

DO NOT INVOICE THIS ADDRESS

City and County of Denver
 Purchasing Division
 201 W. Colfax Ave Dept. 304
 Denver, CO 80202
 United States of America
 Ph: 720-913-8100 Fax: 720-913-8101



Purchase Order Number	PO-00180167
Purchase Order Date	Feb 25, 2026
Contract ID	
Payment Terms	Immediate
Payment Type	Check
Buyer	Elizabeth Hewes

Supplier
MILE-HI FIRE APPARATUS INC 6075 COUNTRY RD 19 FIRESTONE, CO 80621 United States of America Ph: (303) 2899909

Ship-To: Please note: review the additional notes section below for some more specific agency contact information.
Roslyn Building C 5440 Roslyn St Bldg C Denver, CO 80216 United States of America Daniel Ramsey

Bill To
Bill To Same As Ship To Denver, CO 80202 United States of America Daniel Ramsey

Currency	Total Lines Amount	Tax Exempt	Total PO Amount
USD	\$3,188,070.00	98-02890-0000	\$3,188,070.00
Shipping Terms	Shipping Method	Shipping Instructions	
FOB Destination	Common Carrier		

Goods Lines								
Line Number	Item Name	Supplier Item Identifier	Description	Due Date	Unit of Measure	Quantity	Unit Price	Line Amount
1			Three Spartan Metro Star/Spartan ER Pumpers: REF# 26-002 26-003 26-004		Each	3	\$1,062,690.00	\$3,188,070.00

Vendor to fill in and submit attached Exhibit Vehicle Check-In.

Delivery will NOT be considered complete without the Vehicle Check-In form and payment will not be remitted.

Agency Contact: Dan Ramsey | dan.ramsey@denvergov.org

Vendor Contact: Jeannie Schneiderwent | jeannie.schneiderwent@milehifire.com

Delivery: Monday through Friday between 8:00 am and 1:00 pm by appointment

Location:

City and County of Denver
Fleet Management
5440 Roslyn Street, Building B
Denver, CO 80216
Coordinate Delivery: (720) 865-3985

Title to Read:

City and County of Denver
201 West Colfax Avenue Dept 304
Denver, CO 80202

Documents to be Provided Upon Delivery:

Application for Title, State of Colorado
Odometer/Hours Statement

Internal Reference # 26-002, 26-003, and 26-004

REFER TO EXHIBITS "A" FOR SERVICE DESCRIPTION AND PRICING ONLY.

VENDOR: You must contact the agency contact listed above to confirm this order.

Purchase Order price listed herein includes all shipping and handling.

All invoicing must match the purchase order exactly and contain the purchase order number. All invoices must be sent directly to the bill to address listed on the purchase order, this address may be different than the ship to address. Changes to this purchase are not valid without prior approval from purchasing.

For additional questions regarding this purchase order, contact the Agency Contact listed above on the purchase order

ALL INVOICING AND CORRESPONDENCE MUST CONTAIN THE PURCHASE ORDER NUMBER IN FULL (PO-00180167)

This purchase is pursuant to DRMC 20-64.5 - Cooperative Purchase

The terms and conditions of this purchase order shall supersede and replace the Sourcewell 082025-RVG

Purchase pursuant to DRMC 3.26(e)-This Purchase Order is contingent on Council approval and is void without such action.

Michael
Romero

Digitally signed by
Michael Romero

Authorized By

By accepting this Purchase Order you agree to the Terms and Conditions of the General Services Purchasing Division.
Follow the URL provided to the Purchase Order Terms and Conditions –
<https://denvergov.org/Government/Agencies-Departments-Offices/Agencies-Departments-Offices-Directory/General-Services/Purchasing-Division/Terms-and-Conditions>

CITY PO EXHIBIT
City and County of Denver
Fleet Management
Vendor Supplied Information Data

City Unit(s) # _____

(City Use Only)

ENTER CITY PURCHASE ORDER NUMBER: PO- _____
Example: PO-00003584

The following underlined forms and information are **REQUIRED** for new vehicle deliveries:

- Copy of entire Purchase Order (all pages)
- Original MSO (Manufacturers Statement of Origin) – is required for all vehicles except off-road and construction equipment. May receive one for some off road equipment if manufacturer issues one.
Name of purchaser: **City and County of Denver**
Address: **201 W. Colfax Ave. Dept. 304**
Denver, CO 80202
- Secured Dealer Bill of Sale (DR2407) – IN STATE ONLY – Required for on the road vehicles Such as cars, pickup[s], vans and any vehicle under 16,000 GVWR. Not needed if odometer Section is filled out and signed on MSO. Not required on vehicles over 16,000GVWR LBS.
- Application for Title and Registration (DR2395) – Required for all on-road vehicles and trailers.
- Verification of Vehicle Identification Number (DR2698) – Required for all Vehicles coming from an out of state dealer, incomplete vehicle. I.E. Cab and Chassis.
- Statement of Fact (DR2444) - Required on all vehicles with modifications to the cab and chassis. Such as a body crane, auxiliary engine, etc. The statement of fact must include the modifications made and include VIN numbers of chassis and equipment.
- Special Mobile Machinery Form (DR2689) - Required on all off road and Construction equipment. I.E. Front end loaders, tractors, skid steer loaders, Mowers, air compressors, motor graders, etc.
- Weight slip required - (on all incomplete vehicles that are made into a complete vehicle) – and all off-road equipment and construction type equipment. (Front end loaders, sweepers, graders, air compressors, rollers, etc.).
- Temporary License Plate – Required for all on-road vehicles. Not required for off road Equipment.
- Original Dealer Invoice – Required for all vehicles on and off the Road.
- Receipt or Contract for Optional Warranty – Only if spec or called out on P.O.
- Shop and Parts manuals (as required) (CD or electronic form preferred) – Only if spec or show as a line item of P.O.
- Standard Sales Tax Receipt for Vehicle Sales (DR0024)-IN STATE ONLY- Required for purchases to disclose the purchase amount to the state.

Dealer Signature: _____ Date: _____



Brandon, SD | Charlotte, MI | Ephrata, PA | Snyder, NE
SPARTANER.COM

Vendor Contract #082025-RVG

February 12, 2026

Denver Fire Department
 Member ID #178800
 5440 Roslyn St Bldg. B
 Denver, CO 80216

We are pleased to offer to you three (3) Spartan Metro Star/Spartan ER Pumpers through the Sourcewell® Contract, based on the provided specifications and drawings.

MSRP	\$	3,383,169.00
Sourcewell Discount	\$	195,099.00
Discount Percentage	%	-5.77
Total Contract Price	\$	3,188,070.00

Prices above do not include any Federal, State or local taxes.

We look forward to providing your agency with an industry leading apparatus. Our legacy of expertise means we build your apparatus from the ground up on a foundation ready to handle your specific response equipment and route needs. We strategically configure your apparatus design to represent the best possible mix of safety, speed, agility, ergonomics, and serviceability.

Denver Fire Department Spartan Pumper

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MODEL

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

MODEL YEAR

The chassis shall have a vehicle identification number that reflects a 2027 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:



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

AXLE CONFIGURATION

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

GROSS AXLE WEIGHT RATINGS FRONT

The front gross axle weight rating (GAWR) of the chassis shall be 20,000 pounds.

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

GROSS AXLE WEIGHT RATINGS REAR

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

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

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 up to 750 gallons (2839 liters). The water and/or foam tank(s) shall be supplied and installed by the apparatus manufacturer.



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WARRANTY

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

CAB STYLE

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

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

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

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

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

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

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



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

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

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

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

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

OCCUPANT PROTECTION

An IMMI 4Front® occupant protection system shall be installed in the vehicle's cab. The system shall inflate up to three (3) air bags in the following locations as applicable by customer specification:

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

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

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

A RollTek™ rollover occupant protection system shall be installed in the apparatus cab. The system shall include an integrated roll sensor (IRS).



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

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

CAB FRONT FASCIA

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

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

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

FRONT GRILLE

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

CAB UNDERCOAT

There shall be undercoating applied to the underside of the cab which provides an abrasion resistant coating for protection against corrosion caused by moisture, salt, alkalis and galvanic reaction.

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 following the RFG-SR-001 paint standards.



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CAB PAINT PROCESS/MANUFACTURER

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

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

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

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

CAB PAINT PRIMARY/LOWER COLOR

The primary/lower paint color shall be PPG FBCH 2185 White.

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.



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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.



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APPARATUS WIRING PROVISION

An apparatus wiring panel shall be installed in the center dash area behind the rocker switch panel which shall include eight (8) open circuits consisting of three (3) 20 amp, one (1) 25 amp, three (3) 10 amp, and one (1) 15 amp circuit, with relays and breakers with trigger wires which shall be routed to the rocker switch panel.

MULTIPLEX DISPLAY

The multiplex electrical system shall include an **UltraView 780** display with an interactive touchscreen display and fourteen (14) tactile push buttons. The display shall be located on the left side of the dash in the switch panel. The display shall feature a full color 7.00 inch LCD display screen which shall include a message bar displaying the time of day and important messages requiring acknowledgement by the user. The display screen shall be video ready for back-up cameras, thermal cameras, and 360 camera systems.

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

LOAD MANAGEMENT SYSTEM

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

DATA RECORDING SYSTEM

The chassis shall have a **Weldon Vehicle Data Recorder (VDR)** system installed. The system shall be designed to meet NFPA 1900 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 1900 guidelines and shall be retrievable by connecting

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a laptop computer to the VDR system. The laptop connection shall be a panel mounted female type B USB connection point, remotely mounted in the left side foot well.

ACCESSORY POWER

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

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

AUXILIARY ACCESSORY POWER

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

ADDITIONAL ACCESSORY POWER

An additional set of power and ground studs shall be provided and installed behind the electrical center cover with a 40 amp breaker. The studs shall be 0.38 inch diameter and capable of carrying up to a 40 amp battery direct load.

EXTRA ACCESSORY POWER

An extra six (6) position Blue Sea Systems 5025 blade type fuse panel shall be provided and installed on the lower center rear wall of the cab. The fuse panel shall be protected by a 40 amp fuse. The panel shall be capable of carrying up to a maximum 40 amp battery direct load.

EXTERIOR ELECTRICAL TERMINAL COATING

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

ELECTRICAL SYSTEM WARRANTY

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

ENGINE

The chassis engine shall be a Cummins X12 engine. The X12 engine shall be an in-line six (6) cylinder, four-cycle diesel-powered engine. The engine shall offer a rating of 500 horsepower



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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 2021-26 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.

If a pre-2027 emission engine is NOT available at the time of build (starting production on January 1, 2026) your order will automatically be upgraded and charged for either the 2027 engine compliant Cummins X-10 or X-15, with all associated costs being passed on to the end user. No exceptions.

CAB ENGINE TUNNEL

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

DIESEL PARTICULATE FILTER CONTROLS

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

ENGINE PROGRAMMING HIGH IDLE SPEED

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

ENGINE HIGH IDLE CONTROL

The vehicle shall be equipped with an automatic high-idle speed control which shall be pre-set to operate the engine at a specified RPM to increase alternator output if the system voltage drops to 12.5 volts. This device shall automatically operate only when the engine is running, the transmission is in neutral, and with the parking brake set. The automatic high idle will stay engaged for a minimum of ten (10) minutes and until the system, voltage has reached 13.0 volts. Application of the service brake will override the automatic high idle and reset timer. The vehicle shall be equipped with a high-idle speed virtual button on the vehicle



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display and control screen to activate/deactivate manual control only. It shall be pre-set so when activated, it will operate the engine at the specified RPM to increase alternator output. This device shall operate only when the engine is running, the transmission is in neutral, and with the parking brake set. When automatically engaged the high idle 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 pedal is released, or when the transmission is placed in neutral. Virtual control screen shall not override automatic high idle between voltage parameters during timed cycle. Display shall indicate when high idle is disabled, enabled, or active.

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.



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FLUID FILLS

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

ENGINE DRAIN PLUG

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

ENGINE WARRANTY

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

REMOTE THROTTLE HARNESS

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

ENGINE PROGRAMMING REMOTE THROTTLE

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

ENGINE PROGRAMMING IDLE SPEED

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

ENGINE AIR INTAKE

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



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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



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

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

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

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

ENGINE COOLING SYSTEM PROTECTION

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

ENGINE COOLANT

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

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

ELECTRONIC COOLANT LEVEL INDICATOR

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

COOLANT HOSES

The cooling system hoses shall be blue stripe heater hose with formed silicone radiator coolant hoses and formed aluminized steel tubing. The heater hose, radiator hose, and tubing shall be secured with stainless steel constant torque band clamps.



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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. Radiator cap and expansion tank will be dual action so coolant will return to system when temperatures lower.

ENGINE PUMP HEAT EXCHANGER

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

ENGINE EXHAUST SYSTEM

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

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

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

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

DIESEL EXHAUST FLUID TANK

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

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

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



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ENGINE EXHAUST ACCESSORIES

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

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

ENGINE EXHAUST WRAP

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

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

EMISSIONS SYSTEMS WARRANTY

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

TRANSMISSION

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

The transmission shall include two (2) internal oil filters which shall offer 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.

There shall be an extension provided on the transmission vent to move it upward from its standard position a minimum of 12.00 inches.

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)



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TRANSMISSION MODE PROGRAMMING

The transmission, upon start-up, will automatically select a four (4) speed operation. The fifth speed over drive shall be available with the activation of the mode button on the shifting pad. No mode button for 5 & 6 gear range.

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.

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.

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.



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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. The driveline shall include a half round yoke.

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 pump.

See PDF for specific hole pattern.

MIDSHIP PUMP / GEARBOX MODEL

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



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

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

PUMP SHIFT CONTROLS

One (1) 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 locking toggle switch; 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. One (1) label indicating pump instructions and 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 switch is in the up (forward) position and pump mode shall be selected when the switch is in the down (aft) position.

The center switch 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.



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FUEL SHUTOFF VALVE

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

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

ELECTRIC FUEL PRIMER

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

FUEL TANK

The fuel tank shall have a capacity of sixty-five (65) gallons and shall measure 35.00 inches in width X 18.50 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.



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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 in-line with the left and right side fill ports located in the rearward position of the fuel tank.

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 3.74 inches of drop and a 70.87 inches wide 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 up to 20,000 pounds.

FRONT WHEEL BEARING LUBRICATION

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

FRONT SHOCK ABSORBERS

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.



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ELECTRONIC POWER STEERING FLUID LEVEL INDICATOR

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

POWER STEERING PUMP

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

FRONT AXLE CRAMP ANGLE

The chassis shall have a front axle cramp angle of 45-degrees to the left and right.

Note: Addition of optional equipment may require cramp angle to be reduced.

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

REAR AXLE

The rear axle shall be a Meritor model RS-24-160 single drive axle. The axle shall include precision forged, single reduction differential gearing, and shall have a rated capacity of 24,000 pounds.

The axle shall be built of superior construction and quality components to provide the rugged dependability needed to stand up to the fire industry's demands. The axle shall include rectangular shaped, hot-formed housing with a standard wall thickness of 0.50 of an inch for extra strength and rigidity and a rigid differential case for high axle strength and reduced maintenance.

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

REAR AXLE DIFFERENTIAL LUBRICATION

The rear axle differential shall be lubricated with oil.



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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 oil.

VEHICLE TOP SPEED

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

REAR SUSPENSION

The single rear axle shall feature a Reyco 79KB vari-rate, self-leveling captive slipper type parabolic five (5) leaf spring pack suspension with 57.50 inch X 3.00 inch springs. The suspension shall also utilize two (2) torque arms with eccentric cam adjustment.

The rear suspension capacity shall be rated from 21,000 to 24,000 pounds.

REAR SHOCK ABSORBERS

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

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

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

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

TIRE INTERMITTENT SERVICE RATING

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



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FRONT TIRE

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

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

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

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

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

REAR TIRE

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

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

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

REAR AXLE RATIO

The rear axle ratio shall be 4.89:1.

TIRE PRESSURE INDICATOR

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

FRONT WHEEL

The front wheels shall be Alcoa hub piloted, 22.50 inch X 12.25 inch aluminum wheels featuring a polished finish. The hub piloted mounting system shall provide easy installation and shall include two-piece flange nuts.

REAR WHEEL

The outer rear wheels shall be Alcoa hub piloted, 22.50 inch X 8.25 inch aluminum wheels with a polished finish. The inner rear wheels shall be Alcoa hub piloted, 22.50 inch X 8.25



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inch aluminum wheels with polished finish. The hub piloted mounting system shall provide easy installation and shall include two-piece flange nuts.

