**

The rear tailboard shall be approximately 13.50 inches deep and shall incorporate a .125 inch embossed aluminum diamond plate overlay.

The stepping area shall span the width of the apparatus, overlapping the perimeter of the structural tailboard framework.

**INTERMEDIATE REAR STEP**

The rear step shall be 39.00 inches wide by 10.00 inches in depth. There shall be up to three (3) handhold cutouts provided in the top step surface measuring approximately 2.50 inches deep. There shall be one (1) full length aluminum non lit handrail integrated into the assembly.

The step shall be mounted on the flat back of the apparatus with gusset-type mounting and 5/16" bolts to provide sufficient support for loading hose and gaining access to the hose bed area.

The platform stepping surface shall be constructed of .188 inch (4.76 mm) embossed aluminum diamond plate materials.

**INTERMEDIATE STEP LIGHTING**

Two (2) Whelen OS lights shall be installed to illuminate the stepping area.

Additionally, there shall be one (1) On-Scene Access 38" LED tube light installed below the intermediate step to illuminate below the step.

**STEP LIGHT ACTIVATION**

The step lights shall be activated when the park brake is set.

**FOLDING STEPS**

Innovative Controls Inc. model #3004234 steps, made of high strength die cast aluminum, conforming to current NFPA requirements, shall be provided and installed on the apparatus as specified.

The steps shall include a molded gasket and drain at the bottom to allow any water to escape the assembly, preventing water ingress and keeping the mount from damaging painted surfaces.

The steps shall be mounted with 5/16" bolts.

The steps shall have a minimum of 46 sq. inches of surface area capable of sustaining a 1200 lb. static load. The steps shall be mounted no more than 18" inches between each step.

**ILLUMINATED FOLDING STEPS**

Three (3) illuminated folding steps shall be installed on the left front vertical face of the body.

**STEP LIGHT ACTIVATION**

The step lights shall be activated when the park brake is set.

**10" HANDRAILS**

One (1) 1.25-inch diameter handrail constructed of extruded aluminum with 10.00 inches of grip surface and shall be installed in a best-fit location above the rear step(s) to assist in climbing the steps in accordance with (NFPA) 1901, Standard for Automotive Fire Apparatus. There shall be a minimum of 2.00 inches of clearance between the bracket and the body.

Location: Front edge of catwalk, angled at approximately 30 degrees.

**ILLUMINATED FOLDING STEPS**

Three (3) illuminated folding steps shall be installed on the right front vertical face of the body.

**STEP LIGHT ACTIVATION**

The step lights shall be activated when the park brake is set.

**10" HANDRAILS**

One (1) 1.25-inch diameter handrail constructed of extruded aluminum with 10.00 inches of grip surface and shall be installed in a best-fit location above the rear step(s) to assist in climbing the steps in accordance with (NFPA) 1901, Standard for Automotive Fire Apparatus. There shall be a minimum of 2.00 inches of clearance between the bracket and the body.

Location: Front edge of catwalk, angled at approximately 30 degrees.

**ILLUMINATED FOLDING STEPS**

Three (3) illuminated folding steps shall be installed on the left rear vertical face of the body.

**STEP LIGHT ACTIVATION**

The step lights shall be activated when the park brake is set.

**ILLUMINATED FOLDING STEPS**

Three (3) illuminated folding steps shall be installed on the right rear vertical face of the body.

**STEP LIGHT ACTIVATION**

The step lights shall be activated when the park brake is set.

**HANDRAILS**

Two (2) full height vertical handrails shall be mounted, one (1) on each side of the rear center compartment area of the rear of the apparatus. The vertical rear of body handrails shall be mounted with offset stanchions.

One (1) 36" horizontal hand rail shall be installed above the intermediate step.

**REAR TOW EYES**

There shall be two (2) rear tow eyes installed on the rear sub frame support structure, one each side. The location of the tow eyes shall be below the rear center compartment. The tow eyes shall be manufactured of 1.00 inch plate steel that is bolted to the chassis frame rail with a minimum of 6 grade 8 bolts.

