**MARYVILLE FIRE PROTECTION**

**DISTRICT**

**INVITATION TO BID**

**Date: \_\_\_\_\_\_\_\_\_ Name of bidder: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Address of bidder: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**City: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ State: \_\_\_\_\_\_\_\_\_\_\_\_ Zip: \_\_\_\_\_\_\_\_\_**

**Phone #: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Fax: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**E-Mail: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**YOU ARE INVITED TO SUBMIT SEALED BIDS**

**ON THE FOLLOWING ITEMS PER SPECIFICATIONS**

**NFPA 1901 Class A Pumper**

**CLOSING DATE: Thursday January 27, 2021 at 3:30 PM.**

Proposals may be delivered in person to **Maryville Fire Department 300 N. Donk Ave. Maryville, IL 62062** or Mailed to **Maryville Fire Protection District 6700 E. Main St, Maryville, IL 62062.** Proposals will not be accepted after **3:00 p.m. on Wednesday January 27, 2021**.

Bids will be opened at a special meeting of the Board of Directors, at the Maryville Fire Department 300 N. Donk Ave., Maryville, IL 62062 January 27, 2021 at 3:30 p.m.

The District Board of Directors reserves the right to reject all bids, and also the right to take any bid whether or not it is the lowest, if in the judgment of the Board of Directors the quality of the items submitted on the bids justify taking another bid other than the lowest one. The District also reserves the right to reject items on delivery, if at that time it does not meet incoming inspection of the district.

All items quoted must be FOB Maryville Fire Department 300 N. Donk Ave. 62062

Mailing address: Maryville Fire Protection District 6700 E. Main St., Maryville, IL 62062

The Maryville Fire Protection District has determined that the published RFP specifications meet the needs of the fire department therefor proposals for “stock pumpers” will not be accepted and will be excluded from consideration.

**Exceptions to the Specifications** shall be listed separately by RFP specifications page number. The exceptions shall include how the bidder’s proposal differs from the published RFP specifications, (“meets the intent of the specification” will not be accepted) and how the bidder intends to meet the requirements of the specification.

**TOTAL AMOUNT OF BID**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Customer: MARYVILLE FIRE PROTECTION DISTRICT

## TESTING COMPLIANCE STANDARD

### Hose Bed Capacity

The hose bed shall have the capacity to store the following hose from the driver side to the officer side. 5” X 1000’ LDH. (2) 2.5” X 600”, 3” X 600’.

### Overall Height Restriction

The apparatus shall have no overall height restrictions.

### Overall Length Restriction

The unit overall length shall not exceed 34 feet.

### NFPA Compliance

The manufacturer supplied components of the apparatus shall be compliant with NFPA 1901, 2016 edition.

### Equipment Capacity

Equipment allowance on the apparatus shall be 2000 lbs. This allowance is in addition to the weight of the hoses and ground ladders listed in the shop order as applicable.

## BUMPERS

### Front Bumper

The vehicle shall be equipped with a one-piece 10” high bumper made from 10 gauge (0.135” nominal) polished stainless steel for corrosion resistance, strength, and long-lasting appearance. It shall be mounted directly to the front frame extensions for maximum strength. The bumper shall incorporate two (2) stiffening ribs.

### Front Bumper Extension

The bumper shall be extended approximately 22” from the face of the cab as required.

### Bumper Gravel Shield

The extended front bumper gravel shield shall be made of 3/16” (.375”) aluminum tread plate material.

## BUMPER TRAYS

### Bumper Tray - Center

A hose tray constructed of 1/8” aluminum shall be recessed into the front bumper extension. The tray shall be located in the center of the bumper and be approximately 14" deep (13" to the top of the slats). One-inch thick aluminum slats shall be included in the bottom of the hose tray to aid in the dissipation of water from the tray.

### Bumper Tray Securing Strap

A heavy-duty black nylon strap with a stainless steel quick-release buckle shall be provided for center front bumper tray. The strap shall be attached to the inboard side of the tray and shall not reduce the overall tray capacity.

## FRAME ASSEMBLY

### Rear Underbody Support Frame

The body shall be supported at the rear by a steel frame extension bolted to the chassis frame rails. The frame rails and frame extension shall be isolated from the aluminum body extrusions by 5/16” x 2” fiber reinforced rubber.

The frame extension shall be built with (2) 2.5” sq. x .25 wall thickness x full width cross rails welded to (2) 2.5” sq. x .25 wall thickness side rails. The frame extension assembly will be welded to steel weldments, which are secured to the chassis frame with grade 8 5/8” bolts.

The frame extension shall not interfere with N.F.P.A. minimum requirements for angle of departure.

### Frame Assembly

The frame shall consist of two (2) C-channel frame rails with heavy-duty cross-members. Each frame rail shall have the following minimum specifications in order to minimize frame deflection under load and thereby improve vehicle ride and extend the life of the frame:

Dimensions: 10-1/4” x 3-1/2” x 3/8”

Material: 110,000-psi minimum yield strength, high strength, low alloy steel

Section Modulus: 16.61 cu. in.

Resistance to Bending Moment (RBM): 1,827,045 in. lbs.

If larger rails are provided, the maximum height of each frame rail shall not exceed the 10-1/4” dimension by more than 1/2” in order to ensure the lowest possible body height for ease of access as well as the lowest possible vehicle center of gravity for maximum stability.

There shall be a minimum of six (6) cross-members joining the two (2) frame rails in order to make the frame rigid and hold the rails/liners in alignment. The cross-members shall be a combination of a formed steel C-channel design along with heavy duty steel fabricated designs as required for the exact chassis configuration. The cross-members shall be attached to the frame rails with not less than four (4) bolts at each end arranged in a bolt pattern to adequately distribute the cross-member load into the rail/liner and minimize stress concentrations.

All frame fasteners shall be high-strength Grade 8, flanged-head threaded bolts and nuts for frame strength, durability, and ease of repair. The nuts shall be Stover locknuts to help prevent loosening. The frame fasteners shall be tightened to the proper torque at the time of assembly.

The frame rails shall be hot-dip galvanized and powder coated for improved corrosion resistance. The galvanization shall be a minimum of 4 mils thick and done in accordance with ASTM A123. The powder coat shall be 6.5 mils thick (+/- 1.5 mils) and pass ASTM D3359 testing.

The frame cross-members and frame mounted components (suspensions, axles, air tanks, battery boxes, fuel tank, etc.) shall be painted black.

The apparatus manufacturer shall supply a full lifetime frame warranty including cross-members against defects in materials or workmanship. Warranties that provide a lifetime warranty for only the frame rails, but not the cross-members, are not acceptable. NO EXCEPTIONS.

The custom chassis frame shall have a WHEEL ALIGNMENT in order to achieve maximum vehicle road performance and to promote long tire life. The alignment shall conform to the manufacturer`s internal specifications. All wheel lug nuts and axle U-bolt retainer nuts shall be tightened to the proper torque at the time of alignment. The wheel alignment documentation shall be made available at delivery upon request.

### Frame Liner

A 9-3/8” x 3-1/8” x 3/8” channel frame liner shall be bolted to each frame rail for added strength and rigidity. Frame liners shall be made of 110,000 psi minimum yield, high strength, low alloy steel. The frame rail liners shall be hot dip galvanized and powder coated for improved corrosion resistance. The galvanization shall be a minimum of 4 mils thick and done in accordance with ASTM A123. The powder coat shall be 6.5 mils thick (+/- 1.5 mils) and pass ASTM D3359 testing.

Each frame rail with liner shall have the following minimum characteristics:

Section Modulus: 28.74 cu. in.

RBM: 3,161,400 in. lbs.

The frame liners shall be inserted inside the open portion of the frame rails and shall run continuously from the rear of the frame to the centerline of the front axle to provide maximum frame strength at all critical load points.

### Coated Fasteners

The custom chassis frame assembly shall be assembled using GEOMET 720 coated fasteners for corrosion resistance.

## AXLE OPTIONS

### Front Shock Absorbers

The front suspension shall be furnished with two (2) heavy duty, double acting shock absorbers, one (1) on each side.

### Rear Axle

The vehicle shall be equipped with a Meritor RS-24-160 single rear axle with single-reduction hypoid gearing and a manufacturer`s rated capacity of 24,000 lbs. The axle shall be equipped with oil-lubricated wheel bearings with Meritor oil seals. The rear axle hubs shall be made from ductile iron and shall be designed for use with 10-hole hub-piloted wheels to improve wheel centering and extend tire life.

### Front Axle

The vehicle shall utilize a Meritor FL-941 front axle with a rated capacity of 18,000 lbs. It shall have “easy steer” knuckle pin bushings and 68.5” kingpin centers. The axle shall be of I-beam construction and utilize grease-lubricated wheel bearings.  The vehicle shall have a nominal cramp angle of 45 degrees, plus two (+ 2) degrees to minus three (- 3) degrees including front suction applications.

The front axle hubs shall be made from ductile iron and shall be designed for use with 10-hole hub-piloted wheels in order to improve wheel centering and extend tire life.

Front springs shall be parabolic tapered, minimum 4” wide x 54” long (flat), minimum 3 leaf, progressive rate with a capacity of 18,000 lbs. at the ground. The springs shall have Berlin style eyes and rubber bushings on each end with an additional standard wrap at the front eye. Tapered leaf springs provide a 20% ride improvement over standard straight spring systems.