WHEEL TRIM

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

TIRE CHAINS

Onspot brand six (6) strand automatic ice chains shall be installed on the rear axle of the chassis to provide instant traction while traveling on ice and snow at speeds below 35 MPH.

TIRE CHAINS ACTIVATION

The tire chain system shall be activated by a virtual button on the vehicle display and control screen. The virtual button shall display “Active” when the tire chains are engaged. The tire chains shall be interlocked with the transmission and shall engage only if the vehicle is traveling 30 MPH or less. After traveling over 30 MPH, the vehicle must be reduced to a speed below 5 MPH for the tire chains to be engaged or re-engaged. The virtual button, once the vehicle reaches 35 MPH shall be reset to “Inactive”. The vehicle must then reduce to a speed below 5 MPH to enable the tire chains virtual button.

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



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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 EX225 Disc Plus disc brakes with 17.00 inch vented rotors.

PARK BRAKE

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

PARK BRAKE CONTROL

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



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The parking brake actuation valve shall be mounted to the left side of the engine tunnel integrated into the transmission shift pod console within easy access of the driver.

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

AIR COMPRESSOR

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

AIR GOVERNOR

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

AUXILIARY AIR RESERVOIR

One (1) auxiliary air reservoir with a 1200 cubic inch capacity shall be installed on the chassis to act as an additional reserve supply to the air system for air horn, air tool, or other non-service brake use. The reservoir shall be isolated with a 90 PSI pressure protection valve on the reservoir supply side to prevent depletion of the air to the air brake system.

MOISTURE EJECTORS

Manual cable actuated drain valves shall be installed on all reservoirs of the air supply system. The actuation pull cables shall be coiled and tied at each drain valve. The supplied



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cables when extended shall be sufficient in length to allow each drain to be activated from the side of the apparatus.

AIR SUPPLY LINES

The air system on the chassis shall be plumbed with 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 INLET CONNECTION

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

AIR INLET LOCATION

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

AIR INLET/ OUTLET FITTING TYPE

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

AIR TANK SPACERS

The air tanks shall be moved 1.50 inches inward towards the center of the chassis from the standard position when mounted in the frame rail. This shall provide clearance between the air tanks and the frame for body U-bolt clearance.

REAR AIR TANK MOUNTING

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

WHEELBASE

The chassis wheelbase shall be 187.00 inches.

REAR OVERHANG

The chassis rear overhang shall be 47.00 inches.

FRAME

The frame shall consist of double rails running parallel to each other with cross members forming a ladder style frame. The frame rails shall be formed in the shape of a "C" channel, with the outer rail measuring 10.25 inches high X 3.50 inches deep upper and lower flanges X 0.38 inches thick with an inner channel of 9.44 inches high X 3.13 inches deep and 0.38



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inches thick. Each rail shall be constructed of 110,000 psi minimum yield high strength low alloy steel. Each double rail section shall be rated by a Resistance Bending Moment (RBM) minimum of 3,213,100 inch pounds and have a minimum section modulus of 29.21 cubic inches. The frame shall measure 35.00 inches in width.

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

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

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

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

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

REAR TOW DEVICE

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

FRAME PAINT

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

- Main frame “C” channel or channels

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

- Steering gear bracket
- Front splayed rails and fish plates
- Bumper extensions
- Cross members
- Cross member gussets
- Fuel tank mounting brackets
- Fuel tank straps (unless material/finish is specified in 3130 subcat)
- Air tanks (unless color coded tanks are specified in 3205 subcat)



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- 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-cured pencil hardness of H-2H. The direct impact resistance test per ASTM D2794 shall have an impact resistance of 120.00 inches per pound at 2 mils.

FRAME ASSEMBLY STRUCTURAL

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

FRAME RAIL CORROSION

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

FRAME COMPONENTS CORROSION

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

REAR MUD FLAP

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



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FRONT BUMPER

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

FRONT BUMPER EXTENSION LENGTH

The front bumper shall be extended approximately 18.00 inches ahead of the cab.

FRONT BUMPER APRON

The 18.00 inch extended front bumper shall include an apron constructed of 0.19 inch thick embossed aluminum tread plate.

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

FRONT BUMPER DISCHARGE

The chassis shall include frame mounted 2.50 inch diameter plumbed pipe intended for use as a discharge trash line. The discharge pipe shall be routed from the right hand front splay rail area behind the bumper to the area rear of the front axle, ahead of the battery box.

The discharge shall pipe shall be a, 2.50 inch stainless steel schedule 10 tube. The discharge shall include a Victaulic groove for connecting to the pump and discharge hose plumbing on each end of the tube.

The apparatus manufacturer shall plumb the discharge pipe to the pump and shall provide all valves as required.

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.

MECHANICAL SIREN

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

MECHANICAL SIREN LOCATION

The siren shall be recess mounted on the left side of the front fascia of the bumper approximately in the center of the flat surface between the bumper radius and the frame rail.



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The siren shall be mounted completely behind the face of the bumper to protect the siren from damage. Siren will be mounted on a pedestal located on the L. side top of apron.

AIR HORN

The front bumper shall include two (2) Hadley brand E-Tone air horns which shall measure 18.00 inches long with a 6.00 inch round flare. The air horns shall be trumpet style with a chrome finish on the exterior and a painted finish deep inside the trumpet.

AIR HORN LOCATION

The air horns shall be recess mounted in the front bumper fascia between the frame rails in the right and left outboard positions.

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.

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.



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

CAB TILT AUXILIARY PUMP

A manual cab tilt pump module shall be attached to the cab tilt pump housing/power distribution box.

CAB TILT LIMIT SWITCH

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

CAB TILT CONTROL RECEPTACLE

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.



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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 manually utilizing a crank style handle on the inside of the door. A reinforced window regulator assembly shall be provided for severe duty use.

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 ring on the exterior.

GLASS TINT FRONT DOOR

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

GLASS REAR DOOR RH

The rear right hand side door shall include a window which is 27.00 inches in width X 26.00 inches in height. This window shall roll up and down manually utilizing a crank style handle on the inside of the door. A reinforced window regulator assembly shall be provided for severe duty use.

GLASS TINT REAR DOOR RIGHT HAND

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

GLASS REAR DOOR LH

The rear left hand side door shall include a window which is 27.00 inches in width X 26.00 inches in height. This window shall roll up and down manually utilizing a crank style handle on the inside of the door. A reinforced window regulator assembly shall be provided for severe duty use.

GLASS TINT REAR DOOR LEFT HAND

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

GLASS SIDE MID RH

The cab shall include a window on the right side behind the front and ahead of the crew door which shall measure 16.00 inches wide X 26.00 inches high. This window shall be fixed



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within this space and shall be rectangular in shape. The window shall be mounted using self locking window rubber. The glass utilized for this window shall include a green automotive tint unless otherwise noted.

GLASS TINT SIDE MID RIGHT HAND

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

GLASS SIDE MID LH

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

GLASS TINT SIDE MID LEFT HAND

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

CLIMATE CONTROL

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

Six (6) adjustable louvers shall provide comfort for the front seat occupants and ten (10) adjustable louvers shall provide comfort for the rear crew occupants. The plenum shall be shortened to terminate in the mid crew area on cabs with 10.00 inch raised roofs and greater. This shortened plenum shall allow for the customer to utilize the upper rear center wall for compartmentation, equipment, or apparatus operations.

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.



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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 single stage flat paint to closely match the color of our medium gray spray on bedliner.



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HEATER HOSE INSULATION

The heater hoses leading from the engine to the cab shall include a foam insulation wrap which runs the length of the hose improving heating in extreme cold climates. The heater hoses which shall be routed inside the cab shall not be insulated.

A/C CONDENSER LOCATION

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

A/C COMPRESSOR

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

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

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

Refrigerant Compressor displacement: 19.1 cubic inches per revolution.

UNDER CAB INSULATION

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

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

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

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

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

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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 a cast aluminum trim piece at each cab door opening. All exposed seams shall be sealed with silicone caulk matching the color of the floor mat to reduce the chance of moisture and debris retention.

INTERIOR TRIM

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

REAR WALL INTERIOR TRIM

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

HEADER TRIM

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

TRIM CENTER DASH

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

TRIM LH DASH

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

TRIM RH DASH

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



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inches high X 5.88 inches deep. The MDT provision shall be provided above the glove compartment.

ENGINE TUNNEL TRIM

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

POWER POINT DASH MOUNT

The cab interior shall include one (1) Blue Sea dual universal serial bus (USB) charging receptacle in the cab dash switch panel to provide a power source for USB chargeable electrical equipment. The USB port shall be capable of a 5 Volt-4.8 amp total output. The receptacle shall be wired battery direct.

AUXILIARY POWER POINT ENGINE TUNNEL

The cab interior shall include two (2) Blue Sea dual universal serial bus (USB) charging receptacles to provide a power source for USB chargeable electrical equipment. Each USB port shall be capable of a 5 Volt 4.8 amp total output. The receptacles shall be connected directly to the batteries. The receptacles shall be located one (1) on each side of the engine tunnel near the top towards the rear of the tunnel within a composite housing.

AUXILIARY POWER POINT MID CREW

The cab interior shall include two (2) 12 volt cigarette lighter type receptacles located in the mid crew area. One (1) receptacle shall be located under the right hand mid side window location and one (1) receptacle shall be located under the left hand mid side window location, each within a composite housing. The receptacles shall be connected directly to the batteries. These receptacles shall provide a power source for 12 volt electrical equipment.

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 stainless steel material shall have a number 8 mirror finish. The lower step shall be mounted to a frame which is integral with the construction of the cab for rigidity and strength. The middle step shall be integral with the cab construction and shall be trimmed in 0.08 inch thick 3003-H22 embossed aluminum tread plate.



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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 a two (2) piece panel constructed of SAE 304 stainless steel. The stainless steel shall have a brushed finish.

DOOR TRIM CUSTOMER NAMEPLATE

The interior door trim on the front doors shall include a customer nameplate which states the vehicle was custom built for their department, city, township, or county.

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 rear outer edge of the door. The lowest portion of each door skin shall include a reflective tape chevron with red and white stripes and a Spartan logo. 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 SUN VISOR

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



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

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

INTERIOR FLOOR MAT COLOR

The cab interior floor mat shall be gray in color.

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) removable panels located one (1) to the right of the driver position, one (1) in the center of the dash and one (1) to the left of the officer position. The center panel shall be within comfortable reach of both the driver and officer.

SWITCHES CENTER PANEL

The center dash panel shall include six (6) switch positions in the upper left portion of the panel.

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

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,



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black switches with a green indicator light. Each blank switch legend can be custom engraved by the body manufacturer. All switch legends shall have backlighting provided.

SWITCHES RIGHT PANEL

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

SEAT BELT WARNING

A 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 seats shall be covered with a 45.00 ounce vinyl material. This material shall be semi-resistant to UV rays and from being saturated or contaminated by fluids.

SEAT COLOR

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

SEAT BACK LOGO

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

SEAT DRIVER

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

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



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

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

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

SEAT BACK DRIVER

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

SEAT MOUNTING DRIVER

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

OCCUPANT PROTECTION DRIVER

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

The Driver's seating area protection shall include:

- Drivers airbag DAB - inflates a steering wheel airbag to protect the head and neck of the driver.
- Driver's knee airbag DKAB - inflating knee bolster airbags to protect the knees.
- Integrated roll sensor IRS - detects an imminent rollover, activates protective devices and records crash events.
- Integrated belt pretension IBP - device for mechanical and/or electrical seats tightens the seat belt, securing driver in seat and positions driver for contact with seat integrated head cushion side roll airbag.

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

SEAT OFFICER

The officer's seat shall be 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.



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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.

SEAT BACK OFFICER

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

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

SEAT MOUNTING OFFICER

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

OCCUPANT PROTECTION OFFICER

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

The Officer's seating area protection shall include:

- Officer's knee airbag OKAB - inflating knee bolster airbags to protect the knees.
- Integrated roll sensor IRS - detects an imminent rollover, activates protective devices and records crash events.



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- Integrated belt pretension IBP - device for mechanical and/or electrical seats tightens the seat belt, securing officer in seat and positioning officer for contact with seat integrated head cushion side roll airbag.
- Inflatable head cushion seat integrated side roll airbag SRA - protects officer's head/neck and shields officer from dangerous surfaces.

POWER SEAT WIRING

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

SEAT BELT ORIENTATION CREW

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

SEAT REAR FACING OUTER LOCATION

The crew area shall include one (1) rear facing crew seat located directly behind the right side front seat.

The primary position designation per NFPA 1900 2024 edition, shall only declare the positioning in the cab offers a minimum width of 27.60 inches of shoulder clearance without overlap of any other primary seating position and a minimum of 10.80 inches each side of seat center line. Clear width may be offset from center of seat cushion by up to 3.00 inches. It shall also offer a minimum of 22.00 inches of shoulder width clearance without any overlap of any position.

SEAT CREW REAR FACING OUTER

The crew area shall include a seat in the rear facing outboard position which shall be a H.O. Bostrom 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.



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In order to reflect the larger size outfitted firefighters, the test dummy used shall be a 95th percentile hybrid III male weighing 225 pounds rather than the 50th percentile male dummy weighing 165 pounds as referenced in FMVSS 208. The model of seats shall also have successfully completed the flammability of materials used in the occupant compartments of motor vehicles as outlined in FMVSS 302, of which decides the burning rate of materials in the occupant compartments of motor vehicles.

SEAT BACK REAR FACING OUTER

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

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

SEAT MOUNTING REAR FACING OUTER

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

OCCUPANT PROTECTION RFO

The rear facing outer seat position(s) shall be equipped with the RollTek™ System which shall secure belted occupants and increase the survivable space within the cab. The RollTek™ System shall deploy integrated systems to protect against injuries in rollover events.

The rear facing outer seat position(s) protection shall include:

- Integrated roll sensor IRS - detects an imminent rollover, activates protective devices and records crash events.
- Integrated belt pretension IBP - device for flip-up (non-theatre) and fixed mechanical seats tightens the seat belt, securing occupant in seat and positioning occupant for contact with seat integrated head cushion side roll airbag.

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



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SEAT FORWARD FACING CENTER LOCATION

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

SEAT CREW FORWARD FACING CENTER

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

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

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

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

SEAT BACK FORWARD FACING CENTER

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

The hands-free holder shall consist of a back plate, bottom cradle, non-marring top claws, and claw height adjustment knob. The height adjustment knob shall allow for easy adjustment of the claws to the SCBA. The hands-free holder's claws shall lock from inertial forces to prevent the SCBA from becoming a projectile in the event of a crash to meet the



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NFPA 1901-03 standard for SCBA retention. The SCBA holder shall offer single-motion insertion into the claws and hands-free release when the SCBA fitted seat occupant rises.

OCCUPANT PROTECTION FFC

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

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

- The seat belt shall tighten around the occupant.

System Components Shall Include:

- Integrated Roll Sensor IRS - detects an imminent rollover, activates protective devices and records crash events.
- Integrated Belt Pretension IBP with flip-up (non theatre) and fixed mechanical seats - tightens the seat belt around occupant, securing occupant in seat.
- Integrated Gas Pretension IGP with flip-up theatre style seats - tightens the seat belt around occupant, securing occupant in seat.

SEAT FRAME FORWARD FACING

The forward facing center seating positions shall include an enclosed 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.

SEAT MOUNTING FORWARD FACING CENTER

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

CAB FRONT UNDERSEAT STORAGE ACCESS

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



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SEAT COMPARTMENT DOOR FINISH

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

WINDSHIELD WIPER SYSTEM

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

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 gloss black 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 grab handle behind each cab door. The Hansen Anti-Slip Rails shall be mounted in bright anodized aluminum 4000 Series II stanchions, complete with weep holes to prevent the buildup of moisture.

The grab rails shall include red reflective tape.

LIGHTED GRAB HANDLES

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



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REARVIEW MIRRORS

Ramco model 8015-FFHR-750HR bus style mirrors shall be provided. The mirror heads shall be polished cast aluminum and shall measure 9.75 inches wide X 13.00 inches high with an additional top mount convex assembly. The mirrors shall be mounted one (1) on each front cab corner radius below the windshield with 15.00 inch long polished cast aluminum arms.

The mirrors shall feature a remote controlled heated full flat glass and a top mounted remote controlled heated convex glass. The mirror control switches shall be located within easy reach of the driver. The mirrors shall be manufactured using the finest quality non-glare glass and shall feature a rigid mounting thereby reducing vibration. The mirrors shall be corrosion free under all weather conditions.