**PAINT SPECIFICATIONS**

All bright metal fittings, if unavailable in stainless steel, shall be heavily chrome plated.

Critical body and sub-frame area which cannot be primed after assembly shall be pre-painted.

All welded metal surfaces shall be ground to a smooth surface prior to a degreasing and high pressure, high temperature phosphatizing process. The entire surface shall be sprayed with a non-chromate sealing compound to prevent formulation of stains or flash rust on previously phosphatized parts.

The paint applied to the apparatus shall be Akzo Nobel, Sikkens brand, LVBT650 basecoat, applied throughout a multi-step process including at least two coats of each color and clear coat finish.

The coating shall be an infra-red, baked air dried. The coatings shall provide full gloss finished suitable for application by high-pressure airless or conventional low pressure air atomizing spray.

The coatings shall not contain lead, cadmium or arsenic. The polyisocyanate component shall consist of only aliphatic isocyanates, with no portion being aromatic isocyanates in character. The solvents used in all components and products shall not contain ethylene glycol mono-ethyl ethers or their acetates (commercially recognized as cello solves), nor shall they contain any chlorinated hydrocarbons. The products shall have no adverse effects on the health or nor present any unusual hazard to personnel when used according to manufacturer's recommendations for handling and proper protective safety equipment, and for its intended use.

The coating system, as supplied and recommended for application, shall meet all applicable federal, state and local laws and regulations now in force or at any time during the courses of the bid.

The manufacturer shall supply (upon request) for each product and component of the system, a properly complete OSHA "Safety Data Sheet".

The following documents of the issue in effect on the date of the invitation to quote form a part of this document to the extent specified herein:

Federal Standards: Number 141A and 141B paint, varnish, lacquer and related material: methods of inspection, sampling, and testing.

Military Standard: MIL-C 83486B Coating, Urethane, Aliphatic Isocyanates, for Aerospace applications.

Industry Methods and Standards: ASTM Method of Analysis (American Society for testing and Materials). BMS 10-72A (Boeing Material Specifications).

The entire exterior body structure (excluding roll-up doors) shall receive the primer coats and the finish coats. The apparatus body will be painted in a down draft type paint booth to reduce dust, dirt or impurities in the finish paint. The painted surfaces shall have a finish with no runs, sags, craters, pinholes or other defects. The coating will meet the following test performance properties as a minimum standard.

The apparatus shall be painted Sikkens FLNA 32528 Red

**SPEEDLINER COMPARTMENT FINISH**

The compartment interiors shall be coated with bed liner type spray.

**COMPARTMENT FINISH COLOR**

The Superliner Color shall be Medium Gray.

**LOW-VOLTAGE ELECTRICAL SYSTEM**

The apparatus shall be equipped with a Weldon Logic Controlled, Low-Voltage (12v) Electrical System compliant with the latest revision of the NFPA 1901 guideline.

The system shall be capable of performing total load management, load management sequencing, and load shedding via continuous monitoring of the low-voltage electrical system. In addition, the system shall be capable of switching loads (like operating as an emergency warning lamp flasher) eliminating the dependency on many archaic electrical components such as conventional flasher modules. The system shall also incorporate provisions for future expansion or modification.

The low-voltage electrical system shall be designed to distribute the placement of electrical system hardware throughout the apparatus thereby enabling a smaller, optimized wire harness. The programmable, logic controlled system shall eliminate redundant electrical hardware such as harnesses, circuit boards, relays, circuit breakers, and separate electrical or interlock subsystems and associated electronics for controlling various electrical loads and inputs.

As-built electrical system drawings and a vehicle-specific reference of I/O shall be furnished in the delivery manuals. These drawings shall show the electrical system broken down into separate functions, or small groups of related functions. Drawings shall depict circuit numbers, electrical components and connectors from beginning to end. A single drawing for all electrical circuits installed by the apparatus builder shall not be accepted.