The vehicle shall be equipped with a Sheppard model M-110 integral power steering gear. The steering assembly shall be rated to statically steer a maximum front axle load of 18,000 lbs. Relief stops shall be provided to reduce system pressure upon full wheel cut. The system shall operate mechanically should the hydraulic system fail.

In order to achieve maximum vehicle road performance and to promote long tire life, there shall be a wheel alignment. The alignment shall conform to the manufacturer`s internal specifications. All wheel lug nuts. and axle U-bolt retainer nuts shall be tightened to the proper torque at the time of alignment. The wheel alignment documentation shall be made available at delivery.

## TIRE OPTIONS

### Front Tires

Front tires shall be two Michelin 315/80R22.5 tubeless type 20 PR radial tires with X Multiway 3D XZE tread.

Tires with wheels shall have the following weight capacity and speed rating:

18,000 lbs. @ 75 MPH. (Intermittent fire service max load 19,452 lbs.)

The tires and wheels shall conform to the Tire and Rim Association requirements.

### Rear Tires

The rear tires shall be four (4) Michelin 11R22.5 tubeless type 16 PR (Ply Rating) radial tires with XZE2 highway tread.

The tires with wheels shall have the following maximum weight and speed capacity:

24,020 lbs. (dual) @ 75 MPH.

The tires and wheels shall conform to the Tire and Rim Association requirements.

### Tire Pressure Indicators

The apparatus shall be provided with Real Wheels AirGuard LED tire pressure indicating valve stem caps.  When the tire is under inflated by 5-10 PSI, the LED indicator on the cap shall flash red.  The indicator housings shall be shock resistant and constructed from polished stainless steel.  The indicators shall be calibrated by attaching to valve stem of a tire at proper air pressure per load ratings and easily re-calibrated by simply removing and re-installing them during service.

Real Wheel Part number RWC1234 was superseded by RWC1235 as of June 2015

## SUSPENSIONS

### Rear Suspension

The rear suspension shall be a pair of linear-rate leaf springs with auxiliary “helper” leaf springs and bronze bushings. The variable-rate springs with auxiliary springs ensure that the vehicle rides and handles smoothly under both loaded and unloaded conditions.  The suspension shall be rated for the maximum axle capacity.

## WHEEL OPTIONS

### Front Wheel Trim Package

The front wheels shall have stainless steel lug nut covers (for use with aluminum wheels) or chrome plated plastic (for use with steel wheels). The front axle shall be covered with American made Real Wheels brand mirror finish, 304L grade, non-corrosive stainless-steel universal baby moons. All stainless-steel baby moons shall carry a lifetime warranty plus a 2-year re-buffing policy. There shall be two (2) baby moons and twenty (20) lug nut covers.

### Rear Wheel Trim Package, Single Axle

The rear wheels shall have stainless steel lug nut covers (chrome plated steel lug nut covers not acceptable), or American made chrome plated plastic lug nut covers. The rear axle shall be covered with American made Real Wheels brand mirror finish, 304L grade, non-corrosive stainless steel, spring clip band mount high hats, DOT user friendly. All stainless-steel high hats shall carry a lifetime warranty plus a 2-year re-buffing policy. There shall be two (2) high hats and twenty (20) lug nut covers.

### Front Wheels

The vehicle shall have two (2) Accuride polished (on outer wheel surfaces only) aluminum disc wheels. They shall be forged from one-piece corrosion-resistant aluminum alloy and sized appropriately for the tires.

The wheel shall have a load rating of up to 11,000 lbs. each (up to 11,400 lb rating available with speed limited to 60 MPH)

### Rear Wheels

The vehicle shall have four (4) Accuride polished (on outer wheel surfaces only) aluminum disc wheels. They shall be forged from one-piece corrosion-resistant aluminum alloy and sized appropriately for the tires.

## BRAKE SYSTEMS

### Front Brakes

The front axle shall be equipped with Meritor DiscPlus EX225H 17-inch disc brakes.

The brakes shall be covered by the manufacturer`s standard warranty which is two years, unlimited mileage and parts only.

### Rear Brakes

The rear axle shall be equipped with ArvinMeritor 16-1/2” x 7” S-cam brakes with cast brake drums. Q-Plus shoes shall be provided with up to 24,000 lb. axle ratings and P-Type shoes with over 24,000 lb. axle ratings.

The rear axle brakes shall be furnished with automatic slack adjusters. ArvinMeritor brand shall be supplied on RS-24-160 and RS-25-160 axles, and Haldex brand shall be supplied on RS-26-185 and RS-30-185 axles.

A 3 year/unlimited miles parts and 3-year labor rear brake warranty shall be provided as standard by ArvinMeritor Automotive. The warranty shall include bushings, seals, and cams.

### Brake System

The vehicle shall be equipped with air-operated brakes and an anti-lock braking system (ABS). The brake system shall meet or exceed the design and performance requirements of the current Federal Motor Vehicle Safety Standard (FMVSS)-121, and the test requirements of the current NFPA 1901 Standard.

A dual-treadle brake valve shall correctly proportion the braking power between the front and rear systems.  The air system shall be provided with a rapid pressure build-up feature, designed to meet current NFPA 1901 requirements, to allow the vehicle to begin its emergency response as quickly as possible.

A pressure-protection valve shall be installed to prevent use of the air horns or other air-operated devices should the air system pressure drop below 85 psi. This feature is designed to prevent inadvertent actuation of the emergency/parking brakes while the vehicle is in motion.

Two (2) air pressure needle gauges, one (1) each for front and rear air pressure, with a warning light and buzzer shall be installed at the driver`s instrument panel.

The braking system shall be provided with a minimum of three (3) air tank reservoirs for a total air system capacity of 5,214 cu. in. One (1) reservoir shall serve as the wet tank and a minimum of one (1) tank shall be supplied for each of the front and rear axles. The total system shall carry a sufficient volume of air to comply with FMVSS-121.

Tank Capacities in Cubic Inches:

Wet        Front        Rear        Total

1,738      1,738       1,738      5,214

Spring-actuated emergency/parking brakes shall be installed on the rear axle.

A Bendix-Westinghouse SR-1 valve, in conjunction with a double check valve system, shall provide automatic emergency brake application when the air brake system pressure falls below 40 psi in order to safely bring the vehicle to a stop in case of an accidental loss of braking system air pressure.

A four-channel Wabco ABS shall be provided to improve vehicle stability and control by reducing wheel lock-up during braking. This braking system shall be fitted to both front and rear axles. All electrical connections shall be environmentally sealed for protection against water, weather, and vibration.

The system shall constantly monitor wheel behavior during braking. Sensors on each wheel transmit wheel speed data to an electronic processor, which shall detect approaching wheel lock-up and instantly modulate (or pump) the brake pressure up to five (5) times per second to prevent wheel lock-up. Each wheel shall be individually controlled. To improve field performance, the system shall be equipped with a dual-circuit design configured in a diagonal pattern. Should a malfunction occur in one circuit, that circuit shall revert to normal braking action. A warning light at the driver`s instrument panel shall signal a malfunction.

The system shall also be configured to work in conjunction with all auxiliary engine, exhaust, or driveline brakes to prevent wheel lock-up.

To improve maintenance troubleshooting, provisions in the system for an optional diagnostic tester shall be provided. The system shall test itself each time the vehicle is started, and a dash-mounted light shall go out once the vehicle is moving above 4 MPH.

A 3 year/300,000-mile parts and labor Anti-Locking Braking System (ABS) warranty shall be provided as standard by Meritor Automotive.

### Park Brake Release

One (1) Bendix-Westinghouse PP-5 parking brake control valve shall be supplied on the lower dash panel within easy reach of the driver.

## AIR SYSTEM OPTIONS

### Air Dryer

The chassis air system shall be equipped with a Bendix-Westinghouse AD-9 air dryer to remove moisture from the air in order to help prevent the air lines from freezing in cold weather and prolong the life of the braking system components.

### Air Inlet

A 1/4” brass quick-release air inlet with a male connection shall be provided. The inlet shall allow a shoreline air hose to be connected to the vehicle, discharging air directly into the wet tank of the air brake system. It shall be located driver door jamb.

### Isolated Air Reservoir

The air system shall have an additional 1738 cu. in. isolated reservoir. The supply side of the reservoir shall be equipped with a check valve and an 85-psi pressure protection valve.

Specified options shall be plumbed to the isolated air tank.

### Auxiliary Air Tank Plumbing

The auxiliary air tank to be plumbed to the chassis air horns only.

### Heated Moisture Ejectors

All air reservoirs shall be equipped with a Bendix DV-2 automatic reservoir drain valve which shall automatically eject moisture and contaminants from the reservoirs. The moisture ejectors shall be heated.

### Air Lines

Air brake lines shall be constructed of color-coded nylon tubing routed in a manner to protect them from damage. Brass fittings shall be provided.

### Air Horns

Dual Grover Stuttertone air horns shall be provided, connected to the chassis air system. The horns shall be mounted through the front bumper. The front bumper shall have two (2) holes punched to accommodate the horns. The air horns shall be plumbed to the Auxiliary air tank and a pressure protection valve shall be installed to prevent the air brake system from being depleted of air pressure.