REARVIEW MIRROR HEAT SWITCH

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

AUXILIARY EXTERIOR MIRRORS

The cab exterior shall include two (2) Retractable 10.00 inch diameter convex look down mirrors with black plastic backs. The mirrors shall be located above the left and right side front windshields using Retractable model 612665 stainless steel arm assemblies to provide a stable three-point mount to reduce mirror vibration. The mirrors shall provide additional visibility to the left and right front corners of the vehicle.

TRIM REAR WALL EXTERIOR

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

MUD FLAPS FRONT

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

CAB EXTERIOR FRONT & SIDE EMBLEMS

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

CAB EXTERIOR MODEL NAMEPLATE

The cab shall include "Metro Star" nameplates on the front driver and officer side doors.



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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.

The batteries shall be held in place by non-conducting phenolic resin hold down boards.

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.

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 360 amp Niehoff 12 volt alternator. The alternator shall include an ignition excited external regulator. 350amp Leece-Neville BLP4004H an option?



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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 circuit protected 40-amp output for the chassis batteries and a 20-amp output circuit for accessory loads. The conditioner shall also include a battery temperature sensor.

BATTERY CONDITIONER LOCATION

The battery conditioner shall be mounted in the cab in the left-hand rear facing outer seating position.

BATTERY CONDITIONER MISCELLANEOUS WIRING

Battery to conditioner wiring including output circuit breaker and wiring to labeled junction box with branch circuit protection shall be included in the cab. The 120-volt wiring from the battery conditioner junction box shall be routed outside of the cab and down the left side frame rail with a 35.00 foot coil for the installation of the 120-volt inlet receptacle by the body manufacturer.

BATTERY CONDITIONER DISPLAY

A Kussmaul battery conditioner display with a Digital Status Center shall be integrated into the electrical inlet.

BATTERY CONDITIONER DISPLAY LOCATION

The battery conditioner display shall be integrated into the electrical inlet and located via the electrical inlet location 5209 subcategory.

ELECTRICAL INLET LOCATION

An electrical inlet shall be shipped loose for the OEM to install on the body.

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. It will be located at the left rear of the apparatus.

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 Chief 4012 Charger – 5.7 Amps
- Kussmaul 80 LPC Charger - 13 Amps



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- Kussmaul Chief 6012 Charger - 9 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 cab shall be pre-wired for an electrical inlet. Included in the eject feature wiring circuit from the starter button shall be 35.00 feet of coiled wire for installation of the auto-eject inlet by the body builder.

ELECTRICAL INLET COLOR

The electrical inlet connection shall include a yellow cover.

HEADLIGHTS

The cab front shall include four (4) rectangular LED headlamps with separate high and low beams mounted in bright chrome bezels. Each lamp shall include a heating system that de-ices the headlight.

HEADLIGHT LOCATION

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

FRONT TURN SIGNALS

The front fascia shall include two (2) Whelen model 600 4.00 inches X 6.00 inches programmable 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) marker lamps on the front of the vehicle designating identification and clearance. There shall be five (5) face mounted lights integrated into the scene light.

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



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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.

AUX SIDE MARKER/TURN LIGHTS

The cab shall include two (2) Weldon model 9186-1500-20 LED marker lamps with a chrome bezel. The lights shall operate as a side clearance marker. The lights shall be mounted on the side of the cab behind the rear doors in the lower position.

INTERIOR OVERHEAD LIGHTS

The cab shall include a 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.

LIGHTBAR PROVISION

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

CAB FRONT LIGHTBAR MODEL

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

If applicable, clear lights shall be disabled with park brake engaged.

LIGHTBAR 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 one (1) Whelen Pioneer Summit model S72MW LED scene light installed on the brow of the cab. The light shall feature five (5) integrated marker lights.

The housing 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.



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FRONT SCENE LIGHTS ACTIVATION

The front scene lighting shall be activated by individual rocker switches for each of the three (3) separate scene lighting circuits. Each circuit shall be activated independently and shall include rocker switches labeled “Front Scene”, “Front Flood”, and “Front Spotlight”.

SIDE SCENE LIGHTS

The cab shall include two (2) Whelen M9 EZ LED scene lights, one (1) each side which shall be surface mounted in a chrome bezel.

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) virtual buttons on the vehicle display and control screen(s), one (1) for each light.

GROUND LIGHTS

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

GROUND LIGHTS

The ground lighting shall be activated by the opening of the door on the respective cab side and through a virtual button on the vehicle display and control screen.

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.



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MAP LIGHTS

A Sunnex swivel map light shall be provided. The light shall have a clear lens and a control switch on the base. The light shall be mounted on the overhead HVAC cover on the right hand side.

CAB SPOTLIGHTS

The cab shall include two (2) Golight model 3000ST white remote controlled spotlights. Each spotlight shall be mounted on a bracket above the lightbar as far outboard as possible. Each spotlight shall feature a halogen lamp, capable of 370-degree rotation and 135-degree vertical adjustment. Each spotlight shall include a hand held remote control.

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 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.



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INBOARD FRONT WARNING LIGHTS

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

INBOARD FRONT WARNING LIGHTS COLOR

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

INTERSECTION WARNING LIGHTS COLOR

The intersection warning light located on the left side shall be red in color and the intersection warning light located on the right side shall be blue in color. Both lights shall have clear lenses.

INTERSECTION WARNING LIGHTS LOCATION

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

SIDE AND INTERSECTION WARNING SWITCH

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

TRAFFIC CONTROL

There shall be one (1) GTT (Global Traffic Technologies) Opticom model 795H traffic control optical emitter mounted in the lightbar on the front of the cab roof. The emitter shall be activated by a lighted rocker switch on dash and shall be deactivated when the parking brake is applied.

REAR WARNING LIGHTS

The cab shall have a Whelen TACTL5 Traffic Advisor control head installed and wired in the header above the driver. The control head shall be mounted in the driver’s side header inboard of the radio position.

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



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

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.

STEERING WHEEL HORN BUTTON SELECTOR SWITCH

A virtual button on the display and control screen shall allow control of the electric horn, the air horn, or the mechanical siren from the steering wheel horn button.

AUDIBLE WARNING LH FOOT SWITCH

Two (2) foot actuated switches shall be supplied for installation in the front section of the cab for driver actuation. One (1) switch shall be wired to actuate the air horn(s) and one (1) switch the mechanical siren(s).

AIR HORN FOOT SWITCH LH

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

AIR HORN FOOT SWITCH LH LOCATION

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

AIR HORN FOOT SWITCH LH POSITION

The air horn foot switch shall be positioned inboard of any other foot switch, if applicable.

MECHANICAL SIREN FOOT SWITCH LH

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

MECHANICAL SIREN FOOT SWITCH LH LOCATION

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

MECHANICAL SIREN FOOT SWITCH LH POSITION

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



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AUDIBLE WARNING LH FOOT SWITCH BRACKET

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

AUDIBLE WARNING RH FOOT SWITCH

Two (2) foot actuated switches shall be supplied for installation in the front section of the cab for officer actuation. One (1) switch shall be wired to actuate the air horn(s) and one (1) switch the mechanical siren(s).

AIR HORN FOOT SWITCH RH

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

AIR HORN FOOT SWITCH RH LOCATION

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

MECHANICAL SIREN FOOT SWITCH RH

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

MECHANICAL SIREN FOOT SWITCH RH LOCATION

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

AIR HORN AUXILIARY ACTIVATION

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

MECHANICAL SIREN BRAKE/AUXILIARY ACTIVATION

A red momentary siren brake rocker switch shall be provided in the switch panel on the dash.

MECHANICAL SIREN INTERLOCK

The siren shall only be active when master warning switch is on to prevent accidental engagement.

BACK-UP ALARM

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



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INSTRUMENTATION

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

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

The instrument panel shall contain the following gauges:

- One (1) three-movement gauge displaying vehicle speed, fuel level, and Diesel Exhaust Fluid (DEF) level. The primary scale on the speedometer shall read from 0 to 100 MPH, and the secondary scale on the speedometer shall read from 0 to 160 KM/H. The scale on the fuel and DEF level gauges shall read from empty to full as a fraction of full tank capacity. Red indicator lights in the gauge and an audible alarm shall indicate low fuel or low DEF at 1/8th tank level.
- One (1) three-movement gauge displaying engine RPM, and primary and secondary air system pressures shall be included. The scale on the tachometer shall read from 0 to 3000 RPM. The scale on the air pressure gauges shall read from 0 to 150 pounds per square inch (PSI) with a red line zone indicating critical levels of air pressure. Red indicator lights in the gauge and an audible alarm shall indicate low air pressure.
- One (1) four-movement gauge displaying engine oil pressure, coolant temperature, voltmeter, and transmission temperature shall be included. The scale on the engine oil pressure gauge shall read from 0 to 100 pounds PSI with a red line zone indicating critical levels of oil pressure. A red indicator light in the gauge and audible alarm shall indicate low engine oil pressure. The scale on the coolant temperature gauge shall read from 100 to 250 degrees Fahrenheit (°F) with a red line zone indicating critical coolant temperatures. A red indicator light in the gauge and audible alarm shall indicate high coolant temperature. The scale on the voltmeter shall read from 9 to 18 volts with a red line zone indicating critical levels of battery voltage. A red indicator light in the gauge and an audible alarm shall indicate high or low system voltage. The low voltage alarm shall indicate when the system voltage has dropped below 11.8 volts for more than 120 seconds in accordance with the requirements of NFPA 1901. The scale on the transmission temperature gauge shall read from 100 to 300 degrees °F with a red line zone indicating critical temperatures. A red indicator light in the gauge and an audible alarm shall indicate a high transmission temperature.

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

RED INDICATORS

Stop Engine - indicates critical engine fault

Air Filter Restricted - indicates excessive engine air intake restriction

Park Brake - indicates parking brake is set

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

Low Coolant - indicates critically low engine coolant

Cab Tilt Lock - indicates the cab tilt system locks are not engaged.

AMBER INDICATORS

Malfunction Indicator Lamp (MIL) - indicates an engine emission control system fault

Check Engine - indicates engine fault

Check Transmission - indicates transmission fault

Anti-Lock Brake System (ABS) - indicates anti-lock brake system fault

High exhaust system temperature – indicates elevated exhaust temperatures

Water in Fuel - indicates presence of water in fuel filter

Wait to Start - indicates active engine air preheat cycle

Windshield Washer Fluid – indicates washer fluid is low

DPF restriction - indicates a restriction of the diesel particulate filter

Regen Inhibit-indicates regeneration of the DPF has been inhibited by the operator

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

SRS - indicates a problem in the supplemental restraint system

Check Message - indicates a vehicle status or diagnostic message on the LCD display requiring attention.

GREEN INDICATORS

Left and Right turn signal indicators

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



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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 red LED backlighting.



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RADIO

A Jensen brand heavy-duty radio with weather band, AM/FM stereo receiver and Bluetooth capabilities shall be installed in a customer specified location. Radio shall be the current, commercially available heavy-duty single-DIN automotive model at time of vehicle manufacturing date. REMOVE

RADIO LOCATION

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

AM/FM ANTENNA

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

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. REMOVE

CAMERA RIGHT HAND

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

CAMERA REAR

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

The 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 7.00 inch flip down HD monitor which shall include a color display and day and night brightness modes installed above the driver position.

COMMUNICATION ANTENNA

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



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construction and gold plated contact design. The antenna base shall be chassis builder supplied.

COMMUNICATION ANTENNA CABLE ROUTING

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

AUXILIARY COMMUNICATION ANTENNA

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

AUXILIARY COMMUNICATION ANTENNA CABLE ROUTING

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

FIRE EXTINGUISHER

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

ROAD SAFETY KIT

The cab and chassis shall include one (1) emergency road safety triangle kit.

DOOR KEYS

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

DIAGNOSTIC INTERFACE MODULE

The shipped cab and chassis shall include a USB-Link™ interface module equipment kit which, shall communicate between the vehicle and the computer. The vehicle interface is compatible with RP1210A OEM diagnostic software including: Caterpillar, Cummins, Detroit Diesel, Allison Transmission and Meritor Wabco.

The kit shall include the USB-Link™, a USB cable which shall be 15.00 feet in length, a quick start reference guide, a 6 and 9 pin “Y” Deutsch adapter.

DIAGNOSTIC SOFTWARE WELDON V-MUX

The cab and chassis shall include diagnostic software for the Weldon VMUX system shipped loose with the vehicle. The software kit shall include the following.

- One (1) carrying case
- One (1) USB Transceiver



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- One (1) on one (1) cable for mini node
- One (1) on one (1) cable for Hercules node
- One (1) Deutsch wire removal tool, 14.00 to 16.00 gauge wire (blue)
- One (1) Deutsch wire removal tool, 18.00 to 20.00 gauge wire (red)
- One (1) cable, RS232 9 pin serial PC to transceiver
- One (1) cable, RS485 transceiver to VMUX
- One (1) cable which shall troubleshoot Hercules outputs
- One (1) cable which shall trouble shoot mini node outputs
- One (1) downloader manual
- One (1) diagnostics manual

The system shall support PDF and USB diagnostic kits for Windows 2000, XP, Vista, and Windows 7.

CHASSIS OPERATION MANUAL

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

ENGINE AND TRANSMISSION OPERATION MANUALS

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

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

ENGINE SERVICE MANUALS

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

TRANSMISSION SERVICE MANUALS

There shall be one (1) printed hard copy set of Allison 4000 transmission service manuals included with the chassis.

CAB/CHASSIS AS BUILT WIRING DIAGRAMS

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

SALES TERMS

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



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DRIVELINE LAYOUT CONFIRMATION

During the design phase of the chassis the Spartan Chassis driveline engineer shall submit the driveline layout to an OEM engineer to review the chassis design for any potential problems integrating the OEM body to the chassis. This shall also include review and approval of requested clear areas. The OEM engineer shall provide approval to the driveline engineer prior to driveline bills of materials being released.

INTENT OF SPECIFICATIONS

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

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

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

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

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

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

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

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

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



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

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

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

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

QUALITY AND WORKMANSHIP

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

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

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

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

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



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core arc welding to use alloy rods, type 7000, American Welding Society AWS standards A5.20-E70T1.

DELIVERY

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

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

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

PERFORMANCE TESTS AND REQUIREMENTS

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

- A. The apparatus shall be capable of accelerating to 35 MPH (55 km/hr) from a standing start within 25 seconds on a level concrete highway without exceeding the maximum governed RPM of the engine.
- B. The apparatus, fully loaded, shall be capable of obtaining a minimum top speed of 50 MPH (80 km/hr) on a level dry concrete highway with the engine not exceeding its governed RPM (fully loaded).
- C. The service brakes shall be capable of stopping a fully loaded vehicle in 35ft (10.7 m) at 20 mph (32.2 km/hr) on a level concrete highway. The air brake system shall conform to Federal Motor Vehicle Safety Standards (FMVSS) 121.
- D. The apparatus, when fully loaded, shall have not less than 25 percent or more than 50 percent of the weight on the front axle, and not less than 50 percent nor more than 75 percent on the rear axle.
- E. From a steady pace of 15 mph, the vehicle will accelerate to a true speed of 35 mph within 15 seconds. This will be accomplished without moving gear selector.
- F. The apparatus will be able to maintain a speed of at least 20 mph on any grade up to and including 6 percent.
- G. The contractor shall have a third party testing company conduct the tests of the apparatus as in accordance with standard practices required by the third party testing



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company (Guide for the Certification of Fire Department Pumper latest edition). A copy of all tests shall accompany the Apparatus. (For apparatus sold within Canadian ULC S515 latest revision shall prevail).

- H. The contractor shall provide copies of the Pump Manufacturer's Certification of hydrostatic test, the Engine Manufacturer current certified brake horsepower curve, and the Manufacturer's record of pumper construction details when delivered.
- I. All fluid levels and applicable pressures will be brought to proper levels and noted prior to final delivery.

INFORMATION REQUIRED

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

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

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

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

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

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

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

LIABILITY

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



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GENERAL CONSTRUCTION

The apparatus shall be designed with due consideration to distribution of load between the front and rear axles, so that all specified equipment, including filled water tank, a full complement of personnel and fire hose will be carried without injury to the apparatus. Weight balance and distribution shall be in accordance with the recommendations of the current NFPA, Standard for Automotive Fire Apparatus, documentation at time of contract signing.

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

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

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

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

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

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

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

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

WARRANTY

Warranties applicable to the chassis and body (excluding vendor supplied components {engine, transmission, axles, etc.} which carry their own specific warranties) will be



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addressed by a single point warranty service provider approved by the manufacturer to perform service as necessary.