**LED PERIMETER LIGHTS**

There shall be six (6) LED TecNiq model T44 series, 4.00 inch round, 8 diode LED lights installed on the apparatus. One (1) under each side at the front of the body, one (1) under each side at the rear of the body and one (1) each side under the rear tailboard. The lights shall be positioned to provide illumination to the immediate ground area around the unit.

**PERIMETER LIGHTS ACTIVATION**

The underbody perimeter lights shall be activated with activation of the chassis ground lights.

**LED DOT LIGHTING**

There shall be seven (7) lights located on the rear of the vehicle. Three (3) of the lights shall be mounted on the upper rear face of the body just below the hosebed area in a cluster for use as identification lamps. Two (2) lights shall be located outboard on the upper rear, one each side for use as clearance lamps and two (2) lights in the rearmost position of the side rub-rail on the tailboard facing the side for use as rear side marker lamps

The lights shall be Weldon brand 9186-1500 series LED red markers

**DOT ADDITIONAL MARKER LIGHTS**

There shall be two (2) amber LED intermediate marker lights/intermediate turn signals installed in the rub rail, forward of the rear wheel well, one (1) each side.

The lights shall be Weldon brand 9186-1500 series LED amber markers/turn.

**INTERMEDIATE MARKER LIGHTS**

The intermediate amber side marker lights installed in the rub rail, forward of the rear wheel well, shall flash when their respective side turn signal is activated. The lights shall return to steady burn when turn signal is deactivated.

**UPPER LIGHTING PACKAGE**

The following NFPA lighting package, manufactured by Whelen, shall be supplied and installed in the upper areas of the vehicle.

**UPPER ZONE C**

There shall be two (2) Whelen model L31H beacons with 360 degree LED lights, provided and installed on the apparatus.

One (1) each side on the rear upper outboard corners of the apparatus.

**REAR WARNING LIGHTS COLOR**

The upper warning lights mounted at the rear shall be red with red lenses.

**UPPER REAR WARNING LIGHT SWITCH E-MASTER/VISTA**

The upper rear warning lights shall be controlled through the master warning switch and a secondary rear warning switch located on the Vista display control screen. The switches shall be clearly labeled for ease of identification.

**LOWER LED WARNING LIGHTING**

The following NFPA lighting package, manufactured by Whelen, shall be supplied and installed in the lower areas of the vehicle.

**LOWER ZONE B&D**

There shall be four (4) Whelen model M6 series LED lights with chrome bezels, two (2) each side, provided and installed with the apparatus.

**SIDE WARNING LIGHTS FLASH**

The lower side lights shall feature multiple flash patterns including steady burn for solid colors and multiple flash patterns for split colors. The lights shall be programmed to emit the "Triple Flash 75 In/Out" solid flash pattern.

**SIDE WARNING LIGHTS COLOR**

The lower side warning lights mounted on the side positions shall be red with clear lenses.

**SIDE WARNING LIGHTS LOCATION**

The warning lights on the side of the apparatus shall be mounted under the pump house walkway step, and at the rear tailboard location.

**LOWER ZONES B&D CAST ALUMINUM LIGHT HOUSING WITH PAINTED INSERT**

A cast aluminum light housing with painted outward facing inserts, shall be installed for the rearmost warning light in zones B&D. The housing will ensure the light is mounted as far rearward as possible.

The inserts shall be painted to color match the body.

**LOWER SIDE WARNING LIGHT SWITCH E-MASTER/VISTA**

The lower side warning lights shall be controlled through the master warning switch and a secondary side warning switch located on the Vista display control screen. The switches shall be clearly labeled for ease of identification.

**LOWER ZONE C**

There shall be two (2) Whelen model M6 series Super-LED lights with chrome bezels, one (1) each side, on provided and installed on the rear of the body.

**REAR WARNING LIGHTS FLASH**

The lower rear lights shall feature multiple flash patterns including steady burn for solid colors and multiple flash patterns for split colors. The lights shall be programmed to emit the "Triple Flash 75 in/out" solid flash pattern.

**REAR WARNING LIGHTS COLOR**

The lower rear warning lights mounted at the rear shall be red with clear lenses.