## ENGINES & TRANSMISSIONS

### Transmission Selector

A push-button transmission shift module, Allison model 29538373, shall be located to the right side of the steering column within easy reach of the driver. The shift position indicator shall be indirectly lit for after dark operation. The shift module shall have a “Do Not Shift” light and a “Service” indicator light. The shift module shall have means to enter a diagnostic mode and display diagnostic data including oil life monitor, filter life monitor, transmission health monitor and fluid level. A transmission temperature gauge with warning light and buzzer shall be installed on the cab instrument panel.

### Transmission Fluid

The transmission fluid shall be TranSynd, Shell Spirax S6ATF A295, or equivalent synthetic.

### Vehicle Speed

The maximum speed shall be electronic limited to 68 MPH as required by NFPA 1901.

Note: Maximum speed may be set at 65 MPH due to tire rating.

### Engine/Transmission Package

#### Engine

The vehicle shall utilize a Cummins L9 engine as described below:

* 450 maximum horsepower at 2200 rpm
* 1250 lb-ft peak torque at 1200 rpm
* Six (6) cylinder, charge air cooled, 4-cycle diesel
* 543 cu. in. (8.9 liter) displacement - 4.49 in bore x 5.69 in stroke
* 16.6:1 compression ratio
* Viable Geometry Turbocharged
* Engine shall be equipped with Full-Authority Electronics
* Electronic Timing Control fuel system
* Fuel cooler (when equipped with a fire pump)
* Cummins supplied fuel filter with integral water separator and water-in-fuel sensor approved by Cummins for use on the L9 engine
* Fleetguard LF9009 Venturi Combo combination full flow/by-pass oil filter approved by Cummins for use on the ISL engine
* Engine lubrication system, including filter, shall have a minimum capacity of 25 quarts
* Delco-Remy 39 MT-HD 12-volt starter
* Cummins 18.7 cubic foot per minute (cfm) air compressor
* Corrosion inhibitor additive for coolant system
* After treatment system consisting of a oxidation catalyst and diesel particulate filter and selective catalyst reduction system
* Ember separator compliant with current NFPA 1901 standard
* The engine shall be compliant with 2021 EPA Emission standards

The engine air intake shall draw air through the front cab grill. The intake opening shall be located on the officer (right) side behind front cab face with a plenum that directs air to the air filter. The air cleaner intake piping shall be made from aluminized steel tubing with flexible rubber hoses. The intake piping clamps shall be heavy-duty, constant-torque, T-bolt style to ensure proper sealing under all temperatures in order to keep dust and other contaminants out of the engine intake air stream and protect the engine.

The air cleaner shall be an 11” diameter K&N for lower restriction and high air flow. The filtration media shall be washable and easily accessed for service. The air filter shall have a 3 year / 300,000-mile warranty.

The engine exhaust piping shall be a minimum of 4” diameter welded stainless steel tubing. The aftertreatment system shall be mounted horizontally under the right-hand frame rail in back of the cab in order to minimize heat transmission to the cab and its occupants. The exhaust shall be directed away from the vehicle on the right side ahead of the rear wheels in order to keep exhaust fumes as far away as possible from the cab and pump operator position.

A 5-year/100,000-miles parts and labor warranty shall be provided as standard by Cummins.

A copy of the Engine Installation Review stating the engine installation meets Cummins recommendations shall be provided as requested. The engine installation shall not require the operation of any type of” power-down” feature to meet engine installation tests.

#### Transmission

The vehicle shall utilize an Allison EVS3000P, electronic, 5-speed automatic transmission.

A push button shift module shall be located right side of the steering column, within easy reach of the driver. The shift position indicator shall be indirectly lit for after-dark operation. The shift module shall have a” Do Not Shift” light and a “Service” indicator light that are clearly visible to the driver. The shift module shall have means to enter a diagnostic mode and display diagnostic data.

A transmission oil temperature gauge with warning light and buzzer shall be installed on the cab instrument panel to warn the driver of high oil temperatures that may damage the transmission.

The transmission shall have a gross input torque rating of 1250 lb.-ft. and a gross input power rating of 450 HP.

The gear ratios shall be as follows:

1 - 3.49

2 - 1.86

3 - 1.41

4 - 1.00

5 - .75

R - 5.03

The transmission shall have an oil capacity of 23 quarts and shall be equipped with a fluid level sensor (FLS) system, providing direct feedback of transmission oil level information to the driver.

A water-to-oil transmission oil cooler shall be provided to ensure proper cooling of the transmission when the vehicle is stationary (no air flow). Air-to-oil transmission oil coolers, which require constant air flow, are not acceptable.

The transmission shall be provided with two (2) engine-driven PTO openings located at the 4 o`clock and 8 o`clock positions for flexibility in installing PTO-driven equipment.

The automatic transmission shall be equipped with a power lock-up device. The transmission lock-up shall prevent down shifting of the transmission when the engine speed is decreased during pump operations, thereby maintaining a constant gear ratio for safe operation of the pump. The transmission lock-up shall be automatically activated when the pump is engaged in gear. The transmission lock-up shall be automatically deactivated when the pump is disengaged for normal road operation.

A 5-year/unlimited miles parts and labor warranty shall be provided as standard by Allison Transmission.

#### Automatic Shift to Neutral

The transmission shall be programmed to comply with NFPA 1901 and automatically shift to neutral upon application of the parking brake.

## SECONDARY BRAKING

### Jacobs Engine Brake

One (1) Jacobs engine brake shall be installed to assist in slowing and controlling the vehicle as required by NFPA 1901 for vehicles with gross vehicle weight ratings (GVWR) of 36,000 lbs. or greater. An on-off control switch and a high-medium-low selector switch shall be mounted in the cab accessible to the driver.

When activated, the Jacobs engine brake shall cut off the flow of fuel to the cylinders and alter the timing of the exhaust valves. This shall transform the engine into a high-pressure air compressor, driven by the wheels, and the horsepower absorbed by the engine in this mode shall slow the vehicle. The selector switch allows the driver to select the amount of retarding power.

When the on-off switch is in the “on” position, the engine brake shall be automatically applied whenever the accelerator is in the idle position and the automatic transmission is in the lock-up mode. If the accelerator is depressed or if the on-off switch is placed in the “off” position, the engine brake shall immediately release and allow the engine to return to its normal function.

### Transmission Programming

The transmission shall include the Allison 2nd gear Pre-Select feature.  This option will direct the transmission to down shift to second gear when the throttle is released and the Jacobs engine brake (or Telma retarder wired to activate with release of throttle) is engaged.  This feature is designed to increase brake life and aid vehicle braking.

## COOLING PACKAGE

### Engine Cooling Package

#### Radiator

The cooling system shall include an aluminum tube-and-fin radiator with a minimum of 1,408 total square inches of frontal area to ensure adequate cooling under all operating conditions. There shall be a drain valve in the bottom tank to allow the radiator to be serviced. A sight glass shall be included for quick fluid level assessment. The radiator shall be installed at the prescribed angle in order to achieve the maximum operational effectiveness. This shall be accomplished according to established work instructions and properly calibrated angle measurement equipment.

#### Silicone Hoses

All radiator and heater hoses shall be silicone. Pressure compensating band clamps shall be used to eliminate hose pinching on all hoses 3/4" diameter and larger. All radiator hoses shall be routed, loomed, and secured so as to provide maximum protection from chafing, crushing, or contact with other moving parts.

#### Coolant

The cooling system shall be filled with a 50/50 mixture of water and antifreeze/coolant conditioner to provide freezing protection to minus 40 (- 40) degrees F for operation in severe winter temperatures.

#### Coolant Recovery

There shall be a coolant overflow recovery system provided.

#### Charge Air Cooler System

The system shall include a charge air cooler to ensure adequate cooling of the turbocharged air for proper engine operation and maximum performance.

#### Charge Air Cooler Hoses

Charge air cooler hoses shall be made from high-temperature, wire-reinforced silicone to withstand the extremely high temperatures and pressures of the turbocharged air. The hoses shall incorporate a flexible hump section to allow motion and misalignment of the engine relative to the charge air cooler. Charge air cooler hose clamps shall be heavy-duty, constant-torque, T-bolt clamps to ensure proper sealing under all temperatures in order to keep dust and other contaminants out of the engine intake air stream and protect the engine.

#### Fan/Shroud

The fan shall be 30” in diameter with eleven (11) blades for maximum airflow and dynamic balance. It shall be made of nylon for strength and corrosion resistance. The fan shall be installed with grade 8 hardware which has been treated with thread locker for additional security.  A fan shroud attached to the radiator shall be provided to prevent recirculation of engine compartment air around the fan in order to maximize the cooling airflow through the radiator.  The fan shroud shall be constructed of fiber-reinforced high temperature plastic.  The shroud shall be specifically formed with curved surfaces which improves air flow and cooling.

#### Transmission Cooler

The cooling system shall include a liquid-to-liquid transmission cooler capable of cooling the heat generated from the transmission. When a transmission retarder is selected, the cooler shall have an increased capacity to handle the additional heat load.

## FUEL SYSTEMS

### Fuel System

One (1) 50-gallon fuel tank shall be provided. The tank shall be of an all-welded, aluminized-steel construction with anti-surge baffles and shall conform to all applicable Federal Highway Administration (FHWA) 393.65 and 393.67 standards. The tank shall be mounted below the frame rails at the rear of the chassis for maximum protection. The tank shall be secured with two (2) wrap-around T-bolt type stainless steel straps. Each strap shall be fitted with protective rubber insulation and shall be secured with grade 8 hardware. This design allows for tank removal from below the chassis.