PRE-CONSTRUCTION DRAWINGS

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

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

In addition, a detailed engineering drawing of the pump operator's panel shall be provided prior to manufacturing for fire department approval.

PERFORMANCE BOND

A 100% Performance Bond shall be supplied within thirty days of bid award. The signatures of both buyer and bidder on the contract shall construe awarding of the bid. The prime apparatus builder shall provide the performance bond. Any bonds supplied by the dealer or representative shall not be acceptable.

SINGLE SOURCE MANUFACTURER

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

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

TAG-ON ORDERS-COOPERATIVE PURCHASING

Other fire departments, metropolitan regions, or municipalities may purchase apparatus and equipment from same manufacture similar to the Apparatus and Equipment that is the subject of this Contract held by the same manufacture. The following terms shall apply to any such tag-on orders:

- A. Changes - Tag-on orders utilizing the same specification as the Apparatus and Equipment that is the subject of this Contract in order to provide favorable pricing and lead-times to other buyers due to having such specification fully engineered. Limited changes will be permitted. Such changes will be captured in the pre-construction meeting and the price of any tag-on unit adjusted accordingly.
- B. Term – Tag-on orders may be placed for a term of one year after the Effective Date of this Contract.



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- C. Escalation - Manufacture reserves the right to adjust the price of any tag-on order if material costs escalate during the term of this Contract, changes in regulations become effective (for example EPA, NFPA or other), or the tag-on order would cross a model year.
- D. Acceptance – Manufacture holding the contract reserves the right to accept or reject any tag-on orders under this Contract.

FINITE ELEMENT ANALYSIS AND TESTING

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

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

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

Analysis shall also have been conducted on the mounting system for the apparatus body and pump house.

SUPPLIED INFORMATION & EXTRAS

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

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

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

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

- Owner name and address
- Apparatus manufacturer, model, and serial number
- Chassis make, model, and serial number
- GAWR of front and rear axles
- Front tire size and total rated capacity in pounds
- Rear tire size and total rated capacity in pounds



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

ELECTRICAL SCHEMATICS

The apparatus manufacturer shall supply one (1) set(s) as-built wiring schematics, to include all line voltage schematics with each apparatus.

WARNING AND INFORMATION LABELS

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

ON-LINE CUSTOMER INTERACTION

The manufacturer shall provide the capability for online access through the manufacturer's website. The customer shall be able to view digital photos of their apparatus in the specified



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phases of construction. The following phases will be captured and displayed on the manufacturer's website:

1. Chassis when available at manufacturing facility
2. Body – Prior to Paint
3. Body – Painted
4. Pump and Plumbing
5. Assembly – 80% Complete

Due to the complex nature of fire apparatus and the importance of communication between the manufacture and customer, this line item is considered a critical requirement.

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 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.

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.

THIRD PARTY PUMP CERTIFICATION AND TESTING

The apparatus upon completion will be tested and certified by an independent third party testing company. The certification tests will follow the guidelines outlined in the current NFPA, Standard for Automotive Fire Apparatus, documentation at time of contract signing.

There shall be multiple tests performed by the contractor and the third party testing company when the apparatus has been completed. The manufacturer shall provide the completed Test Certificate(s) to the purchaser at time of delivery.

The fire pump shall be mounted on the apparatus and shall have a minimum rated capacity of 250 gpm (1000 L/min) at 150 psi (1000 kPa) net pump pressure.

Where the apparatus is designed for pump in-motion operations, the vehicle drive engine and drive train shall be arranged so that the pump can deliver at least 20 gpm (76 L/min) at a gauge pressure of 80 psi (550 kPa), while the fire apparatus is moving.



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

1. One hundred percent of rated capacity at 100 psi (700 kPa) net pump pressure
2. Seventy percent of rated capacity at 150 psi (1000 kPa) net pump pressure
3. Fifty percent of rated capacity at 200 psi (1400 kPa) net pump pressure

If the fire pump has a rated capacity of 750 gpm (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 feet (1.2 m) deep, with the water level not more than 10 feet (3 m) below the center of the pump intake, and close enough to allow the suction strainer to be submerged at least 2 feet (0.6 m) below the surface of the water when connected to the pump by 20 feet (6 m) of suction hose.

Tests shall be performed when conditions are as follows:

1. Air temperature: 0 degrees Fahrenheit to 110 degrees Fahrenheit (-18 degrees Celsius to 43 degrees Celsius)
2. Water temperature: 35 degrees Fahrenheit to 90 degrees Fahrenheit (2 degrees Celsius to 32 degrees Celsius)
3. Barometric pressure: 29 inches Hg (98.2 kPa), minimum (corrected to sea level)

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

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



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1. Aerial hydraulic pump
2. Foam pump
3. Hydraulically driven equipment (other than hydraulically driven line voltage generator)
4. Winch
5. Windshield wipers
6. Four-way hazard flashers
7. 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 3 1/2 per ASME B40.100. 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 3A or 4A gauges, 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.

If the apparatus is equipped with a fire pump rated at 750 gpm (3000 L/min) or greater but not greater than 3000 gpm (12,000 L/min), 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.

If the apparatus is equipped with a fire pump rated at greater than 3000 gpm (12,000 L/min), the pump shall be subjected to a 3 hour pumping test from draft consisting of 2 hours of continuous pumping at rated capacity at 100 psi (700 kPa) net pump pressure, followed by 1/2 hour of continuous pumping at 70 percent of rated capacity at 150 psi (1000 kPa) net pump pressure and 1/2 hour of continuous pumping at 50 percent of rated capacity at 200

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psi (1400 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.

If the apparatus is equipped with a fire pump rated at less than 750 gpm (3000 L/min), the pump shall be subjected to a 50-minute pumping test from draft consisting of 30 minutes of continuous pumping at rated capacity at a minimum of 150 psi (1000 kPa) net pump pressure, followed by 10 minutes of continuous pumping at 70 percent of rated capacity at a minimum of 200 psi (1400 kPa) net pump pressure and 10 minutes 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 30-minute test at rated capacity, unless it becomes necessary to clean the suction strainer.

Pumping Engine Overload Test:

If the pump has a rated capacity of 750 gpm (3000 L/min) or greater but not greater than 3000 gpm (12,000 L/min), 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:

If the pump is rated at 3000 gpm (12,000 L/min) or less, 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) \pm 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) \pm 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.

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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) \pm 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.

If the pump is rated at greater than 3000 gpm (12,000 L/min), 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 100 psi (700 kPa).
2. The pressure control system shall be set in accordance with the manufacturer's instructions to maintain the discharge gauge pressure at 100 psi (700 kPa) \pm 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 pump shall be operated at draft, pumping 50 percent of rated capacity at a discharge gauge pressure of 200 psi (1400 kPa).
7. The pressure control system shall be set according to the manufacturer's instructions to maintain the discharge gauge pressure at 200 psi (1400 kPa) \pm 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.

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 inches (100 mm) or larger intake pipe having a volume of 1 foot³ (0.30 m³) or more.



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Vacuum Test:

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

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

The vacuum shall not drop more than 10 inches/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.



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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.



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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 degrees Fahrenheit and 110 degrees Fahrenheit (-18 degrees Celsius and 43 degrees Celsius). 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:



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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.

FACTORY PRE-CONSTRUCTION CONFERENCE

The factory authorized Distributor shall be required, prior to manufacturing, to have a pre-construction conference at the manufacturing facility with a factory representative present and with three (3) individuals from the department to finalize all construction details.

The factories authorized distributor shall, at his expense, provide transportation, lodging, and meals. Any distance greater than 200 miles shall be by commercial air travel.

CUSTOMER INSPECTION

There shall be a customer inspection of the chassis at Spartan Chassis in Charlotte, Michigan and /or Brandon South Dakota. The dealer shall be responsible for all travel costs and arrangements.

The date of the chassis inspection shall be determined based on the requested chassis completion date, OEM production schedules, the chassis off-line date, and the chassis completion date.

The inspection must be coordinated between the OEM/Dealer representative and Andy Torrence the Spartan Chassis FT Auditor/Inspection Coordinator. Andy can be contacted by phone at 517-543-6400 extension 3148, on his cell at 517-231-0959, or by email to andy.torrence@spartanchassis.com.

FINAL INSPECTION CONFERENCE

The factory authorized Distributor shall be required, during manufacturing, to have a final completion inspection conference at the site of the manufacturing facility with three (3) individuals from the department to inspect the apparatus after construction.

The factories authorized distributor shall, at his expense, provide transportation, lodging, and meals. Any distance greater than 200 miles shall be by commercial air travel.



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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 with no restrictions to the maximum overall height.

MAXIMUM OVERALL WIDTH OF NINETY-NINE (99) INCHES

The apparatus specified shall be constructed as detailed and shall NOT exceed a Maximum Overall Width of Ninety-nine (99.00) inches.

This dimension shall include the primary construction of the apparatus body and chassis cab. Any peripheral items shall not be incorporated into this measurement.

The items included, but not limited to, are: Rub Rails, Fenderettes, Mirrors, Lights, Handrails, Front Bumpers, Cab Steps, Overlays, Etc.

MAXIMUM WHEELBASE REQUIREMENT

The apparatus specified shall be constructed with no restrictions to the maximum wheelbase.

ALTITUDE PERFORMANCE REQUIREMENT

The apparatus specified shall be constructed with no altitude performance requirements.

EXHAUST HEAT SHIELD

There shall be an exhaust heat shield added to the chassis provided exhaust. The shield shall terminate past the front compartment and shall incorporate a heavy duty spray on insulation under R1.

The heat shield shall be attached to the underside of the body utilizing a flexible bracket.

SHORELINE RECEPTACLE W/AUTO EJECT

A Kussmaul "Super Auto-Eject" 120 volt shoreline receptacle shall be shipped loose with the chassis and installed on the apparatus.

RECEPTACLE LOCATION

The shoreline connection shall be installed in the left rear body panel of the apparatus.

ELECTRICAL INLET CONNECTION

The electrical inlet shall be connected to the battery charger.

CHASSIS REQUIRED LABELING

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



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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)

CAB TILT CONTROL

There shall be a cab tilt pendant control provided and installed on the right side of the apparatus. The pendant shall be located directly behind the lower 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".

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

AIR TANK DRAIN LINES (extended)

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

HELMET RESTRAINTS

Five (5) Ziamatic UHH-1 Universal Helmet Holders shall be provided and shipped loose with the apparatus.



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MUD FLAPS

There shall be no front mud flaps added by the body manufacturer.

MUD FLAPS

Heavy-duty black rubber mud flaps with manufactures logo shall be provided behind the rear wheels. The mud flaps shall be bolted in place.

PUMP COMPARTMENT

The complete apparatus pump compartment shall be constructed of a combination of structural tubing and formed sheet metal. The same materials used in the body shall be utilized in the construction of the pump compartment. The structure shall be welded utilizing the same A.W.S. Certified welding procedure as used on the structural body module. These processes shall ensure the quality of structural stability of the pump compartment module.

The pump compartment module shall be separated from the apparatus body with a gap. This gap is necessary to accommodate the flexing of the chassis frame rails that are encountered while the vehicle is in transit so that harmful torsional forces are not transmitted into the structural framework.

VIBRA-TORQ™ 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 8 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



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premature pump module structural failures. The Vibra-Torq™ body mounting system shall have a twenty (20) year or 100,000 miles limited warranty in accordance with, and subject to, warranty certificate RFW0710.

PUMP COMPARTMENT WORK LIGHT

One (1) LED OnScene Solutions "Access" Series 54.00 inch (1371.60 mm) tube light shall be installed inside the pump compartment module to illuminate the piping and plumbing components.

The light shall be activated by a weather resistant toggle switch installed inside the pump compartment.

LEFT SIDE OPERATORS PANEL & PUMP PANEL

The pump operator's panel shall be located on the left side of the apparatus pump compartment. The panel shall be split into an upper and lower section.

The material of the operator's panel shall match that of the overlays and right side panels specified.

The upper panel shall house gauges and controls and be hinged to allow easy access to components. The door shall have a stainless steel hinge, dual point chrome push button latches and a rubber seal provided to prevent excessive moisture from entering or leaving the pump house.

The lower panel on the left side shall be a removable panel attached with mechanical fasteners.

Valve controls shall be immediately adjacent to its respective gauge. The valve controls shall be properly labeled, and color coded for ease of use. All markings shall be permanent in nature.

OPEN DOOR WARNING

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

VALVE CONTROL - T-HANDLE PULL ASSEMBLY

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



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PUMP PANEL LIGHTS

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

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

Each shield shall contain one (1) maximum length LED light available model #RX-15T16-5020.

The operator panel light shield shall have chamfered ends for additional body and cab clearance.

PUMP PANEL LIGHT ACTIVATION

The pump panel light(s) shall illuminate with the activation of the park brake.

PUMP COMPARTMENT SERVICE ACCESS

The front portion of the pump compartment structure (directly behind the chassis cab) shall not be overlaid. The outer edges of the pump compartment shall be overlaid with aluminum diamond plate for a pleasing appearance.

PUMP COMPARTMENT WIDTH

The width of the pump compartment (front to back) shall be 56.00 inches (1.42 m).

RIGHT SIDE PUMP PANELS STYLE

There shall be two (2) pump panels on the right side of the pump compartment, one (1) upper and one (1) lower. Each panel shall be accessible by a quick-release mechanical type latch, closing against a door seal. Both panels shall be easily removed for access to the pump for service.

RIGHT & LEFT SIDE BRUSHED STAINLESS STEEL PANELS & OVERLAYS

The panels for the pump compartment on the left and right side shall be made from 16 gauge "Brushed Stainless Steel" capable of withstanding the conditions and effects of extreme weather and temperature changes.

The tubular structure shall be overlaid on each side of the pump compartment underneath the access panels and shall be made of "Brushed Stainless Steel".

RUNNING BOARDS

The pump compartment running boards shall be made of a structural tubular framework. The tubular frame supports all loads by transmitting the loads through the pump compartment structure directly to the chassis frame rails.



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The running boards shall be independent of the apparatus body and shall be integrated to the pump compartment structure only, eliminating any pump compartment to body interference. This is essential in keeping a truly 'modular' configuration. Slip-resistant abrasive adhesive materials shall be applied to the top surface of the running board framework to provide a suitable stepping surface where applicable.

EMBOSSSED ALUMINUM DIAMOND PLATE OVERLAYS

The side running boards shall have a .188 inch (4.76 mm) embossed aluminum diamond plate overlays installed. The stepping areas shall be as large as possible, overlapping the perimeter of the running board structure.

PRESSURE GOVERNOR and ENGINE MONITORING DISPLAY

Fire Research PumpBoss Max series PBA500-A00 pressure governor and control module kit shall be installed. The kit shall include a control module, intake pressure sensor, discharge pressure sensor, and cables. The control module housing shall be waterproof and have dimensions not to exceed 7 1/2" high by 3 5/8" wide. The control knob shall be 2" in diameter with no mechanical stops, have a serrated grip, and a red idle push button in the center. It shall not extend more than 2" from the front of the control module. The control LCD shall be 3.5" in size with a minimum brightness of 1000 nits and optically bonded to 3mm Borofloat Glass. Inputs for monitored engine information shall be from a J1939 data bus or independent sensors. Outputs for engine control shall be on the J1939 data bus or engine specific signal wiring. Inputs from the pump discharge and intake pressure sensors shall be electrical.

The following continuous displays shall be provided:

- Engine RPM; shown on LCD screen
- Check engine and stop engine warning; shown on LCD screen
- Engine oil pressure; shown on LCD screen
- Engine coolant temperature; shown on LCD screen
- Transmission Temperature; shown on LCD screen
- Battery voltage; shown on LCD screen
- Pressure and RPM operating mode LEDs
- Pressure / RPM setting; shown on LCD screen
- Throttle ready / Ok to Pump LEDs.

On screen (LCD) 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. LCD Screen and LED's intensity shall be automatically adjusted for day and nighttime operation.

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

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

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

The pressure 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 and Ok to Pump LED shall light when the interlock signal is recognized. The pressure governor shall start in pressure mode and set the engine RPM to idle. In pressure mode the pressure 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 pressure governor shall limit a discharge pressure increase in RPM mode to a maximum of 30 psi. Other safety features shall include recognition of low water and no water conditions with an automatic programmed response and a push button to return the engine to idle.

The pressure governor control module shall be programmed at installation for a specific engine.

INTAKE 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 easy to read 90, 125, 150, 200, 250, 300 psi settings and an "OFF" position. Pressure adjustment can be made utilizing a ¼" hex key, 9/16" socket or 14mm socket.