**REAR WARNING LIGHT ACTIVATION**

The rear lower warning lights shall be activated by the master warning switch, and individually switched by a virtual switch on the vista screen in the cab by a "lower rear warning lights" switch.

**LED REAR TAIL LIGHT ASSEMBLY**

There shall be Whelen M6-Series Super LED rear tail light assemblies provided and installed with the apparatus, one (1) each side at the rear.

The following shall be installed in the order as specified from top to bottom:

One (1) Warning light called out above

One (1) #M6BTT LED red brake light

One (1) #M6T LED series amber turn signal light

One (1) #M6 BUW LED clear backup light

**MOUNTING FLANGES**

There shall be individual chrome bezels provided for each light of the taillight assembly.

**BACKUP LIGHTS**

The backup lights shall illuminate when the apparatus is placed in reverse.

**REAR TRAFFIC ADVISOR**

One (1) Whelen model #TAL65 36.00 inch long directional lightbar with six (6) 500 series LED light heads shall be installed on the rear of the apparatus.

The lightbar shall be installed below the intermediate step for protection and above the rear center compartment area to be readily visible by approaching traffic.

**REAR VIEW CAMERA SYSTEM**

The chassis provided camera shall be surface mounted below the intermediate step and the rear directional light bar, on the center rear of the apparatus body for maximum viewing capability.

**SIDE SCENE LIGHTING**

There shall be four (4) scene lights installed on the body sides, two (2) on each side.

One (1) located at the front and one (1) located at the rear corner of the body sidewalls.

The scene lights shall be Whelen model #M9LZC 12 volt scene lights with chrome bezels. The lights shall offer LED directional lighting from 2 to 40-degrees with internal and external optics. The lights shall draw 6.0 amps and generate 6,500 lumens.

**SIDE SCENE LIGHT ACTIVATION**

The side scene lights shall be activated by two (2) virtual buttons on the Vista display control screen, and two (2) switches on the officer switch panel, one (1) labeled for each side of the body.

The switches shall be labeled as follows:

Left Scene

Right Scene

**REAR SCENE LIGHTING**

There shall be two (2) scene lights installed at the rear body panels, one (1) on each side.

The scene lights shall be Whelen model #M9LZC 12 volt scene lights with chrome bezels. The lights shall offer LED directional lighting from 2 to 40-degrees with internal and external optics.

The lights shall draw 6.0 amps and generate 6,500 lumens.

**REAR SCENE LIGHT ACTIVATION**

The rear scene lights shall be activated by one (1) virtual button on the Vista display control screen, one (1) switch on the officer switch panel, and when the apparatus transmission is shifted into reverse.

The switch shall be labeled as follows:

Rear Scene

**GENERATOR SPACE**

There shall be space for a generator provided in the hose bed dunnage on the officers side, to the right of the water and foam fill towers.

**REAR RETRO-REFLECTIVE CHEVRON STRIPING**

The rear of the body, excluding rear door, shall be equipped with Diamond Grade, retro-reflective striping in a chevron pattern, sloping downward and away from the centerline of the vehicle at an angle of 45-degrees.

The stripe shall be 6.00 inch (152.40 mm) wide alternating in colors in compliance with the current edition of (NFPA) 1901, Standard for Automotive Fire Apparatus.

**CHEVRON COLORS**

The retro-reflective chevron striping shall be red and fluorescent yellow-green in color.

**LICENSE PLATE BRACKET**

A Cast Products, model LP0005-1-C, cast aluminum open bottom license plate bracket shall be installed on the apparatus. The bracket shall incorporate a clear LED (WL0501) light to illuminate the license plate to meet DOT requirements.

**LICENSE PLATE BRACKET LOCATION**

The above specified license plate bracket shall be installed at the back of the apparatus on the right side. The bracket shall be mounted to meet all applicable DOT standards.

**WHEEL CHOCKS**

One (1) set of NFPA compliant wheel chocks shall be provided and installed by the Dealership before the truck is placed into service.