The fuel tank shall be equipped with a 2” diameter filler neck. The filler neck shall extend to the rear of the vehicle behind the rear tires and away from the heat of the exhaust system as required by NFPA 1901 Standard for Automotive Fire Apparatus. The open end of the filler neck shall be equipped with a twist-off filler cap with a retaining chain.

The tank shall be plumbed with top-draw and top-return fuel lines in order to protect the lines from road debris. Bottom-draw and/or bottom-return fuel lines are not acceptable. A vent shall be provided at the top of the tank. The vent shall be connected to the filler neck to prevent splash-back during fueling operations. A .50” NPT drain plug shall be provided at the bottom of the tank.

The tank shall have a minimum useable capacity of 50 gallons of fuel with a sufficient additional volume to allow for thermal expansion of the fuel without overflowing the vent.

A mechanical fuel pump shall be provided and sized by the engine manufacturer as part of the engine.

### Fuel Line

All fuel lines shall be rubber.

### Fuel/Water Separator

A Racor fuel/water separator shall be installed in place of the Cummins fuel/water separator with drain. The unit shall utilize a three-step separate process: centrifuge for primary contaminant separation, conical baffles for water coalescing, and a replaceable filter for final particulate removal. The separator shall have a bottom drain for removing contaminants, shall be heated and shall have a rated maximum flow of 3.16 GPM. A sensor with indicator light and audible alarm shall be provided for the Racor fuel/water separator. The indicator light shall be mounted in the cab visible to the driver with the unit located inside the frame rails (as applicable). The unit will alert the driver of high-water content in the separator bowl.

### Fuel Shut-Off

A shut-off valve shall be supplied to prevent drain back of fuel into the main supply line during filter changes. The valve(s) shall be located: one (1) inlet side of fuel/water separator.

## ALTERNATOR

### 420 Amp Alternator

There shall be a 420-amp Leece Neville alternator installed as specified. The alternator shall be a Leece Neville brushless type with integral rectifier and adjustable voltage regulator with an output of 369 amps per NFPA 1901 rating (420 amps per SAE J56).

## BATTERIES

### Battery System

The manufacturer shall supply four (4) heavy duty Group 31 12-volt maintenance-free batteries. Each battery shall be installed and positioned so as to allow easy replacement of any single battery. Each battery shall be equipped with carrying handles to facilitate ease of removal and replacement. There shall be two (2) steel frame mounted battery boxes, one (1) on the left frame rail and one (1) on the right frame rail. Each battery box shall be secured to the frame rail with Grade 8 hardware. Each battery box shall hold (2) batteries. The batteries shall have a minimum combined rating of 4,000 (4 x 1000) cold cranking amps (CCA) @ 0 degrees Fahrenheit and 820 (4 x 205) minutes of reserve capacity for extended operation. The batteries shall have 3/8-16 threaded stud terminals to ensure tight cable connections. The battery stud terminals shall each be treated with concentrated industrial soft seal after cable installation to promote corrosion prevention. The positive and negative battery stud terminals and the respective cables shall be clearly marked to ensure quick and mistake-proof identification.

Batteries shall be placed on non-corrosive rubber matting and secured with hold-down brackets to prevent movement, vibration, and road shock. The hold-down bracket J-hooks shall be cut to fit and shall have all sharp edges removed. The batteries shall be placed in plastic trays to provide preliminary containment should there be leakage of hazardous battery fluids. There shall be two (2) plastic trays, each containing (2) batteries. Each battery tray shall be equipped with a rubber vent hose to facilitate drainage. The rubber vent hose shall be routed to drain beneath the battery box. The batteries shall be positioned in well-ventilated areas.

One (1) positive and one (1) negative jumper stud shall be provided.

Batteries shall have a warranty of twelve (12) months that shall commence upon the date of delivery of the apparatus.

## CHASSIS OPTIONS

### Engine Fan Clutch

The engine shall be equipped with a thermostatically controlled engine cooling fan. The fan shall be belt driven and utilize a clutch to engage when the engine reaches a specified temperature.

When disengaged, the fan clutch shall allow for improved performance from optional floor heaters, reduced cab interior noise, increased acceleration, and improved fuel economy.

The fan shall be equipped with a fail-safe engagement so that if the clutch fails the fan shall engage to prevent engine overheating.

### Drivelines

Drivelines shall have a heavy-duty metal tube and shall be equipped with Spicer 1710HD universal joints to allow full-transmitted torque to the axle(s). Drive shafts shall be axially straight, concentric with axis and dynamically balanced.

### Front Tow Eyes

Two (2) 3/4” thick heavy-duty steel tow eyes shall be securely attached to the chassis frame rails at the front of the apparatus. They shall be mounted down below the bumper / cab.

### Rear Tow Eyes

Two (2) heavy duty tow eyes made of 3/4” (0.75”) thick steel having 2-1/2” diameter holes shall be mounted below the body at the rear of the vehicle to allow towing (not lifting) of the apparatus without damage. The tow eyes will be welded to the lower end of a 5” steel channel that is bolted at the end of the chassis frame rails. The tow eyes shall be painted chassis black.

### DEF Tank

A diesel exhaust fluid (DEF) tank with a five (5) gallon capacity shall be provided.

The DEF tank shall include a heater fed by hot water directly from the engine block to prevent the DEF from becoming too cool to operate correctly per EPA requirements. The tank shall include a temperature sensor to control the heater control valve that controls the feed of hot water from the engine to the DEF tank heater.

A sender shall be provided in the DEF tank connected to a level gauge on the cab dash.

The tank shall be located left side below rear of cab.

### Power Steering Cooler

A heat exchanger (cooler) shall be installed to maintain desired power steering fluid temperature.  The cooler shall be a model DH-073-1-1 with air / oil design rated at 6300 BTU/HR @10 GPM.  The cooler shall be mounted in front of the radiator and plumbed with #10 lines.

## CAB MODEL

### Medium Cab

The vehicle shall be distinguished by an all-welded aluminum and fully enclosed tilt cab.  The cab shall be designed exclusively for fire/rescue service and shall be pre-engineered to ensure long life. It shall incorporate an integral welded substructure of high-strength aluminum alloy extrusions that creates an occupant compartment that is essentially a protective perimeter.  The end result is a distinctive structure that is aesthetically appealing, functionally durable, and characterized by increased personnel safety.

The cab shall be constructed from 3/16” (0.188”) 3003 H14 aluminum alloy plate roof, floor, and outer skins welded to a high-strength 6063-T6 aluminum alloy extruded subframe. Wall supports and roof bows are 6061 T6 aluminum alloy. This combination of a high-strength, welded aluminum inner structure surrounded on all sides by load bearing, welded aluminum outer skins provides a cab that is strong, lightweight, corrosion-resistant, and durable.

The inner structure shall be designed to create an interlocking internal ”roll-cage” effect by welding two (2) 3” x 3” x 0.188” wall-thickness 6063-T5 aluminum upright extrusions between the 3” x 3” x 0.375” wall-thickness 6061-T6 roof crossbeam and the 2.25” x 3” x 0.435” wall-thickness 6063-T6 subframe structure in the front. An additional two (2) aluminum upright extrusions within the back-of-cab structure shall be welded between the rear roof perimeter extrusion and the subframe structure in the rear to complete the interlocking framework. The four (4) upright extrusions -- two (2) in the front and two (2) in the rear -- shall be designed to effectively transmit roof loads downward into the subframe structure to help protect the occupant compartment from crushing in a serious accident. All joints shall be electrically seam welded internally using aluminum alloy welding wire.

The subframe structure shall be constructed from high-strength 6061-T6 aluminum extrusions welded together to provide a structural base for the cab. It shall include a side-to-side 3” x 1.5” .375 thick C-channel extrusion across the front, with 3/4” x 2-3/4” (.75” x 2.75”) full-width crossmember tubes spaced at critical points between the front and rear of the cab.

The cab floor shall be constructed from 3/16” (0.188”) 3003 H14 smooth aluminum plate welded to the subframe structure to give the cab additional strength and to help protect the occupants from penetration by road debris and under-ride collision impacts.

The cab roof shall be constructed from 3/16” (0.188”) 3003 H14 aluminum treadplate supported by a grid of fore-aft and side-to-side aluminum extrusions to help protect the occupants from penetration by falling debris and downward-projecting objects. Molded fiberglass or other molded fiber-reinforced plastic roof materials are not acceptable.

The cab roof perimeter shall be constructed from 4” x 6-5/8” (4” x 6.625”) 6063-T5 aluminum extrusions with integral drip rails. Cast aluminum corner joints shall be welded to the aluminum roof perimeter extrusions to ensure structural integrity. The roof perimeter shall be continuously welded to the cab roof plate to ensure a leak-free roof structure.

The cab rear skin shall be constructed from 3/16” (0.188”) 3003 H14 aluminum plate. Structural extrusions shall be used to reinforce the rear wall.

The left-hand and right-hand cab side skins shall be constructed from 3/16” (0.188”) 3003 H14 smooth aluminum plate. The skins shall be welded to structural aluminum extrusions at the top, bottom, and sides for additional reinforcement.