For corrosion resistance the cast aluminum valve shall be a hardcoat anodized with a powder coat interior and exterior finish. The valve shall meet NFPA, Standard for Automotive Fire Apparatus, requirements for pump inlet relief valves. The unit shall be covered by a five year warranty. The valve shall be preset at 125 PSI (860 kPa) suction inlet pressure, unless otherwise shop noted. 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 and shall dump on the opposite side of the pump operator.



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

PRESSURE GOVERNOR and MONITORING DISPLAY BUZZER

Fire Research PumpBoss –Z1 option for an audible alarm buzzer shall be installed. The buzzer shall sound when a signal from the PumpBoss activates it.

MASTER GAUGES

An Innovative Controls TC Series nominal 4.00 inch gauge shall be supplied for the master intake and master discharge gauges.

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

The master intake gauge shall be marked for a reading from -30 to 400 PSI and the master discharge shall be marked for reading a discharge pressure of 0 to 400 PSI.

GAUGE FACE COLOR

Each gauge shall have black markings on a white face.

TESTING PORTS

Test port connections for pressure and vacuum shall be provided at the pump operator's panel. One (1) shall be connected to the intake side of the pump, and the other to the discharge manifold side of the pump.

Each port shall have 0.25 inch (6.35 mm) standard pipe thread connection and be manufactured of non-corrosive polished stainless steel or brass plugs.

TANK LEVEL GAUGE

A Fire Research TankVision model WLA300-A00 tank indicator kit shall be installed at the pump operator's panel location. The kit shall include an electronic indicator module, a pressure sensor, and a 20.00 foot sensor cable. The indicator shall show the volume of water in the tank on nine (9) easy to see super bright LEDs. A wide view lens over the LEDs shall provide for a viewing angle of 180 degrees. The indicator case shall be waterproof, manufactured of aluminum, and have a distinctive blue label.

The program features shall be accessed from the front of the indicator module. The program shall support self-diagnostics capabilities, self-calibration, and a datalink to connect



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remote indicators. Low water warnings shall include flashing LEDs at 1/4 tank, down chasing LEDs when the tank is almost empty, and an output for an audio alarm.

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

PUMP COMPARTMENT TOP OVERLAY

The top cap of the pump compartment shall be overlaid with materials of a non-slip .125 inch (3.18 mm) embossed aluminum diamond plate.

DUNNAGE AREA

A single wall .125 inch (3.18 mm) aluminum diamond plate dunnage area shall be provided above the pump house compartment for equipment mounting and storage space.

The dunnage area shall be as wide as possible from side to side, and as deep as allowed with the available space.

MIDSHIP PUMP

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

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

Pump casing shall be close grained gray iron, bronze fitted and horizontally split in two sections for easy removal of entire impeller assembly, including wear rings, without disturbing setting of pump in chassis or pump piping. The pump, for ease and rapid servicing in the future, shall have the separable impeller shaft which allows true separation of transmission or pump without disassembly or disturbing the other component. This shall be accomplished by using a two piece shaft. This feature will allow field service to accomplish in much less time since each component (pump or transmission) can be repaired independently. The impeller shaft shall be stainless steel, accurately ground to size and polished. Shaft shall be supported at each end by ball type oil grease lubricated bearings. Sleeve bearings or bushings will not be acceptable. The bearings shall be protected from water at each end of the impeller shaft.

The discharge manifold shall be cast as an integral part of the pump body assembly and shall provide at least three full 3.50 inch openings for ultimate flexibility in providing various



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discharge outlets for maximum efficiency and shall be located as follows: one outlet on the right side of the pump body, one outlet on the left side of the pump body, and one outlet directly on top of the pump discharge manifold.

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

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

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

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

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

PUMP WARRANTY

Waterous Co 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.

PUMP DE-RATE

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

PUMP SEALS

The pump shall be equipped with self-adjusting, maintenance free mechanical shaft seals that shall not require manual adjustment. These seals shall be designed in a manner that they will remain functional enough to permit continued use of the pump in the unlikely event of a seal failure.

PUMP SHIFT

The drive unit shall be provided with an air pump shift system. The control valve shall be a spring loaded guard lever that locks in "Road" or "Pump" mode.



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To the left of the pump shift control, there shall be two indicator lights to show the position of the pump when the control is moved to "Pump" position. A green light shall be energized when the pump shift has been completed and shall be labeled "PUMP ENGAGED"; a second green light shall be labeled "OK TO PUMP" energized when both the pump shift has been completed and the chassis automatic transmission is engaged.

A third green indicator light shall be installed adjacent to the throttle on the pump operator's panel. This light shall be labeled "Throttle Ready".

In addition to this indicator light, an additional indication shall be provided to the pump operator at the panel when the pump is ready to pump. This additional indication shall be that one (1) of the operator's panel illumination lights will only activate when the "OK TO PUMP" indicator is lit.

AIR PUMP SHIFT LOCATION

The pump shift shall be mounted in the "best fit" location as determined by the apparatus manufacture.

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 priming components shall be mounted above the highest priming point on the suction side of the pump to permit air removal and allow for drainage. 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.

PRIMER CONTROL

There shall be one (1) push button control to actuate the primer control valve at the operator's panel.

MAIN PUMP INLET-LEFT SIDE

A 6.00 inch (150 mm) pump manifold inlet shall be provided on the left side of the pump. The inlet shall protrude up to 2.00 inches (50 mm) away from the side panel and maintain a low connection height.



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The main pump inlet shall have National Standard Threads and includes a removable screen designed to provide cathodic protection for reducing deterioration in the pump.

HIGH FLOW ELECTRIC REMOTE BALL INTAKE VALVE

There shall be one (1) Task Force Tips (TFT) model #AX1ST-NX-RC electric remote control operated 6.00 inch (150 mm) NST x 5.00 inch (125 mm) Storz 30 degree Jumbo Ball Intake Valve (BIV) installed on the steamer inlet.

The valve shall be equipped with an adjustable pressure relief valve under the main valve body with an eight position adjustable inlet elbow. The valve shall be controlled by a remote panel-mounted push-button switch with LED lights to indicate valve position. The valve can also be controlled with an NFPA compliant slow-close knob which can be configured for left or right hand operation on the valve. A .75 inch (19.05 mm) bleeder valve shall be provided to exhaust excess air or water from the valve and hose line. A position indicator shall be provided to allow for quick visualization of the status of the valve in the open, closed or partial positions. For maximum corrosion protection the aluminum casting shall be hardcoat anodized, with a powder coat internal and external finish and all components facing the wet side of the valve shall be constructed from hard coat anodized aluminum alloy with corrosion resistant coating.

The jumbo ball intake valve shall have a free swiveling 5.00 inch (125 mm) Storz connection with an A01ST 5.00 inch (125 mm) Storz cap provided.

MAIN PUMP INLET-RIGHT SIDE

A 6.00 inch (150 mm) pump manifold inlet shall be provided on the right side of the pump. The inlet shall protrude up to 2.00 inches (50 mm) away from the side panel and maintain a low connection height.

The main pump inlet shall have National Standard Threads and includes a removable screen designed to provide cathodic protection for reducing deterioration in the pump.

HIGH FLOW ELECTRIC REMOTE BALL INTAKE VALVE

There shall be one (1) Task Force Tips (TFT) model #AX1ST-NX-RC electric remote control operated 6.00 inch (150 mm) NST x 5.00 inch (125 mm) Storz 30 degree Jumbo Ball Intake Valve (BIV) installed on the steamer inlet.

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anodized, with a powder coat internal and external finish and all components facing the wet side of the valve shall be constructed from hard coat anodized aluminum alloy with corrosion resistant coating.

The jumbo ball intake valve shall have a free swiveling 5.00 inch (125 mm) Storz connection with an A01ST 5.00 inch (125 mm) Storz cap provided.

MASTER DRAIN VALVE

A Trident manifold type drain valve shall be installed in the pump compartment. All pump drains shall be connected to the master drain valve. The drain valve shall be controlled from the left side lower pump house sill. The control shall be a hand wheel knob marked “open” and “closed”.

The drain shall be located such that it shall not interfere with pumping operations or function such as soft suction hoses, etc. nor shall it protrude past the outer edge of the apparatus, to prevent damage to the valve.

In some cases, it is necessary to locate the master drain in a secondary location to ensure proper draining. If no lower or vertical sill exists, the drain shall be located below the bottom outside edge of the hose body near the forward most corner on the driver's side hose body. The drain shall not protrude past the outer edge of the body, thus preventing damage to the valve.

PUMP COOLING LINE

There shall be a .38 inch (9.5 mm) line running from the pump to the water tank to assist in keeping the pump water from overheating. A valve shall be installed on the operator's panel.

PUMP ANODES

Two (2) pump anodes shall be installed in the pumping system, one (1) on the discharge side and one (1) on the suction side, to prevent damage from galvanic corrosion within the pump system.

STAINLESS STEEL PLUMBING

All auxiliary suction and discharge plumbing related fittings, and manifolds shall be fabricated with a minimum of 3.00 inch (77 mm), or greater as required by design, schedule 10 stainless steel pipe; brass or high pressure flexible piping with stainless steel couplings. Galvanized components and/or iron pipe shall NOT be accepted to ensure long life of the plumbing system without corrosion or deterioration of the waterway system. Where waterway transitions are critical (elbows, tees, etc.), no threaded fittings shall be allowed to promote the smooth transition of water flow to minimize friction loss and turbulence. All piping components and valves shall be non-painted, unless otherwise specified. All piping welds shall be wire brushed and cleaned for inspection and appearance.

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The high pressure flexible piping shall be black SBR synthetic rubber hose with 700 PSI working pressure and 1200 PSI burst pressure for flexible piping sizes 1.50 inches (38 mm) through 4.00 inches (100 mm). Sizes .75 inch (19 mm), 1.00 inch (25 mm) and 5.00 inches (125 mm) are rated at 250 PSI working pressure and 1000 PSI burst pressure. All sizes are rated at 30 in HG vacuum. Reinforcement consists of two plies of high tensile strength tire cord for all sizes and helix wire installed in sizes 1.00 inch (25 mm) through 5.00 inches (125 mm) for maximum performance in tight bend applications. The material has a temperature rating of -40 degrees Fahrenheit to +210 degrees Fahrenheit.

The stainless steel full flow couplings are precision machined from high tensile strength stainless steel. All female couplings are brass. Mechanical grooved and male .75 inch (19 mm) and 1.00 inch (25 mm) couplings are brass. A high tensile strength stainless steel ferrule with serrations on the I.D. is utilized to assure maximum holding power when fastening couplings to hose.

PUMP HOUSE LINE PROTECTION

All drain lines for the discharges, suctions, ABS discharge gauge lines and any other appropriate connections in the pump house area shall have a protective cover provided on the lines in the required areas of the lines to prevent the lines from rubbing on any other components in the pump house area.

All drain lines, ABS lines, high pressure discharge lines and electrical wiring in the pump house area shall be properly and neatly routed, wire tied, and rubber coated "P" clamped, to keep the items secured.

PLUMBING TERMINATION SECUREMENT

All plumbing termination caps and plugs for intakes and discharges, shall be secured by a coated cable.

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.

FOAMPRO 1600

The apparatus shall be equipped with an electronic, fully automatic, variable speed, direct injection, and discharge side foam proportioning system. The system shall be capable of handling Class A foam concentrate. The foam proportioning operation shall be based on direct measurement of water flows and remain consistent within the specified flows and



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pressures. System must be capable of delivering accuracy to within 5% of calibrated settings over the advertised operation range when installed according to factory standards. The system shall be equipped with a control module suitable for installation on the pump panel. Incorporated within the motor driver shall be a microprocessor that receives input from the system flowmeter, while also monitoring foam concentrate pump output. This compares values to ensure that the operator's preset is proportional to the amount of foam concentrate injected into the discharge side of the fire pump.

A paddlewheel-type flowmeter shall be installed in the discharge system specified to be "foam capable." The flow meter shall be mounted in a manifold providing accurate water flow readings from 20-750 gpm and operate up to 900 gpm. A simulated flow feature shall be incorporated into the motor driver to simulate an approximate flow value of 100 gpm. This feature is to be engaged or disengaged with a momentary switch and will automatically disengage when the main system switch is turned off.

The control module shall enable the pump operator to:

- Activate the foam proportioning system
- Select proportioning rates from 0.1% to 1.0%
- See a "low concentrate" warning light flash when the foam tank runs low. In two minutes, if foam concentrate is not added to the tank, shut the foam concentrate pump down.

A 12-volt electric motor driven positive displacement plunger pump shall be provided. The pump capacity shall be from 0.1 gpm (0.38 L/min) to 1.7 gpm (6.4 L/min) at 200 psi (13.8 BAR) with a maximum operating pressure up to 400 psi (27.6 BAR). The pump shall have the capability to draw 3 feet of lift. The system will draw a maximum of 30 amps @ 12 VDC. The motor shall be controlled by the microprocessor (mounted to the base of the pump). It shall receive signals from the control module and power the 1/3 hp (.25 Kw) electric motor in a variable speed duty cycle to ensure that the correct proportion of concentrate is injected into the water stream. A full flow check valve shall be provided in the discharge piping to prevent foam contamination of fire pump and water tank. A 12 psi (.83 BAR) opening pressure check valve shall be provided in concentrate line.

Components of the complete proportioning system as described above shall include:

- Operator control module
- Paddlewheel flowmeter
- Pump and electric motor/motor driver
- Wiring harnesses
- Low level tank switch
- Foam injection check valve
- Main waterway check valve

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FOAM SYSTEM TESTING

The apparatus foam system shall be tested, and the Water Flow meter shall be certified by the manufacturer prior to delivery.

FOAM SYSTEM SUPPLY

The system shall be supplied by a single foam tank that shall be monitored by the control display. The display shall flash a "low concentrate" warning for two minutes when the foam tank runs low. In the event that no additional concentrate is added to the tank, the foam concentrate pump shall be deactivated.

FOAM TANK

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

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.

Each foam tank shall be integral with the booster water tank provided.

FOAM TANK DRAIN

There shall be a 1.00 inch (25.4 mm) quarter turn drain valve installed to drain the foam tank. The valve shall be installed in the pump house with a drain line extended to the side running board.

The drain line shall be labeled "FOAM DRAIN".

FOAM LEVEL GAUGE

An Innovative Controls SL Plus Tank Monitor System model number 3030796-02, with a Spartan bezel, shall be installed. The system shall include an electronic display module, a pressure transducer-based sender unit, and the necessary wiring with water-tight plug terminations.

The display module shall show the volume of foam in the tank using 16 super bright easy-to-see LEDs. Tank level indication shall be achieved by the use of 4 horizontal rows of LEDs. Full and near-full levels shall be indicated with the illumination of all 4 rows of LEDs, including the illumination of the top row of 4 green LEDs. Tank levels between $\frac{1}{2}$ and $\frac{3}{4}$ full shall be indicated with the illumination of the bottom 3 rows of LEDs, including the illumination of the top row of 4 blue LEDs. Tank levels between $\frac{1}{4}$ and $\frac{1}{2}$ full shall be indicated with the illumination of the bottom 2 rows of LED's including the illumination of the top row of 4 amber LEDs. Tank levels between $\frac{1}{4}$ full and near empty shall be indicated with 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.



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A wide-angle polycarbonate diffusion lens in front of the LEDs create a 180 degree viewing angle. The electronic display module shall be waterproof and shock resistant being encapsulated in a urethane-based potting compound. The potted display module shall be mounted to a chrome plated panel-mount bezel with a durable easy-to-read polycarbonate insert featuring blue graphics and a water icon.

All programming functions shall be accessed and performed from the front of the display module. The programming includes manual or self-calibration and networking capabilities to connect remote slave displays. Low tank level warnings shall include flashing red LEDs starting below the ¼ level, down-chasing LEDs when the tank is almost empty.

The display module shall receive an input signal from a pressure transducer. This stainless steel sender unit shall be installed on the outside of the foam tank near the bottom. All wiring, cables and connectors shall be waterproof without the need for sealing grease.

LEFT SIDE INLET

There shall be one (1) gated suction inlet with .75 inch (19mm) bleeder installed on the left side of the apparatus with the following specified components.

A 2.50 inch (65 mm) Akron Brass 8000 series swing-out valve with stainless steel ball.

The intake control valve shall be a 'swing out type' direct operation manual lever actuator at the valve.

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.

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.

The inlet shall be located on the pump panel in the forward position.

RIGHT SIDE INLET

There shall be one (1) gated suction inlet with .75 inch (19mm) bleeder installed on the right side of the apparatus with the following specified components.

A 2.50 inch (65 mm) Akron Brass 8000 series swing-out valve with stainless steel ball.