The cab front skins shall be constructed from 3/16” (0.188”) 3003 H14 smooth aluminum plate. The upper portion shall form the windshield mask, and the lower portion shall form the cab front. Each front corner shall have a full 9” outer radius for strength and appearance. The left-hand and right-hand sides of the windshield mask shall be welded to the left-hand and right-hand front door frames, and the upper edge of the windshield mask shall be welded to the cab roof perimeter extrusion for reinforcement. The cab front shall be welded to the subframe C-channel extrusion below the line of the headlights to provide protection against frontal impact.

### Cab Exterior

The exterior of the cab shall be 94” wide x 130” long to allow sufficient room in the occupant compartment for up to four (4) fire fighters. The cab roof shall be approximately 101” above the ground with the flat roof option. The back-of-cab to front axle length shall be a minimum of 58”.

Front axle fenderette trim shall be brushed aluminum for appearance and corrosion resistance. Bolt-in front wheel well liners shall be constructed of 3/16” (0.188”) composite material to provide a maintenance-free, damage-resistant surface that helps protect the underside of the cab structure and components from stones and road debris.

A large stainless-steel cooling air intake grille with an open area of no less than 81% shall be at the front of the cab.

The cab windshield shall be of a two-piece replaceable design for lowered cost of repair. The windshield shall be made from 1/4” (0.25”) thick curved, laminated safety glass with a 75% light transmittance automotive tint. A combined minimum viewing area of 2,561-sq. in. shall be provided. Forward visibility to the ground for the average (50th percentile) male sitting in the driver`s seat shall be no more than 11 feet 7 inches from the front of the cab to ensure good visibility in congested areas.

### Windshield Wipers

Two (2) opposed radial style windshield wipers with two (2) separate electric motors shall be provided for positive operation. The wipers shall be tested beyond the minimum SAE requirement to a total of 3.3 million cycles. The wipers shall be a wet-arm type with a one (1) gallon washer fluid reservoir, an intermittent-wipe function, and an integral wash circuit. Wiper arm length shall be approximately 20”, and the blade length approximately 21”. Each arm shall have a 90-degree sweep for full coverage of the windshield.  The wipers shall be synchronized so as to wipe each windshield simultaneously.

### Cab Mounts and Cab Tilt System

The cab shall be independently mounted from the body and chassis to isolate the cab structure from stresses caused by chassis twisting and body movements. Mounting points shall consist of two (2) forward-pivoting points, one (1) on each side; two (2) intermediate rubber load-bearing cushions located midway along the length of the cab, one on each side; and two (2) combination rubber shock mounts and cab latches located at the rear of the cab, one (1) on each side.

An electric-over-hydraulic cab tilt system shall be provided to provide easy access to the engine. It shall consist of two (2) large-diameter, telescoping, hydraulic lift cylinders, one (1) on each side of the cab, with a frame-mounted electric-over-hydraulic pump for cylinder actuation.

Safety flow fuses (velocity fuses) shall be provided in the hydraulic lift cylinders to prevent the raised cab from suddenly dropping in case of a burst hydraulic hose or other hydraulic failure. The safety flow fuses shall operate when the cab is in any position, not just the fully raised position.

The hydraulic pump shall have a manual override system as a backup in the event of an electrical failure. Lift controls shall be located in a compartment to the rear of the cab on the right side of the apparatus. A parking brake interlock shall be provided as a safety feature to prevent the cab from being tilted unless the parking brake is set.

The entire cab shall be tilted through a 42-45-degree arc to allow for easy maintenance of the engine, transmission and engine components. A positive-engagement safety latch shall be provided to lock the cab in the full tilt position to provide additional safety for personnel working under the raised cab.

In the lowered position, the cab shall be locked down by two (2) automatic, spring-loaded cab latches at the rear of the cab. A “cab ajar” indicator light shall be provided on the instrument panel to warn the driver when the cab is not completely locked into the lowered position.

### Cab Interior

The interior of the cab shall be of the open design with an ergonomically designed driver area that provides ready access to all controls as well as a clear view of critical instrumentation.

The engine cover between the driver and the officer shall be a low-rise contoured design to provide sufficient seating and elbow room for the driver and the officer. The engine cover shall blend in smoothly with the interior dash and flooring of the cab. An all-aluminum subframe shall be provided for the engine cover for strength. The overall height of the engine enclosure shall not exceed 23” from the floor at each side and 27” in the center section. The engine cover shall not exceed 41” in width at its widest point.

The rear portion of the forward engine cover shall be provided with a lift-up door to provide easy access for checking and filling engine oil, transmission fluid and power steering fluid without raising the cab (a separate access panel shall be provided for the power steering when equipped with an X12 or X15 engine).

The engine cover insulation shall consist of 1/2” closed cell elastomeric compound foam with aluminum foil faced fiberglass fabric manufactured to specifically fit the engine cover. All edges and seams shall be sealed using aluminum foil faced fiberglass tape. The insulation shall meet or exceed DOT standard FMVSS 302-1 and V-0 (UI subject 94 Test).

All cab floors shall be covered with a black rubber floor mat that provides an aggressive slip-resistant surface in accordance with current NFPA 1901.

The rear engine cover area shall be covered with molded 18 lb/cu. ft. (+/-0.5) flexible integral skinned polyurethane foam at a Durometer of 60 (+/- 5.0) per ASTM F1957-99. The cover shall be approximately .5" thick with a minimum skin thickness of 0.0625 inches. The cover shall be provided to reduce the transmission of noise and heat from the engine. The cover shall be black with a pebble grain finish for slip resistance.

A minimum of 57.25” of floor-to-ceiling height shall be provided in the front seating area of the cab and a minimum of 55.25” floor-to-ceiling height shall be provided in the rear seating area. A minimum of 36” of seated headroom at the "H" point shall be provided over each fender well.

The interior side to side dimensions shall be 87" from wall padding to wall padding and 89.5" from door to door.

The floor area in front of the front seat pedestals shall be no less than 24" side to side by up to 25” front to rear for the driver and no less than 24" side to side by up to 27” front to rear for the officer to provide adequate legroom.

Battery jumper studs shall be provided to allow jump-starting of the apparatus without having to tilt the cab.

All exposed interior metal surfaces shall be pretreated using a corrosion prevention system.

The interior of the cab shall be insulated to ensure the sound (dbA) level for the cab interior is within the limits stated in the current edition of NFPA 1901. The insulation shall consist of 2 oz. wadding and 1/4” (0.25”) foam padding. The padding board shall be backed with 1/4” (0.25”) thick reflective insulation. The backing shall be spun-woven polyester. Interior cab padding shall consist of a rear cab headliner, a rear wall panel, and side panels between the front and rear cab doors.

The vehicle shall use a seven-position tilt and telescopic steering column to accommodate various size operators. An 18” padded steering wheel with a center horn button shall be provided.

The driver and officer seat risers shall be welded to the main cab floor structure. Depending on the make and model of the seats, a storage compartment with a hinged door shall be provided in the risers.

The lower front cab steps shall be a minimum of 11.5” deep x 24” wide. The lower rear cab steps shall be a minimum 16” deep x 21” wide. The first step at the front and rear cab doors shall be no more than 24.0” above the ground with standard tires in the unloaded condition per NFPA 1901 standards. The front and rear steps shall incorporate full width intermediate steps for easy access to the cab interior. The intermediate step at the front doors shall be approximately 6" deep (minimum). The intermediate step at the rear doors shall be approximately 10.75" deep (minimum). The step surfaces shall be aluminum diamond plate with a multi-directional, aggressive gripping surface incorporated into the aluminum diamond plate in accordance with current NFPA 1901.

A black grip handle shall be provided on the interior of each front door below the door window to ensure proper hand holds while entering and exiting the cab. An additional black grip handle shall be provided on the left and right-side windshield post for additional handholds.

### Cab Doors

Four (4) side-opening cab doors shall be provided. Doors shall be constructed of a 3/16” (0.188”) aluminum plate outer material with an aluminum extruded inner framework to provide a structure that is as strong as the side skins.

Front cab door openings shall be approximately 36” wide x 72.5” high, and the rear cab door openings shall be approximately 33.75” wide x 72.5” high. The front doors shall open approximately 85 degrees, and the rear doors shall open approximately 80 degrees.

The doors shall be securely fastened to the doorframes with full-length, stainless steel piano hinges, with 3/8” (0.375”) diameter pins for proper door alignment, long life, and corrosion resistance. Mounting hardware shall be treated with corrosion-resistant material prior to installation. For effective sealing, an extruded rubber gasket shall be provided around the entire perimeter of all doors.

The front door windows shall provide a minimum viewing area of 518 sq. in. each. The rear door windows shall provide a minimum viewing area of 554 sq. in. each. All windows shall have 75% light transmittance automotive safety tint.

The door handles on the exterior of the cab shall be a pull type with vertical orientation. The handles shall be made with corrosion free material and have a black finish. Each exterior door handle shall have an integral keyed lock.

Recessed paddle-style door latches shall be provided on the interiors of the doors. The latches shall be designed and installed to protect against accidental or inadvertent opening as required by NFPA 1901. The rear cab door handles shall have a vertical orientation making them easily accessible from forward or rearward outboard seating positions. Each cab door shall have a manually operated door lock actuated from the interior of each respective door.