The intake control valve shall be a 'swing out type' direct operation manual lever actuator at the valve.

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.

The termination shall include the following components:

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



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- One (1) 2.50 inch (65 mm) self-venting plug.

The inlet shall be located on the pump panel in the forward position.

LEFT SIDE DISCHARGE

There shall be one (1) gated discharge installed on the left side of the apparatus with the following specified components.

A 2.50 inch (65 mm) Akron Brass 8000 series swing-out valve with a stainless steel ball.

The control valve shall be a 'swing out type' direct operation manual lever actuator at the valve.

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.

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.

RIGHT SIDE DISCHARGE

There shall be one (1) gated discharge installed on the right side of the apparatus with the following specified components.

A 2.50 inch (65 mm) Akron Brass 8000 series swing-out valve with a stainless steel ball.

The discharge shall be controlled from the pump operator's panel location.

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.

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.

RIGHT SIDE MASTER DISCHARGE

There shall be one (1) master discharge installed on the right side of the apparatus provided with the following specified components.

A 3.00 inch (77 mm) Akron Brass 8000 series slo-cloz swing-out valve with a stainless steel ball.

The discharge shall be controlled from the pump operator's panel location.



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The plumbing shall consist of 3.00 inch (77 mm) piping and shall incorporate a manual drain control installed below the pump area for ease of access.

The discharge termination shall include the following components:

- One (1) 3.00 inch (77 mm) NST Straight adapter
- One (1) 3.00 inch (77 mm) NST female by 4.00 inch (100 mm) Storz with 30 degree elbow
- One (1) 4.00 inch (100 mm) Storz cap.

LEFT REAR DISCHARGE

There shall be one (1) gated discharge installed on the left rear of the apparatus with the following specified components.

A 2.50 inch (65 mm) Akron Brass 8000 series swing-out valve with a stainless steel ball.

The discharge shall be controlled from the pump operator's panel location.

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.

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.

RIGHT REAR DISCHARGE

There shall be one (1) gated discharge installed on the right rear of the apparatus with the following specified components.

A 2.50 inch (65 mm) Akron Brass 8000 series swing-out valve with a stainless steel ball.

The discharge shall be controlled from the pump operator's panel location.

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.

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.

CROSSLAY AREA

The crosslay hose beds shall be located in the upper portion of the pump compartment.



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The crosslay area shall span the entire width of the apparatus pump module. Removable flooring shall be provided in the hose bed area for drainage.

DOUBLE STACK CROSSLAYS

The crosslay area shall be constructed with a minimum of 25.00-inch (635mm) approximate depth for laying a double stack of each hose size as specified below.

Chiksan swivels shall be installed just below the floor of each crosslay bed just high enough for hose couplings to be accessed and tightened on to chiksans. Chiksan swivels shall swing from left to right to allow attached hose to be deployed from either side.

ADJUSTABLE CROSSLAY DIVIDERS WITH HAND HOLD CUTOUTS

Each crosslay divider, acting as a hose bed separator, shall be fabricated of .25-inch smooth aluminum. Each divider shall be adjustable from side to side and be of full length. Each divider shall have a vertical hand hold cutout provided at each end.

2 1/2" CROSSLAY

A crosslay with the following specified components shall be provided for up to 200 feet (60 m) of 2.50 inch (63.5 mm) hose.

There shall be a total of two (2) provided.

A 2.50 inch (65 mm) Akron Brass 8000 series swing-out valve with a stainless steel ball.

The discharge shall be controlled from the pump operator's panel location.

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.

The discharge termination shall include the following components:

- One (1) 2.50 inch (65 mm) NPT x 2.50 inch (65 mm) NST brass chiksan swivel

One (1) discharge(s) shall be foam capable.

- Crosslay #1 only to be Foam capable

CROSSLAY TRIM

Brushed stainless steel trim shall be installed at the openings on the bottom and on each side of the crosslay hose bed area. The trim shall reduce the chaffing of the hose jacket on the edges of the bay area.

CROSSLAY COVER

The crosslay hose bed area shall have a vinyl cover installed on the top and sides of the crosslay area.



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The top cover shall be held in place by an extrusion installed across the front edge of the crosslay hose bed and with Velcro across the rear edge. The sides of the crosslay cover shall be secured by means of elastic shock cord passing through brass grommets. Hooks shall be installed at the lower corners to secure the cover to the apparatus.

The crosslay hose bed cover shall be yellow in color.

CROSSLAY ROLLERS

Stainless steel hose roller guides shall be installed at the bottom openings on each side of the crosslay hose bed area. The rollers shall aid in hose deployment and reduce the chaffing of the hose jacket on the edges of the bay area.

CROSSLAY HOSE BED LIGHT

There shall be one (1) 18.00 inch OnScene "Access" LED strip light in a bezel provided and installed on the front face of the body to illuminate the crosslay hose bed.

The crosslay light shall be activated when the park brake is set.

2 1/2" PRE-CONNECT

One (1) hose bed pre-connect with the following specified components shall be provided for 2.50 inch (63.5 mm) hose on the left side of the hose bed.

A 2.50 inch (65 mm) Akron Brass 8000 series swing-out valve with a stainless steel ball.

The discharge shall be controlled from the pump operator's panel location.

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.

The discharge termination shall include the following components:

- One (1) 2.50 inch (65 mm) NPT x 2.50 inch (65 mm) MNST chrome plated brass fitting

The discharge shall terminate to the left side lower corner of the hose bed header wall approximately 8.00 inches, on center, above the hose bed floor.

The discharge shall be foam capable.

2 1/2" PRE-CONNECT

One (1) hose bed pre-connect with the following specified components shall be provided for 2.50 inch (63.5 mm) hose on the right side of the hose bed.

A 2.50 inch (65 mm) Akron Brass 8000 series swing-out valve with a stainless steel ball.

The discharge shall be controlled from the pump operator's panel location.

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.



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The discharge termination shall include the following components:

- One (1) 2.50 inch (65 mm) NPT x 2.50 inch (65 mm) MNST chrome plated brass fitting

The discharge shall terminate to the right side lower corner of the hose bed header approximately 8.00 inches, on center, above the hose bed floor.

DECK GUN MONITOR WATERWAY

There shall be one (1) deck gun monitor waterway installed on the apparatus with the following components.

The valve shall be a 3.00 inch (77 mm) Akron Brass 8000 series valve with 4" Trident 'TRU-FLO" handwheel control and position indicator.

The deluge waterway shall consist of 3.00 inch (77 mm) piping and shall be drained with an auto-drain located at the lowest point of the waterway plumbing if required.

The deluge pipe shall be located up through the pump compartment, to the right side of the apparatus.

The deluge waterway shall be capped with a stainless steel cap to allow for future installation of deck gun monitor.

The deluge waterway plumbing shall extend 5.00 inches (125 mm) above the top of the pump compartment unless otherwise specified by overall height requirement. A cap on the plumbing shall be provided.

FRONT BUMPER DISCHARGE OUTLET

One (1) front bumper discharge outlet shall be provided and installed in the location specified.

The valve shall be a 2.50 inch (65 mm) Akron Brass 8000 series valve with 4" Trident 'TRU-FLO" handwheel control and position indicator.

The plumbing shall consist of 2.00 inch (50 mm) piping and incorporate a manual drain control installed below the pump area for ease of access. Auto-drain(s) shall be installed in the discharge piping at lowest point of the plumbed system.

The discharge termination shall include the following components:

- One (1) 2.00 inch (50 mm) NPT x 1.50 inch (38 mm) NST, polished stainless steel chiksan swivel

The front bumper discharge shall be mounted on top of the bumper apron of the front bumper extension. The discharge shall be placed outboard of the frame rail extensions on the right side.

The discharge shall be foam capable.



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BOOSTER REEL

There shall be an electric rewind booster reel with automatic brake installed on the apparatus. The booster reel shall have a capacity to handle 1.00-inch diameter (25.4 mm) booster hose.

There shall be a manual rewind device provided. A manual crank shall be mounted adjacent to booster reel.

The reel shall come equipped with 175 feet (53 m) of 800 psi (55 BAR) booster hose.

The hose shall be provided in one (1) 175 foot (53 m) length with hardcoat aluminum couplings.

The hose reel specified shall be steel and painted the standard silver utilized by Hannay.

The reel shall be plumbed to the pump with a 2.00 inch (50.80 mm) quarter turn Akron brass 8000 series ball valve and 2.00 inch (50.80 mm) high pressure hose and couplings.

The valve shall be controlled from the operator's panel.

An electric rewind switch shall be located adjacent to the booster reel. The switch shall have a weather resistant rubber cover and a label indicating its function.

The switch shall be labeled "HOSE REEL".

The hose reel shall be mounted in dunnage area specified above the pump on the right side.

There will be one (1) Bell Roller assembly installed on the right side upper pump house to allow hose payout to the right side of the apparatus.

There shall be an air "blowout" system provided and installed on the apparatus. The air blow out system shall be connected to the chassis air brake system. A check valve shall be installed between the chassis system and the reel blow out system. A ¼ turn manual control valve shall be installed on the pump operator's panel for the air blow out system.

The valve shall be labeled "REEL BLOW OUT".

There shall be no pressure gauge supplied for the Booster Reel.

The discharge shall be foam capable.

DISCHARGE GAUGES

An Innovative Controls TC Series nominal 63 mm 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



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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.

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

Each gauge shall have black markings on a white face.

Highly-polished stainless steel Innovative Control bezels shall be provided around each of the discharge pressure gauges to prevent corrosion and protect lenses and gauge cases. The gauges shall be installed into decorative chrome-plated mounting bezels that incorporate valve identifying verbiage and/or color labels.

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.

TANK TO PUMP LINE

The connection between the tank and the pump shall be capable of the flow recommendations as set forth in NFPA, Standard for Automotive Fire Apparatus, latest revision and shall be tested to those standards when the pump is being certified.

One (1) non-collapsible flexible hose and valve shall be incorporated into the tank to pump plumbing to allow movement in the line as the chassis flexes to avoid damage during normal road operation. Four (4) inch stainless steel schedule 10 piping shall be used to complete the connection from the tank to pump valve to the water tank.

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 (6.00 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.

TANK TO PUMP VALVE

A 3.00 inch (77 mm) Akron Brass 8000 series swing-out valve with a stainless steel ball.



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The Tank to Pump valve shall be controlled with a push pull control such that when the handle is "IN" the valve is open, and when the handle is in the "OUT" position the valve is closed.

TANK FILL LINE

One (1) 2.00 inch (50.80 mm) tank fill/recirculating line shall be installed from the pump directly to the booster tank.

TANK FILL VALVE

A 2.00 inch (50 mm) Akron Brass 8000 series swing-out valve with a stainless steel ball.

The valve shall be controlled from the pump operator's panel location.

TRI-MAX™ Space Frame Body - ALUMINUM

The apparatus body shall be a Tri-Max™ **Space Frame** design, which serves as an incredibly durable, structural body framework. This framework acts as a series of beams and columns that support and protect the body and its contents. The space frame design provides maximum torsional resistance and load capabilities. The entire space frame structure shall be welded together utilizing an A.W.S. Certified welding procedure.

The space frame design shall also be required because it provides energy absorbing impact zones in the structure, thus providing increased safety to the rest of the apparatus and personnel on board. Documented proof of this extra safety shall be required upon request.

The Tri-Max™ body structure shall consist entirely of closed section members, except where the body is mounted to the chassis. Closed section members (such as square, rectangular, triangular, or round tubes) are required because they provide maximum strength and torsion rigidity. This solid tubular structural style of design ultimately adds longevity to the body structure by eliminating flex and twists in material, creating less stress and fatigue. Body designs that use independent sub-frames will not be acceptable.

BODY STRUCTURE MEMBERS

The space frame body shall have triangular shaped structural members in certain areas of the body. This shape is required to prevent loss of useable compartment space. Other body structure members shall be square or rectangular. Each structural member will have a nominal outside dimension of 2.50 inches (63.50 mm) in at least one direction. The body shall be designed for maximum strength to weight ratio, therefore the gauge of sheet metal and structural members varies from .125 inches (3.18 mm) to .250 inches (6.35 mm) throughout, dependent on the design requirement.

BODY MATERIAL TYPE

All body structural members shall be Aluminum 6061-T6 alloy material. All .125 inch sheet material shall be Aluminum Alloy 5052-H32, and .250 inch sheet materials shall be



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Aluminum Alloy 3003. These alloys are required because it provides optimum all-around performance for strength, manufacturing properties, and corrosion resistance.

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.

FRONT BODY COMPARTMENT WALLS

The front compartment walls of both forward most compartments shall be sheet finished. No overlay material shall be visible from the interior of the compartments.

REAR BODY COMPARTMENT WALLS

The rear compartment walls of both rearward most compartments shall be sheet finished. No overlay material shall be visible from the interior of the compartments. Access panels from the rear walls shall be strategically placed to ensure access to the rear taillight clusters for any servicing that may be completed.

COMPARTMENT TOP

The top of the compartments shall be an integral portion of the body. No overlay material shall be visible from the interior of the compartments.

COMPARTMENT FLOORS

The body compartments shall be enclosed with aluminum sheet metal as specified above. The compartment floors shall have a 1.00 inch 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 centered on the underside of the compartment floor. This additional member shall be integral with the rest of the body structure. Each compartment must be designed, and 3rd party analyzed to carry a working load of:

- Full depth side compartment: 1,000 lbs per compartment
- Half depth side compartment: 750 lbs per compartment
- Rear center compartment: 1,500 lbs

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NOTE: These values are for design purposes only for individual compartment construction and are not meant to be used as an actual overall weight rating for equipment load per compartment for the specified apparatus. The apparatus shall be engineered such that the completed unit, when loaded to its estimated in-service weight, shall comply with the gross axle weight ratings {GAWR}, the overall gross vehicle weight rating {GVWR}, and the chassis manufacturer's load balance guidelines per NFPA.

EXTERIOR HOSE BED WALLS

The exterior hose bed walls shall be an integral portion of the body. The wall shall give a smooth exterior look and finish with no vertical supports tubing visible from the exterior of the truck.

FASTENERS

All bolts and nuts used in the finish construction of the apparatus shall be coated stainless steel which helps prevent dissimilar metal electrolytic reaction and corrosion. Any bolt extending into a compartment or into the hose bed area shall have an acorn nut attached or be protected in such manner where sharp edges are avoided.

FINITE ELEMENT ANALYSIS

The proposed body design must have completed a review and analysis by a legitimate 3rd party engineering firm. At a minimum, the 3rd party must have conducted a computer model 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. The analysis process must conclude that the body structure is properly designed and manufactured to provide longevity under normal conditions. The 3rd party must also validate the manufacturing processes are consistent with the design and analysis performed. Proof of having completed this testing must be submitted with the bid.

PPG Painting/Finish Specifications - Aluminum, Pumper/Tanker

PPG 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 PPG Industries Delta® brand, applied throughout a multi-step process including at least two coats of each color and clear coat finish.



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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.

BODY PAINT COLOR

The apparatus body shall be painted to match Sikkens #30 White.

SUPERLINER COMPARTMENT FINISH

The compartment interiors shall be coated with Superliner.

COMPARTMENT FINISH COLOR

The Superliner Color shall be Medium Gray.



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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.

DIAMOND PLATE FRONT OVERLAYS

The entire front face of the apparatus body shall have aluminum diamond plate overlays installed.

RAW ALUMINUM REAR OVERLAYS

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 adhesive sealant on the back portion to provide an insulating barrier between dissimilar metals.

FRONT CORNER TRIM 16 GAUGE BRUSHED STAINLESS STEEL

The front of the apparatus body vertical wall overlays shall be installed with a 16 gauge brushed stainless steel 1.00 inch x 1.00 inch corner trim piece, for edge protection. The vertical edge trim shall extend from the top to bottom and shall be fastened at a minimum of three locations, top, middle, and bottom.

REAR CORNER TRIM 16 GAUGE BRUSHED STAINLESS STEEL

The rear face of the apparatus body, vertical wall overlays shall be installed with a 16 gauge brushed stainless steel 1.00-inch by 1.00-inch corner trim piece, for edge protection. The vertical edge trim shall extend from the top to bottom and shall be fastened at a minimum of three locations, top, middle, and bottom.

The vertical edge trim piece that is protecting the chevron striping surface or that is utilized for the purpose of striping, shall be secured utilizing fasteners only.

CATWALKS

The catwalks shall be constructed with materials of a non-slip .125 inch embossed aluminum diamond plate.

VIBRA-TORQ™ BODY MOUNTING SYSTEM

The entire body 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 body mounting system.



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The body 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 body mount bracket shall be mounted to the side chassis frame flange with two 5/8"-UNC Grade 8 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 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 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 failures. The Vibra-Torq™ body mounting system shall have a twenty (20) year or 100,000 miles limited warranty in accordance with, and subject to, warranty certificate RFW0541.

BODY STRUCTURE WIDTH

The width of the apparatus body from the outside of the left compartments to the outside of the right compartments shall be 99.00 inch (2.51 m) excluding any attached peripherals such as rub rails, fenderettes, grab handles, etc.

COMPARTMENT VENTILATION

To allow for proper air circulation & flow, each compartment shall have a venting route. The venting locations shall be determined by best-fit for each body configuration. Chrome louvered plate vents shall be installed 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.

The approximate interior dimensions of this compartment shall be 33.50 inches wide by 69.00 inches high with a lower depth of 25.50 inches and an upper depth of 12.50 inches.

The framed opening shall measure approximately 31.00 inches wide by 65.00 inches high.



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The compartment will have approximately 25.04 cubic feet of space.

Compartment "L2"

There shall be one (1) compartment located directly over the rear wheels on the left side of the apparatus.

The approximate interior dimensions of this compartment shall be 62.00 inches wide by 35.00 inches high with a depth of 12.50 inches.

The framed opening shall measure approximately 62.00 inches wide by 31.00 inches high.

The compartment will have approximately 15.70 cubic feet of space.

Compartment "L3"

There shall be one (1) full height compartment located behind the rear wheels on the left side of the apparatus.

The approximate interior dimensions of this compartment shall be 49.00 inches wide by 69.00 inches high with an upper depth of 12.50 inches.

The framed opening shall measure approximately 46.50 inches wide by 65.00 inches high.

The compartment will have approximately 36.62 cubic feet of space.

Compartment "R1"

There shall be one (1) compartment ahead of the rear wheels on the right side of the apparatus.

The approximate interior dimensions of this compartment shall be 33.50 inches wide by 33.00 inches high with a depth of 25.50 inches.

The framed opening shall measure approximately 31.00 inches wide by 29.50 inches high.

The compartment will have approximately 16.31 cubic feet of space.

Compartment "R2"

There shall be one (1) compartment located behind the rear wheels on the right side of the apparatus.

The approximate interior dimensions of this compartment shall be 49.00 inches wide by 33.00 inches high.

The framed opening shall measure approximately 46.50 inches wide by 29.50 inches high.

The compartment will have approximately 23.86 cubic feet of space.

LOCKING ROLL-UP DOOR CONSTRUCTION

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

R-O-M ROLL-UP DOOR



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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. Slat must have interlocking joints with an inverted locking flange. Slat inner seal shall be a one piece PVC extrusion; seal design shall be such to prevent metal to metal contact while minimizing dirt and water from entering the compartment.

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

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

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

SIDE COMPARTMENT DOOR ALUMINUM SATIN FINISH

The side compartment roll up doors shall be satin aluminum finish.

DOOR ASSIST STRAPS

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

DOOR OPEN INDICATOR

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

If the door is not properly closed and the parking brake is released, it shall activate the “hazard



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light” in the cab to alert the crew.

REAR CENTER COMPARTMENT

There shall be one (1) compartment, "B1", located at the rear of the apparatus, below the hose bed access area.

The approximate interior dimensions of this compartment shall be 43.00 inches wide and 32.00 inches high or as high as possible determined by the hose bed height and rear configuration. The depth shall be determined by the length of the rear side compartments specified and maximized for the suspension specified for the chassis.

The framed opening shall be approximately 38.00 inches wide and 27.00 inches high.

REAR COMPARTMENT DOOR

A locking 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. 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.



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REAR COMPARTMENT DOOR FINISH

The rear center compartment door shall be satin aluminum finish.

DOOR OPEN INDICATOR

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

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.

FUEL TANK ACCESS PANEL

There shall be a removable panel located on the interior back wall of the rear center compartment for maintenance access to the chassis fuel tank.

REAR COMPARTMENT PARTITIONS

The rear center compartment of the apparatus shall have permanent partitions installed on each side to increase utilization of the rear center area and to block access to either of the side compartments. The partitions shall be constructed of the same materials as used in the body structure and shall be welded in place to form permanent compartmentation.

SILL PLATES

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

COMPARTMENT LIGHTING

Two (2) LED tube lights model #RX-15T16-5050 shall be installed in each body compartment. The tube lights shall be centered vertically along each side of the door framing and at 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.

Each compartment light shall be activated with the ignition, park brake and the respective compartment door open switch.

REAR TAILBOARD

The rear of the apparatus body shall be vertical in design - otherwise known as a 'flat-back'.

The rear tailboard shall be fabricated of the same tubular materials as used in the apparatus body.

The tailboard shall be an independent assembly welded to the rear body structural framing to provide body protection and a solid rear stepping platform.

The rear step shall be designed to incorporate "crush zone" technology. This idea incorporates lighter materials in the tailboard than the body structure so the step will "crush" in a collision before the body structure.



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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, Standard for Automotive Fire Apparatus.

TAILBOARD LENGTH

The rear tailboard shall be approximately 16.00 inches (406.40 mm) deep and shall incorporate a ventilated "Diamondback" material stepping surface bolted in place which spans the width of the apparatus. The extruded stepping surface shall be completely enclosed by the supporting structural framework to minimize damage.

The ventilated "Diamondback" material shall be capable of being easily replaced if necessary, using only hand tools. The framework shall be covered with an adhesive tape providing an aggressive traction surface. Use of any aluminum diamond plate material on these areas shall not be acceptable.

WHEEL WELLS

Wheel wells shall have semicircular black polymer composite inner liners that are bolted to the wheel well panel and supported inboard by brackets that are connected to the body framework. Each wheel well shall be a continuous piece with no breaks or ledges where road grime or debris may accumulate. This liner shall be removable for access to suspension assembly for repairs. There shall be no exception to the bolted wheel well inner liner requirement.

WHEEL WELL PANELS

The body panel area around the wheel well on each side of the body shall be fabricated of aluminum diamond plate.

SCBA BOTTLE COMPARTMENTS

Cylindrical SCBA storage compartments shall be installed in the wheel well area above the wheel well liner, protected from dirt, rocks, and other debris.

The storage compartments shall be made of a tube that interfaces with a spring loaded cast aluminum door and housing - fastened to the wheel well panel for a secure installation. The inside of each compartment shall be lined with material (if required) to protect the air bottles from being damaged.

The storage compartments shall be installed in the apparatus at an inclined angle and incorporate a 1" nylon safety loop to be attached to the top of the bottle, to prevent the bottles from sliding forward when stored. There shall be holes drilled in the tubes for drainage in the event that water enters the compartment. Each SCBA compartment shall be a minimum internal diameter of 7.5" and be at least 25" deep.



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There shall be two (2) compartments on each side of the apparatus with one forward and one rearward of each wheel well.

FUEL FILL ASSEMBLY

There shall be a fuel fill assembly located on the apparatus body accessing the chassis supplied fuel tank. The assembly shall be located in the area that best suits efficient fuel filling with the space appropriated on the left side of the apparatus.

The fuel fill assembly will have a brushed aluminum door. There shall be a drain in the fuel fill assembly to allow overflow 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 fuel fill neck shall have a .375 inch inside diameter vent line installed from the top of the fuel tank to the fill tube.

FENDERETTES

Two (2) polished stainless steel 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.

HOSE STORAGE

A hose bed shall be provided and installed as long and as deep as the tank volume, rear configuration, and the body height allows. At a minimum the capacity of the hose bed shall meet the latest version of NFPA, Standard for Automotive Fire Apparatus.

The hose bed shall have a slotted .25 inch 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 ease of removal and stability. The area shall be free of sharp edges to protect the hose when loading and unloading.

HOSE BED AREA

The hose bed area of the apparatus shall be overlaid with brushed stainless steel material.

HOSE BED AREA TRIMMED W/ BRUSHED SST

The vertical corners at the back hose bed shall be trimmed with brushed stainless steel. The trim shall extend from the hose floor level up to the top edge of the body side.

HOSE BED WALL CAP

The top rail on the hose bed side walls shall have a trim cap fabricated of 16 gauge brushed 304L stainless steel. The cap shall run the entire length of the hose bed side wall and shall



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provide a smooth surface with a highly finished appearance. It shall extend down at least 1.00 inch on each side of the hose bed side wall.

HOSE BED WALL HEIGHT

The walls of the hose bed shall be 90.00 inches (2.29 m) tall, measured from the bottom edge of the compartments to the top flange.

SYNTEX VINYL COATED NYLON HOSE BED COVER

There shall be a hose bed cover provided and installed with the apparatus to cover the top of the hose bed area.

The cover shall be held in place by extruded aluminum channel on the front and an elastic shock cord sewn into the tarp with brass grommets where the shock cord passes through the hose bed cover on the sides. Hooks shall be provided on the sides to provide a means of attaching the cover to the apparatus. The hooks shall be made of cast aluminum.

HOSE BED COVER COLOR

The hose bed cover shall be yellow in color.

With fill tower flap.

SYNTEX VINYL REAR HOSE BED RESTRAINT

There shall be a vinyl flap that extends down over the rear of the hose bed provided and installed with the apparatus.

REAR HOSEBED FLAP RESTRAINT

The cover shall be fastened by an elastic shock cord sewn into the tarp with brass grommets where the shock cord passes through the hose bed cover. Hooks shall be provided on the lower corners to provide a means of attaching the cover to the apparatus. The hooks shall be made of cast aluminum.

REAR FLAP COLOR

The rear flap shall be yellow.

LED HOSE BED SPOT AND FLOOD LIGHTS

There shall be two (2) 6.00 inch LED Unity deck light model #BG-S-P46*LC, one (1) spot and one (1) flood, with clear LED wide flood lamp provided to illuminate the hose bed.

Each light shall have a heavy duty chrome finish and rotate 360 degrees horizontally and 180 degrees vertically. The lamp shall be 12V with 2,730 candle power 50,000 hours of lamp life.

The two (2) hose bed lights shall be installed at the rear of the apparatus, one (1) each side mounted to a rear flush mounted Cast Product rear stanchion.

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



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HOSE BED DUNNAGE AREA

A vertical bulkhead shall be provided and installed at the front of the hose bed area, behind the water tank fill tower, forming a storage area that is separated from the hose bed.

The rear face of the bulkhead shall serve as a mounting surface for the hose bed dividers, resulting in the ability to move any hose bed divider across the entire width of the hose bed.

REINFORCED HOSE BED DIVIDER WITH HAND CUTOUT

There shall be a full height adjustable reinforced 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. The top and rear edges shall be reinforced with 1.00 inch round aluminum tubing for extra rigidity. Hose payout shall be unobstructed by the divider.

There shall be a total of four (4) provided and installed in the hose bed.

SCALLOP CUTOUTS FOR HOSE BED DIVIDER(S)

Along the top edge of each adjustable hose bed divider specified there shall be equally spaced scalloped cutouts (belly cutouts) that shall be 10.00 inches, not to exceed more than half the height of the divider itself without affecting structural integrity. The number of cutouts shall be a maximum of four (4) depending on length of the divider.

HOSE LOAD

The hose bed shall accommodate the following hose loads:

BAY 1:

-300 feet of 1.75 inch hose

BAY 2:

-1000 feet of 3.00 inch hose

BAY 3:

-600 feet of 2.50 inch hose

BAY 4:

-1000 feet of 3.00 inch hose

BAY 5:

-200 feet of 1.75 inch hose

TANK CAPACITY

The tank shall be 500 gallons in capacity.



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SPARTAN POLY TANK

The water tank shall be designed to utilize cavities that have commonly been wasted space. The water tank may fill the void between the main hose bed floor and the top of the rear center compartment. In addition, this design shall create a lower center of gravity of the vehicle, for improved vehicle handling.

TANK CONSTRUCTION

The booster tank shall be constructed of poly 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 tested for maximum strength and integrity. The top of the booster tank is fitted with lifting eyes designed to facilitate tank removal.

COVER

The tank cover shall be constructed of the same poly material as the rest of the tank and shall be recessed. A minimum of two lifting dowels shall be drilled to accommodate the lifting eyes.

BAFFLES

The swash partitions shall be manufactured of the same poly material as the rest of the tank. All partitions shall be equipped with vent and air holes to permit movement of air and water between compartments 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 have a reinforced floor for added strength and durability. The tank shall be isolated from the body substructure cross members with rubber strips that are 60 durometer in hardness. The tank shall sit nested inside the center body substructure and shall be completely removable without disturbing the body side panels. Tank stops on all four sides will keep the tank from shifting front to back or side to side.

TANK WARRANTY

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

Please see the official warranty document in the appendix (attached) for specific details.

FILL TOWER

The fill tower opening shall be approximately 13.00 inches x 12.00 inches.

The tower will have a removable poly screen and a poly hinged type cover that will open if the tank is filled at an excess rate. The removable poly screen to prevent debris from falling into the tank.



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The fill tower shall have a 4.00 inch overflow that will discharge underneath the tank, behind the rear axle(s), avoiding the chassis fuel tank and suspension components where applicable. The overflow shall terminate above the tank water level when filled to the rated capacity.

The fill tower shall be located to the left side at the front of the hose bed.

SUMP

The sump will be constructed in an 8.00 inch x 16.00 inch x 1.00 inch deep area.

The construction material shall utilize 1.00 inch poly and be located in line with the tank suction valve. There shall be a 4.00 inch schedule 40 poly tube installed that will run from the suction outlet to the sump location. The tank will have an anti-swirl plate located approximately 2.00 inch above the sump.

SUMP PLUG

The sump shall have a 3.00 inch plug for use in draining and cleaning out the tank.

OUTLETS

In addition to the tank suction valve outlet located in the sump, there shall be an outlet provided for the tank fill valve. If there are any additional options selected (such as an extra tank suction or direct tank inlets), there shall be additional outlets provided to accommodate these items.

LADDER MOUNTING

There shall be provisions to mount ground ladders above the low compartments on the right side of the apparatus. Aluminum ladder mounting brackets shall have .25 inch thick plastic wear pads to prevent wear on ladders.

A quick release latch shall be installed on each cast bracket to retain the ladders. The latch mechanism shall be polished chrome plated quarter turn type that is capable of releasing one ladder while retaining the second ladder.

Stainless steel trim shall be provided and installed where ladders may come in contact with painted surfaces.

UNI STRUT CHANNELS

The ladder brackets shall be bolted to the side of the body in unistrut channels to eliminate the need to drill holes.

LADDER COMPLEMENT

The following ladders shall be supplied with the apparatus:

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



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

FOLDING LADDER STORAGE

Mounting provisions for one (1) folding ladder on the catwalks shall be provided with a welded aluminum diamond plate hood on one end and a rubber draw latch on the other for secure positioning.

FOLDING LADDER

The following folding ladder shall be supplied with the apparatus:

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

PIKE POLE STORAGE

There shall be two (2) tulip clip brackets provided for storage of the pike poles installed on the catwalk.

The following pike poles shall be supplied with the apparatus:

- One (1) Duo-Safety 12 foot pike pole(s) with fiberglass handle.
- One (1) Duo-Safety 10 foot pike pole(s) with fiberglass handle.

COMPARTMENT UNISTRUT

Vertically mounted Unistrut shall be installed in all apparatus body compartments, in the upper and lower sections, to accommodate the installation of shelves, trays, and or other miscellaneous equipment.

OVER-WHEEL COMPARTMENT PARTITIONS

Compartment partitions fabricated of the same material as the body shall be permanently installed in the left over-wheel compartment, right over-wheel compartment, or both where applicable by design.

The partitions shall be permanently installed in place and flush to the forward and rearward frame openings.

The partitions shall aid in keeping loose equipment from falling into the fore and aft compartments.

SHELVING

The shelving shall be made out of .190 inch 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 provided for vertical adjustment.

Standard manufacture shelf construction capacity ratings are as follows, any requested change to the manufacture's standard design may affect/reduce the ratings accordingly:



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Shelving shall be rated at a capacity of 200 pounds and applicable to the design configuration.

The following shelving shall be provided:

UPPER FULL DEPTH SHELVING

A full width x full depth shelf shall be provided and installed in the upper area of the compartment as specified.

There shall be a total quantity of three (3) provided.

- One (1) located in the L1 compartment.
- One (1) located in the L2 compartment.
- One (1) in the L3 compartment.

UPPER HALF DEPTH SHELVING

A full width x half depth shelf shall be provided and installed in the upper area of the compartment specified.

There shall be a total quantity of three (3) provided.