### Cab Instruments and Controls

Cab controls shall be located on the cab instrument panel in the dashboard on the driver`s side where they are clearly visible and easily reachable. Chassis operation switches shall be installed in removable panels for ease of service. The following gauges and/or controls shall be provided:

• Speedometer/Odometer
• Tachometer
• Engine hour meter
• Engine oil pressure gauge with warning light and buzzer
• Engine water temperature gauge with warning light and buzzer
• Transmission oil temperature gauge
• Two (2) air pressure gauges with a warning light and buzzer (front air and rear air)
• Fuel gauge with low fuel indicator light
• Voltmeter
• Master battery/ignition switch (rocker with integral guard)
• Engine start switch (rocker)
• Heater and defroster controls with illumination
• Marker light/headlight control switch (rocker)
• Panel light dimmer switch (rocker)
• Self-canceling turn signal control with indicators
• Windshield wiper switch with variable speed and washer controls
• Pump shift control with green ”pump in gear” and ”o.k. to pump” indicator lights
• Parking brake controls with red indicator light on dash
• Automatic transmission shift console
• Electric horn button at center of steering wheel
• Master warning light switch
• Cab ajar warning indicator
• Air filter restriction indicator

Controls and switches shall be identified as to their function by backlit wording adjacent to each switch, or indirect panel lighting adjacent to the controls.

### Electrical System

The cab and chassis system shall have designated electrical distribution areas. All electrical components shall be located such that standard operations shall not interfere with or disrupt vehicle operation. An access cover shall be provided for maintenance access to the electrical distribution area. Circuit protection shall be provided by fuses, thermal reset breakers and / or solid-state controls.

A 6 place, constantly hot, and 6 place ignition switched fuse panel and ground for customer-installed radios and chargers shall be provided at the electrical distribution area. Radio suppression shall be sufficient to allow radio equipment operation without interference.

All wiring shall be mounted in the chassis frame and protected from impact, abrasion, water, ice, and heat sources. The wiring shall be color-coded and functionally-labeled every 3” on the outer surface of the insulation for ease of identification and maintenance. The wiring harness shall conform to SAE 1127 with GXL temperature properties. Any wiring connections exposed to the outside environment shall be weather-resistant. All harnesses shall be covered in a loom that is rated at 280 degrees F to protect the wiring against heat and abrasion.

### Daytime Running Lights

Two (2) dual rectangular chrome plated headlight bezels shall be installed on the front of the cab. The low beam headlights shall activate with the release of the parking brake to provide daytime running lights (DRL) for additional vehicle conspicuity and safety. The headlight switch shall automatically override the DRL for normal low beam/high beam operation.

### Fast Idle System

A fast-idle system shall be provided and controlled by a switch accessible by the driver. The system shall increase engine idle speed to a preset RPM for increased alternator output.

### Cab Crashworthiness Requirement

The apparatus cab shall meet and/or exceed relevant NFPA 1901 load and impact tests required for compliance certification with the following:

Side Impact Dynamic Pre-Load per SAE J2422 (Section 5).

Testing shall meet and/or exceed defined test using 13,000 ft-lbs. of force as a requirement. The cab shall be subject to a side impact representing the force seen in a roll-over. The cab shall exhibit minimal to no intrusion into the cab’s occupant survival space, doors shall remain closed and cab shall remain attached to frame.

Quasi-static Roof Strength (proof loads) per SAE J2422 (Section 6) / ECE R29, Annex 3, paragraph 5.

Testing shall meet and/or exceed defined test using 22,046 lbs. of mass as a requirement. Testing shall be completed using platen(s) distributed uniformly over all bearing members of the cab roof structure.

Cab testing shall be completed using 22,046 lbs. of mass **meeting** testing requirements. The cab shall exhibit minimal to no intrusion into the cab’s occupant survival space and doors shall remain closed.

Additional cab testing shall be conducted using 88,184 lbs. of mass **exceeding** testing requirements by **over four (4) times**. The cab shall exhibit minimal to no intrusion into the cab’s occupant survival space and the doors shall remain closed.

Frontal Impact per SAE J2420.

Testing shall meet and/or exceed defined test using 32,549 ft-lbs. of force as a requirement. The cab shall be subject to a frontal impact as defined by the standard. The cab shall exhibit minimal to no intrusion into the cab’s occupant survival space, doors shall remain closed and cab shall remain attached to frame.

Cab testing shall be completed using 32,549 ft-lbs. of force **meeting** testing requirements.

Additional cab testing shall be conducted using 48,823 ft-lbs. of force **exceeding** testing requirements by **over one and a half (1.5) times**.

The cab shall meet all requirements to the above cab crash worthiness, **NO EXCEPTIONS**.

A copy of a certificate or letter verifying compliance to the above performance by an independent, licensed, professional engineer shall be provided upon request.

For any or all of the above tests, the cab manufacturer shall provide either photographs or video footage of the procedure upon request.

### Seat Mounting Strength

The cab seat mounting surfaces shall be third party tested and in compliance with FMVSS 571.207.

### Seat Belt Anchor Strength

The cab seat belt mounting points shall be third party tested and in compliance with FMVSS 571.210.

### ISO Compliance

The manufacturer shall ensure that the construction of the apparatus cab shall be in conformance with the established ISO-compliant quality system. All written quality procedures and other procedures referenced within the pages of the manufacturer`s Quality Manual, as well as all Work Instructions, Workmanship Standards, and Calibration Administration that directly or indirectly impacts this process shall be strictly adhered to. By virtue of its ISO compliance the manufacturer shall provide an apparatus cab that is built to exacting standards, meets the customer`s expectations, and satisfies the customer`s requirements.

## CAB ROOF TYPE

### Raised Roof

The rear portion of the cab roof shall be raised 12”. This will provide at least 5` 7” standing room. The front of the vista hood shall be sloped at 45 degrees from the vertical. The slope shall begin slightly in front of the centerline of the front axle to leave room for warning lights and air conditioning in front of the vista. The main roof extrusion shall extend up into the vista to strengthen the roof perimeter. Windows shall be provided on front, side, and rear unless otherwise specified.

The rear door shall have an 85” vertical dimension for improved ingress/egress characteristics.

### Raised Roof Front Windows

The front windows of the raised roof portion of the cab shall be deleted.

## CAB DOOR OPTIONS

### Rear Cab Door Position

The cab rear doors shall be moved to the rear of the wheel opening. This door placement facilitates easier entry and egress by reducing the rear facing seat protrusion into the door opening.

Rear door position to the 58” or (medium cab).

### Cab Door Locks

The cab shall have 1250 keyed door locks provided on exterior doors to secure the apparatus.

### Cab Door Panels

The inner door panels shall be made from 14 gauge brushed finish stainless steel for increased durability. The cab door panels shall be split just below the the handrail and incorporate an easily removable panel for access to the latching mechanism and window regulator for maintenance or service.

### Cab Door Stainless Steel Trim

Each cab door shall have a stainless-steel trim on the trailing edge of the door opening. Front cab doors shall be 50" tall on rear vertical edge above floor level. Rear doors shall have full vertical height trim, if applicable.

### Cab Door Reflective Material

Reflective Diamond Grade material striping shall be provided approximately 12" high on the lower cab door panels. The stripes shall run from the top outer corner to the bottom inside corner of the lower door area, forming a "A" shape when viewed from the rear. The reflective material shall meet NFPA 1901 requirements.

### Cab Door Locks

Each cab door shall have a manually operated door lock actuated from the interior of each respective door.  Exterior of each cab door shall be provided with a keyed lock integrated with the cab door handle.

### Cab Front Door Windows

Full roll-down windows shall be provided for the front cab doors with manually operated heavy duty regulators. The regulators shall have worm gear drive cable operation for positive movement and long life. Scissors or gear-and-sector drives are not acceptable.

### Cab Rear Door Windows

Full roll-down windows shall be provided for the rear crew doors with manually operated heavy duty regulators. The regulators shall have worm gear drive cable operation for positive movement and long life. Scissors or gear-and-sector drives are not acceptable.

## CAB STEP OPTIONS

### Cab Step

An auxiliary step below the cab door shall be provided. The step shall be constructed of .188” aluminum tread brite. The step surface shall be provided with an aggressive skid-resistant surface and have an open back. The step shall be in accordance with current NFPA requirements and shall include a multi-directional aggressive gripping surface incorporated into the diamond plate. The surface shall extend vertically from the diamond plate sheet a minimum of 1/8" (0.125"). Gripping surfaces shall be circular in design, a minimum of 1" diameter and on centers not to exceed 4".

The step shall be located driver's front door, officer's front door, driver side rear door, officer side rear door.

Steps under front cab doors shall not interfere with approach angle.

### Cab Steps

The lower cab steps shall extend 3.5" past the side of the cab to provide increased surface area.

## MIRRORS

### Cab Mirrors

Two (2) Ramco model 6001MCR remote controlled polished aluminum mirrors shall be installed. The mirrors shall incorporate a top main section with a manually adjustable convex lower mirror. The adjustment of main sections shall be through dash switches. Location: mounted on cab doors.

## MISC EXTERIOR CAB OPTIONS

### Cab Windows Rear Wall

Fixed glass windows shall be supplied on either side of the cab, providing visibility at the rear. The windows shall be approximately 4” wide and approximately the same height as the door windows.