- One (1) located in the R1 compartment.
- One (1) located in the R2 compartment.
- One (1) located in the R3 compartment.

LOWER FULL DEPTH SHELVING

A full width x full depth shelf shall be provided and installed in the lower area of the compartment as specified.

There shall be a total quantity of four (4) provided.

- One (1) located in the L1 compartment.
- One (1) located in the L3 compartment.
- One (1) located in the R1 compartment.
- One (1) located in the R3 compartment.

SHELF AND TRAY FINISH

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

SIDE RUB RAILS (ALUMINUM CHANNEL)

The lowest edge of the apparatus body side compartments shall be trimmed with brightly anodized aluminum channel rub rail material.



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The rub rails shall be approximately 3.00 inches high with flanges turned outwards for increased rigidity, with each end chamfered to a 45 degree angle. The rub rails shall not be constructed as an integral part of the apparatus body structure, allowing each rub rail to be easily removed in the event of damage.

The rub rails shall be secured with stainless steel fasteners and spaced away from the apparatus body with .50 inch nylon spacers to help absorb moderate side impacts and prevent the collection of water and debris for easier cleaning.

FOLDING STEPS

Innovative Controls Inc. 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 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.

The following components shall be provided on each step:

- One (1) Logo label
- One (1) White step light
- One (1) White down light
- One (1) Safety label
- One (1) Flying leads termination

STEP LOCATION

Three (3) folding steps shall be installed on the left forward vertical wall of the front compartment.

10" HANDRAILS

One (1) 10.00 inch long by 1.25 inch diameter handrail constructed of extruded aluminum with a knurled grip, and full length illuminated LED light strip shall be installed in a location above the forward step(s) and in accordance with NFPA, Standard for Automotive Fire Apparatus, standard requirements. There shall be a minimum of 2.00 inches of clearance between the bracket and the body.

Each handrail LED light strip specified shall be white/clear in color.

The illuminated handrail light shall be activated when the park brake is set.

STEP LIGHT ACTIVATION

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



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STEP LOCATION

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

10" HANDRAIL

One (1) 10.00 inch long by 1.25 inch diameter handrail constructed of extruded aluminum with a knurled grip, and full length illuminated LED light strip shall be installed in a location above the rearward step(s) and in accordance with NFPA, Standard for Automotive Fire Apparatus, standard requirements. There shall be a minimum of 2.00 inches of clearance between the bracket and the body.

Each handrail LED light strip specified shall be white/clear in color.

The illuminated handrail light shall be activated when the park brake is set.

STEP LIGHT ACTIVATION

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

INTERMEDIATE REAR STEP

The rear step shall be 8.00 inches (203.20 mm) in depth.

The step shall be mounted on the flat back of the apparatus with gusset-type mounting 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 REAR STEP LOCATION

The rear step shall be located as high as possible beneath the hose bed floor and the horizontal handrail specified.

STEP LIGHTING

One (1) Whelen model #0AC0EDCR LED step light with 45 deg. mounting bezel shall be installed to illuminate the stepping areas.

The light shall be directed towards and positioned above the stepping surfaces.

STEP LIGHT ACTIVATION

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

HANDRAILS KNURLED ALUMINUM ILLUMINATED

Handrails shall be 1.25 inches in diameter, constructed of extruded aluminum with a knurled grip, and full length illuminated LED light strip.

There shall be a 2.00 inch minimum clearance between the handrail and the body. The light shall illuminate an area adjacent to the handrail and in accordance with NFPA, Standard for Automotive Fire Apparatus, standard requirements.



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The following handrails shall be installed at the approximate lengths noted:

REAR HANDRAIL LOCATION

Three (3) handrails shall be installed on the rear of the apparatus. Each handrail shall be of an adequate length, as available usable space allows, to provide a suitable gripping area for personnel.

The handrails shall be spaced away from the body using chrome plated straight stanchions. Two (2) vertical handrails shall be installed, one on each side, just below the hose bed sides. These vertical handrail(s) shall utilize an offset stanchion with the offset directed away from storage door openings for added clearance, where applicable. The remaining handrail shall be installed horizontally, just below the hose bed area.

Each handrail LED light strip specified shall be white/clear in color.

ILLUMINATED HANDRAIL LIGHTING ACTIVATION

The illuminated handrail light shall be activated when the park brake is set.

TOW EYES

There shall be two (2) rear tow eyes installed to the frame rails, one each side, accessible below the rear of the apparatus.

They shall be manufactured of 1.00 inch plate steel and each plate shall be bolted to the chassis frame rail with a minimum quantity of six (6) grade 8 bolts. The two plates shall be anchored together with 1.00 inch steel tubing to prevent swaying of the frame rails during a towing operation. All steel components shall be painted black.

LOW-VOLTAGE ELECTRICAL SYSTEM

The apparatus shall be equipped with a Logic Controlled, Low-Voltage (12v) Electrical System, compliant with the latest revision of the NFPA, Standard for Automotive Fire Apparatus.

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 (similar to 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 system 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 extra harnesses, circuit boards, relays, circuit breakers, and separate

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electrical or interlock subsystems and associated electronics for controlling various electrical loads and inputs.

As-built electrical system drawings and an apparatus-specific reference of I/O shall be furnished in the final delivery manuals. These drawings shall illustrate 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 manufacturer shall not be accepted.**

MULTIPLEXED ELECTRICAL WARRANTY

A four (4) year limited (V-MUX) multiplex system warranty shall be provided by the apparatus manufacture 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 a (1) year repair parts and labor from the date of installation.

NODE

An electrical distribution node or relay shall be installed in the below locations of the apparatus body.

The pump node shall be mounted as high as practical in the full depth portion of the right front compartment.

The rear body nodes shall be mounted as high and as far rearward as practical on the back wall of the rearmost compartment.

A protective cover shall be installed to prevent damage to the node or electrical system during equipment installation and or removal. Node covers shall be approximately 16.00 to 22.00 inches in length with an inspection hole positioned for view of the node indicator LED lights. The finish of the cover shall match the compartments interior finish. Node covers will not include any type of shelve mounting structure and shall limit the height of unistrut or shelf height within the compartments.

PERIMETER LIGHTS LOCATION

There shall be four (4) underbody perimeter lights installed on the apparatus positioned to provide illumination to the immediate ground area around the unit.

One (1) under each side of the pumphouse running boards and two (2) under the rear tailboard.

PERIMETER LIGHTS

The underbody perimeter lights provided will be TecNiq model T44 series, 4" round, 8 diode LED lights.



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PERIMETER LIGHTS ACTIVATION

The perimeter lights under the body shall illuminate the area with the activation of the chassis ground lights, excluding any chassis door programming.

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 B&D-FORWARD:

There shall be two (2) Whelen model M9 series LED lights with chrome bezels provided and installed with the apparatus.

There shall be one (1) each side of the body in the upper forward corners.

SIDE WARNING LIGHTS FLASH

The upper side lights shall feature multiple flash patterns including steady burn.

SIDE WARNING LIGHTS COLOR

The upper warning lights mounted on the side positions shall be red with red lenses.

UPPER ZONE B&D-REAR:

There shall be two (2) Whelen model M9 series LED lights with chrome bezels provided and installed with the apparatus.

There shall be one (1) each side of the body in the upper rear corners.

SIDE WARNING LIGHTS FLASH

The upper side lights shall feature multiple flash patterns including steady burn.

SIDE WARNING LIGHTS COLOR

The upper warning lights mounted on the side positions shall be red with red lenses.

UPPER ZONE C:

There shall be two (2) Whelen model M9 series LED lights with chrome bezels, one (1) each side, provided and installed with the apparatus. The warning lights shall require fabricated light housing.

The rear upper lights shall feature multiple flash patterns including steady burn.

The upper warning lights mounted at the rear shall be blue on the left and red on the right side with colored lenses.

The upper rear warning lights shall be controlled through the master warning switch and a secondary rear warning switch located on the vehicle display control screen. The switches shall be clearly labeled for ease of identification.



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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 two (2) Whelen model M6 series LED lights with chrome bezels, one (1) each side, provided and installed with the apparatus.

The lower side lights shall feature multiple flash patterns including steady burn.

The lower side warning lights mounted on the side positions shall be LH Blue/RH Red colored lenses

The warning lights on the side of the apparatus shall be mounted at the rear wheel panel centered above the axle.

The lower side warning lights shall be controlled through the master warning switch and a secondary side warning switch located on the vehicle 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.

The lower rear lights shall feature multiple flash patterns including steady burn.

The lower rear warning lights mounted at the rear shall be red on the left and blue on the right side with colored lenses.

The lower rear warning lights shall be controlled through the master warning switch and a secondary rear warning switch located on the vehicle display control screen. The switches shall be clearly labeled for ease of identification.

LED REAR TAILLIGHT ASSEMBLY

There shall be Whelen M6-Series Super LED rear taillight 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) M62BTT LED red brake light
- One (1) M62T LED series amber turn signal light
- One (1) M62BU LED clear back-up light

MOUNTING ASSEMBLY

There shall be Whelen 4-position vertical chrome plated housing provided for each taillight assembly.



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The upper most open cavity shall be filled with the specified warning light for the rear of the apparatus.

REAR TAILLIGHTS COLOR

The taillights mounted at the rear shall have colored lenses to match the color of the optics.

BACKUP LIGHTS

The backup lights shall illuminate when the apparatus is placed in reverse.

LED DOT LIGHTING

There shall be seven (7) lights located on the rear of the apparatus. Three (3) of the lights shall be mounted on the rear of the apparatus center location, for use as identification lamps. Two (2) additional lights shall be located on the rear outboard locations, one (1) each side as high as possible. Two (2) lights shall be mounted on the sides facing the side at the rear corners, for use as clearance lamps.

The lights shall be TecNiq S17 series LED red markers.

DOT ADDITIONAL MARKER LIGHTS

There shall be two (2) amber LED intermediate marker lights/intermediate turn signals installed in the rub rail, forward of the rear wheel well, one (1) each side.

The lights shall be TecNiq S17 series LED amber markers/turn.

INTERMEDIATE TURN SIGNALS

The intermediate turn signals will flash with the turn indicators.

MARKER LIGHT LENS COLOR

The above specified marker lights shall have colored lenses.

The above specified marker lights shall have chrome bezels.

REAR DIRECTIONAL LIGHTBAR

There shall be eight (8) rear directional lights provided and installed on the rear of the apparatus body.

The lights shall be Whelen model #WIONSMCA LED ION amber lights with clear lenses and chrome bezels. Each light shall be surface mounted and equally spaced, spanning horizontally across the rear of the apparatus.

The rear directional lights shall be controlled by a Whelen Model TACTL5 control head.

RDL CONTROL HEAD MOUNTING LOCATION

Rear Directional Lightbar control head shall be mounted in the rocker panel cutout provided by the chassis manufacturer.



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REAR VIEW CAMERA LOCATION

A camera shipped loose with the chassis shall be mounted at the center location to the underside of the intermediate rear step at the rear of the apparatus body for maximum viewing capability.

SIDE SCENE LIGHT LOCATION

There shall be four (4) scene lights installed on the sides of the apparatus, two (2) on each side.

One (1) located at the front and one (1) located at the rear corner.

The scene lights on the side shall be positioned inboard of the warning lights specified.

SCENE LIGHT MODEL

Whelen model 904SLC LED EZ scene lighting with chrome flange shall be surface mounted on the apparatus.

BODY SIDE SCENE LIGHT ACTIVATION

The scene lighting shall be activated with the chassis side scene lights.

REAR SCENE LIGHT LOCATION

There shall be two (2) scene lights installed on the rear facing vertical surface of the apparatus, one (1) on each side.

SCENE LIGHT MODEL

Whelen model 904SLC LED EZ scene lighting with chrome flange shall be surface mounted on the apparatus.

REAR SCENE LIGHT ACTIVATION

The rear scene lighting shall be activated by a virtual button on the vehicle display control screen. The scene shall also be interlocked with the park brake.

The switch shall be labeled as follows:

- Rear Scene

DEALER SUPPLIED/INSTALLED INVERTER

The inverter shall be supplied and installed by the Dealership prior to the truck being placed into service. The apparatus manufacturer shall provide wiring provisions from the chassis batteries to the location specified below. The apparatus manufacture shall also provide any mounting and/or provisions as specified below.

Inverter shall be Xantrex Model 817-2000, 2000W.

The transfer relay shall be included with the dealer provided inverter.

The inverter shall be surface mounted in the L1 compartment.



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3M REFLECTIVE STRIPING

There shall be a 6.00 inch, 3M reflective stripe with two (2) 1.00 inch accent stripes applied to the chassis and apparatus body as specified:

- The above specified Striping shall consist of two colors.

The upper and lower stripe shall be:

- Reflective stripe black in color.

The middle stripe shall be:

- Reflective stripe gold in color.

STRIPE PATTERN

The reflective striping shall be applied around the perimeter of the front of the apparatus in a straight line. In addition, when the stripe reaches the front area of the body, the stripe shall jog in a 'Hockey Stick' shape pattern, then continuing around the rear of the apparatus at a slightly higher level. Transition shall be on the L1 and R1 compartment doors.

REAR RETRO-REFLECTIVE CHEVRON STRIPING

A minimum of 50 percent of the rear-facing vertical surface, visible from the rear of the apparatus, shall be equipped with 3M 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 inches (152.40 mm) wide alternating in colors.

CHEVRON COLOR

The diamond grade retro-reflective chevron striping shall be red and fluorescent yellow-green in color.

DEALER SUPPLIED LETTERING

The apparatus lettering shall be provided and installed by the Dealership before final delivery of the completed apparatus.

DEALER SUPPLIED DECALS

The apparatus decals shall be provided and installed by the Dealership prior to the apparatus being placed into service.

MISCELLANEOUS EQUIPMENT

The following equipment list shall be provided with the completed apparatus.

WHEEL CHOCKS

One (1) set of NFPA compliant cast aluminum folding wheel chocks shall be supplied with the apparatus.



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One (1) set of folding wheel chock underbody horizontal mounts shall be installed on the apparatus under the body on the left side, one (1) mount forward of the rear wheels and one (1) mount rearward.

DEALER SUPPLIED ITEMS

DAVID CLARK WIRED INTERCOM SYSTEM

A five (5) person six (6) position David Clark intercom system shall be installed in the apparatus.

All necessary system power cords, headset modules and adapters will be provided along with the following specified components:

- One (1) U3805 Radio Cord Junction Module
- One (1) U3815 Radio Interface Module
- One (1) U3811 Radio Interface Module
- One (1) U3800 Intercom Unit
- One (1) U3820 Power Cable
- One (1) U3801 Remote Headset Station

HEADSET/JACK LOCATION

There shall be one (1) radio transmit headset located in the cab above and to the right of the driver's seat, one (1) radio transmit headset above and to the left of the officer's seat, three (3) intercom only headset located in the area above the crew seats and one (1) weather resistant jack shall be located on the pump panel.

RADIO INTERFACE CABLE

A two-way radio interface cable shall be provided to interface with the David Clark intercom system.

AUTO LUBRICATION

Vogel automatic lubrication system shall be installed. The system will supply grease while the parking brake is off and will be paused while the parking brake is on. The system will include an electronic control that allows for adjustable timing intervals and monitors the system for faults and low-level indications.

MONITOR

An Akron Model 3423 monitor will be supplied. The monitor shall include both a fixed mounting base and a portable base with two (2) clappered 2.5" inlets.

The monitor will be painted as provided by monitor manufacturer.



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NOZZLE, DELUGE

Akron model 2499 Quad stacked pyrolite deluge tips will be provided.

The tip sizes will be: 1.375", 1.50", 1.75", 2.00".

This will include an Akron 3488 Pyrolite stream shaper.

The deluge riser will have male National Pipe Threads for mounting the monitor.

MAP BOX

A custom map box shall be supplied and mounted per department specifications.

GLOVE BOX

A custom glove box shall be supplied and mounted per department specifications.

STORAGE TRAY

A custom storage tray shall be supplied and mounted per department specifications.

HOSE PACK

A custom hose pack shall be supplied and mounted per department specifications.

HIGH RISE HOOKS

High rise hooks will be supplied and mounted in the chassis per department specifications.

EMS CABINET

A customer EMS cabinet shall be supplied and mounted per department specifications. The EMS cabinet shall be located on the LH rear facing seating position.

FILTERS

Dealer will supply/stock 24 months of the preventative maintenance filters.

FIRE TRUCK TRAINING

Each truck ordered shall come with one paid registration/accommodations to the Spartan Fire Truck Training Conference OR to the Colorado Fire Mechanics annual training.