### Cab Canopy Window

There shall be a fixed window provided between the front and rear doors on the driver`s side of the cab.

Window dimensions shall be as follows:

* 44" C/A cab (short cab): 16"W x 24.5"H
* 58" - 80" C/A cab (medium - extended): 26.69"W x 24.5"H

### Cab Canopy Window

There shall be a fixed window provided between the front and rear doors on the officer`s side of the cab.

Window dimensions shall be as follows:

* 44" C/A cab (short cab): 16"W x 24.5"H
* 58" - 80" C/A cab (medium - extended): 26.69"W x 24.5"H

### Front Mud Flaps

Black linear low-density polyethylene mud flaps shall be installed on the rear of the cab front wheel wells. The design of the mud flaps shall have corrugated ridges to distribute water evenly.

### Handrails

Cab door assist handrails shall consist of two (2) 1.25” diameter x 18” long 6063-T5 anodized aluminum tubes mounted directly behind the driver and officer door openings one each side of the cab. The handrails shall be machine extruded with integral ribbed surfaces to assure a good grip for personnel safety. Handrails shall be installed between chrome end stanchions and shall be positioned at least 2” from the mounting surface to allow a positive grip with a gloved hand.

### Handrails

Cab door assist handrails shall consist of two (2) 1.25” diameter x 36” long 6063-T5 anodized aluminum tubes mounted directly behind the driver and officer rear door openings one each side of the cab. The handrails shall be machine extruded with integral ribbed surfaces to assure a good grip for personnel safety. Handrails shall be installed between chrome end stanchions and shall be positioned at least 2” from the mounting surface to allow a positive grip with a gloved hand.

### Rear Cab Wall Construction

The rear cab wall shall be constructed with the use of 3/16" aluminum diamond plate interlocking in aluminum extrusions.

### Cab Wheel Well

The cab wheel well shall be increased in size to provide additional clearance for larger tires.  The fender trim shall be adjustable in and out to better accommodate various wheel / tire offsets.

### Receptacle Mounting Plate

A mounting plate shall be provided for the battery charger receptacle, battery charger indicator and if applicable the air inlet, etc. The plate shall be constructed of 14 gauge brushed finish stainless steel and be removable for service access to the receptacle(s) and indicator.

## HVAC

### Heat, Supplemental

A single 40,000 BTU water heater shall be supplied in the front area of the cab. The unit shall heat the lower section of the driver`s and officer`s footwell.

Dual 23,000 BTU water heaters with diamond plate covers shall be supplied in the rear of the cab to heat the rear cab lower section.

Dual climate control will be achieved via dual switches installed on a front instrument panel. On units with optional multiplex display climate control, the floor heaters shall be controlled through the HVAC screen in the display.

### HVAC Control Location

Heating and air conditioning controls shall be located in the center dash area.

### Air Conditioning

An overhead air-conditioner / heater system with a single radiator mounted condenser shall be supplied.

The unit shall be mounted to the cab interior headliner in a mid-cab position, away from all seating positions.  The unit shall provide fourteen (14) comfort discharge louvers, eight (8) to the back area of the cab, six (6) to the front area of the cab including one (1) each side outboard in the forward overhead console.  These louvers will be used for both AC and heated air delivery.  Two (2) additional large front louvers shall be damper controlled to provide defogging and defrosting capabilities to the front windshield, as necessary.

The unit shall consist of a high output evaporator coil and heater core with one (1) high output dual blower for front air delivery, and two (2) high performance single wheel blowers for rear air delivery.  For improved corrosion resistance the evaporator shall have a hydrophilic blue fin coating.

The control panel shall actuate the air-distribution system using electric actuators.  The control panel shall allow blended airflow to both the comfort air vents and defrost vents.  Separate three-speed blower switches shall be provided to independently control air speed for the front and rear blowers.

The condenser shall be radiator mounted and have a minimum capacity of 65,000 BTUs and shall include a receiver drier.

Performance Data: (Unit only, no ducting or louvers)
• AC BTU:    55,000
• Heat BTU:  65,000
• CFM:  1300 @ 13.8V (All blowers)

The compressor shall be a ten-cylinder swash plate type Seltec model TM-31HD with a capacity of 19.1 cu. in. per revolution.

The system shall be capable of cooling the interior of the cab from 100 degrees ambient to 75 degrees or less with 50% relative humidity in 30 minutes or less.

## SEATS

### Seating Capacity Tag

A tag that is in view of the driver stating seating capacity of four (4) personnel shall be provided.

### Cab Seats

All cab seats shall be Valor brand.

### Seat Cover Material

All seats shall have Valor Tech XD military grade upholstery material.

### Seat Fabric Color

The color of all seats shall be black with red top stitching.

### Seat, Driver

A USSC Valor P1A air suspension seat shall be supplied for the driver`s position.

Features shall include:

* Dymetrol® Active suspension
* Low-profile air suspension
* 2.75 Suspension stroke
* 350 lb. capacity
* Fore and aft adjustable tracks with 6-inches of travel
* Rotational knob for infinitely adjustable lumbar
* Adjustable seat backrest
* Integral headrest

All seat positions shall have a bright red retractable 3-point lap and shoulder harness, providing additional safety and security for personnel. Extensions shall be provided with the seat belts so the male end can be easily grasped, and the female end easily located while sitting in a normal position.

### Seat, Officer

A USSC Valor fixed SCBA seat shall be supplied for the officer`s position in front of the cab.

Features shall include:

* 95-Degree back angle
* Fixed headrest
* Magnetic SCBA harness securement

All seat positions shall have a bright red retractable 3-point lap and shoulder harness, providing additional safety and security for personnel. Extensions shall be provided with the seat belts so the male end can be easily grasped, and the female end easily located while sitting in a normal position.

### Seat, Rear Facing

Rear facing USSC Valor fixed SCBA seat driver`s side.

Features shall include:

* 95-Degree back angle
* Fixed headrest
* Magnetic SCBA harness securement

All seat positions shall have a bright red retractable 3-point lap and shoulder harness, providing additional safety and security for personnel. Extensions shall be provided with the seat belts so the male end can be easily grasped, and the female end easily located while sitting in a normal position.

### Seat, Rear Facing

Rear facing USSC Valor fixed SCBA seat officer`s side.

Features shall include:

* 95-Degree back angle
* Fixed headrest
* Magnetic SCBA harness securement

All seat positions shall have a bright red retractable 3-point lap and shoulder harness, providing additional safety and security for personnel. Extensions shall be provided with the seat belts so the male end can be easily grasped, and the female end easily located while sitting in a normal position.

## MEDICAL CABINETS

### Medical Cabinet

There shall be a medical storage cabinet provided at the back wall of the interior of the cab, between outboard seats. The medical cabinet shall be constructed of 1/8” smooth aluminum. The medical cabinet shall be approximately 48” high x 32” wide x 24” deep interior.

Three (3) vertically adjustable shelves shall be provided and installed in the medical cabinet. The shelves shall be constructed of 1/8” smooth aluminum plate. Each shelf shall have a 1” front for added strength and reinforcement. The shelves shall be sized to the interior dimensions of the medical cabinet. The shelves shall be mounted with extruded aluminum adjustable shelf tracking attached to the cabinet walls and the shelves to be secured with aluminum brackets to the tracks to allow for vertical height adjustment. As necessary a 3/4” x 2-3/4” aluminum extrusion shall be mounted to the underside of the shelves to provide additional reinforcement as needed.

There shall be a locking roll up door provided to secure contents.

### Medical Cabinet Doors

All medical cabinets on the custom cab shall be Amdor brand roll-up type doors.

### Medical Storage Cabinet Finish

The medical storage cabinet(s) shall have a Zolatone gray finish. The finish shall be applied to the interior, exterior, shelves (if equipped) and trays (if equipped) of the cabinet.

**Medical Storage Cabinet Shelves**

There shall be two adjustable shelves with lips installed in the medical cabinet.

## MAP BOXES

### Map Box Location

The map box suspended between the 3x3 vertical uprights shall be offset to the rear of the 3x3`s. The map box shall be mounted down low as possible as space permits.

### Map Box

An aluminum map/storage box shall be installed in the cab. The map box shall be constructed of 1/8” (.125) inch smooth aluminum. Hinged drop-down doors with push button latches, shall be installed on the front of the box for the access to the driver and officer side storage areas. Each storage area shall have two (2) fixed shelves for storage of ring binders, map books, etc. Each latch shall have a 25 lb. rating.

The map box shall be mounted on the vertical uprights in the center of the cab between the driver and officer seating positions. The map box shall be secured and tested to meet with current NFPA requirements.

Approximate overall dimension: 34” W x 9.50” H x 12” D.

### Map Box Finish

The map box(es) shall have a sanded aluminum finish

## MISC INTERIOR CAB OPTIONS

### Cab Interior Color

Cab instrument panel, overhead console, trim panels, headliner, and door panels shall be gray.

### Sun Visors

Padded sun visors shall be provided for the driver and officer matching the interior trim of the cab and shall be flush mounted into the underside of the overhead console.

### Air Horn Lanyard

There shall be a “Y” style lanyard mounted in the center of the cab that allows the driver and officer to operate the air horns. The lanyard shall activate an electrical air switch.

### Engine Cover

The engine cover shall blend in smoothly with the interior dash and flooring of the cab. The upper left and right sides shall have a sloped transition surface running front to rear providing increased space for the driver and officer.

The engine cover and engine service access door cover shall be molded 18 lb/cu. ft. (+/-0.5) flexible integral skinned polyurethane foam at a Durometer of 60 (+/- 5.0) per ASTM F1957-99. The cover shall be approximately .5" thick with a minimum skin thickness of 0.0625 inches. The cover shall be provided to reduce the transmission of noise and heat from the engine. The cover shall be black and feature a pebble grain finish for slip resistance.

### MDT Bracket

One (1) Havis model C-MD-117 slide-out mount with a model C-HDM-135 mounting base shall be provided on the officer side cab dash.

### Overhead Console

An overhead console shall be provided in the front of the cab for the driver and officer. The areas in front of the driver and officer shall be removable panels that can be used for switches and other electrical items. The entire overhead console shall be hinged for service access.

The center of the overhead console shall have a lowered area for mounting of up to three (3) electrical components like siren heads, directional bar controllers, etc.

The overhead console shall be constructed of aluminum smooth plate painted to match the cab interior. The console shall be installed using stainless steel fasteners.

### Rear Engine Cover

The rear engine cover shall be provided with a reduced profile for increased legroom on the forward-facing rear inboard seats.

### Cab Dash - Low Profile Severe Duty

The driver side and center dash shall be constructed from cast aluminum for durability and long life.

The driver side cast aluminum dash shall enclose the instrument cluster.

The center dash area shall be a low-profile design to provide optimal forward visibility. The driver and officer sides shall be angled for ergonomic access and designed for either a color display or switches. Access panels shall be provided on the top, front and officer side for easy service access.

The officer side dash shall be low profile and constructed from .125" smooth aluminum plate. A service access panel shall be provided in the top surface.

The driver, center and officer side dash shall be painted to match the cab interior.

The lower kick panels below the dash to be constructed from .125 aluminum plate painted to match the cab interior. The panels shall be removable to allow for servicing components that may be located behind the panels.

### Cab Insulation Package

The cab shall be insulated to mitigate noise and ensure maximum cooling/heating capacity. The insulation package shall include 1" Polyester foam with Mylar facing for the front wall, rear wall, side walls, and ceiling, Reflectex (or equal) inside each cab door and 1" closed cell foam insulation below the front and rear facing seat risers.

## CAB ELECTRICAL OPTIONS

### Cab Dome Lights

A Weldon LED dome light assembly with one (1) white lens and one (1) red lens and plastic housing shall be installed. The white light activates with appropriate cab door and light assembly switch, the red light activates with light assembly mounted switch only.

There shall be two (2) mounted in the front of the cab, one (1) in the driver and one (1) in the officer ceiling.

There shall be two (2) mounted in the rear of the cab, one (1) in the driver side and one (1) in the officer side ceiling.

### Push-Button Switch

A heavy-duty metal push-button switch shall be installed on the officer`s side switch panel to operate the Q2B siren brake.

### Auto-Eject Battery Charger Receptacle

The battery charger receptacle shall be a Kussmaul 20-amp NEMA 5-20 Super Auto-Eject #091-55-20-120 with a cover. The Super Auto-Eject receptacle shall be completely sealed and have an automatic power line disconnect.

The receptacle shall be located outside driver's door next to handrail and the cover color shall be Yellow.

### Horn Button Switch

A two (2) position rocker switch shall be installed in the cab accessible to driver and properly labeled to enable operator to activate the OEM traffic horn or Federal Signal Q2B siren from the steering wheel horn button.

### English Dominant Gauge Cluster

The cab operational instruments shall be located in the dashboard on the driver side of the cab and shall be clearly visible. The gauges in this panel shall be English dominant and shall be the following:

* Speedometer/Odometer
* Tachometer with integral hour meter
* Engine oil pressure gauge with warning light and buzzer
* Engine water temperature gauge with warning light and buzzer
* Two (2) air pressure gauges with a warning light and buzzer (front air and rear air)
* Fuel gauge
* Voltmeter
* Transmission oil temperature gauge

This panel shall be backlit for increased visibility during day and nighttime operations.

### Officer Speedometer

A speed indicator shall be provided in the V-Mux display

### Headlights

The front of the cab shall have four (4) headlights. The headlights shall be mounted on the front of the cab in the lower position. The headlights shall be daytime operational.

### Battery Charger/Air Compressor

A Kussmaul Auto-Charge 1200 battery charger and air compressor with automatic battery charger shall be installed.

The battery charger shall be completely automatic with an output of 0-40 amps @ 12 volts DC and an input current requirement of 10 amps @ 120 volts AC.

A Kussmaul air compressor with automatic battery conditioner model 52-21-1100 shall be installed.  The battery conditioner is completely automatic with a 0-40-amp output to maintain the charge in the battery system. The air compressor shall be powered by a 12-volt DC output from the battery charger and has an output of **.**30 cfm at 80 PSI. A pressure switch senses the system pressure and operates the compressor whenever the pressure in the air brake system drops below a pre-determined level.

### 12 Volt (or 24 Volt) Outlet

A plug-in type receptacle for handheld spotlights, cell phones, chargers, etc. shall be installed center rear wall of center rear medical compartment up high. The receptacle shall be wired battery hot.

### Customer Supplied Antenna

The customer supplied external antenna shall be mounted on the cab roof. The antenna shall be located driver side rearward with coaxial cable terminating at the center of the dashboard.

### Battery Charger Location

The battery charger shall be located behind driver's seat.

### Air Compressor Location

The air compressor shall be located behind driver's seat.

### Cab USB Charging Port

A dual USB charging port with 2.1A total power for cell phones, chargers, etc. shall be installed driver side dash, officer side dash.  The receptacles shall be wired battery hot.

### DPF Regeneration Override

A momentary override switch shall be provided for the Diesel Particulate Filter (DPF) regeneration.  The switch will inhibit the regeneration process until the switch is reset or the engine is shut down and restarted. The switch shall be located within reach of the driver.

### Auto Drain

A Kussmaul model 091-9-086 12V auto drain shall be provided for a Kussmaul 12V air compressor model 091-9-12V.

### Cab Headlights

The cab shall be equipped with DOT approved LED head lights, low beam and high beam positions.

### Cab Doorstep Area Lighting

There shall be eight (8) clear TecNiq model D07 LED lights provided to illuminate the cab step well areas. Two (2) lights shall be located at each door area, one (1) above each step. The lights shall have polished stainless-steel housings. The lights shall be activated by the cab door ajar circuit.

### Cab Turn Signals

A pair of TecNiq LED (Light Emitting Diode) turn signal lights with clear lens shall be installed on the front of the cab. The strip type lights shall be 1.25" high x 15" long and be mounted in a polished cast aluminum housing between the quad bezels.

## BODY COMPT LEFT SIDE

### Driver Side Assembly

The driver side assembly shall be constructed entirely of aluminum extrusions and interlocking aluminum plates. This aluminum modular design shall provide a high strength-to-weight ratio for increased equipment carrying capacity.

The driver side body corners shall be 6063-T5 extruded aluminum corner sections with a 3/16” (0.188”) wall thickness. The side body extrusions shall be 6063-T5 aluminum tubing with a 3/16” (0.188”) wall thickness and 3/16” (0.188”) outside corner radius. The corners and sides shall be welded both internally and externally at each joint using an aluminum alloy welding wire.

The driver side body shall be completely sanded and deburred to assure a smooth finish and painted job color.

#### Driver Side Compartments

The three (3) driver side compartments shall be constructed from 3003 H14 1/8” (.125”) smooth aluminum plate. The compartments shall be modular in design and shall not be a part of the body support structure.

There shall be one (1) compartment located ahead of the rear wheels. This compartment shall be approximately 56” wide x 68” high x 26” deep in the lower 57” high section and 14” deep in the upper 11” high section. The compartment shall contain approximately 53 cu. ft. of combined storage space. The door opening shall be approximately 56” wide x 68” high.

There shall be one (1) compartment located over the rear wheel. The compartment shall be approximately 56” wide x 34” high x 26” deep in the lower 23" high section and 14" deep in the upper 11" high section. The compartment shall contain approximately 24.4 cu. ft. of storage space. The door opening shall be approximately 56” wide x 34” high.

There shall be one (1) compartment located ahead of the rear wheels. This compartment shall be approximately 48” wide x 68” high x 26” deep in the lower 57” high section and 14” deep in the upper 11” high section. The compartment shall contain approximately 45 cu. ft. of combined storage space. The door opening shall be approximately 48” wide x 68” high.

Each compartment seam shall be sealed using a permanent pliable silicone caulk. The walls of each compartment shall be machine-louvered for adequate ventilation.

An externally mounted compartment top shall be provided and constructed of a 1/8” (.125”) aluminum treadplate. The compartment top shall be removable for easy access to the main body wiring harness.

## BODY COMPT RIGHT SIDE

### Officer Side Assembly

The officer side assembly shall be constructed entirely of aluminum extrusions and interlocking aluminum plates. This aluminum modular design shall provide a high strength-to-weight ratio for increased equipment carrying capacity.

The officer side body corners shall be 6063-T5 extruded aluminum corner sections with a 3/16” (0.188”) wall thickness. The side body extrusions shall be 6063-T5 aluminum tubing with a 3/16” (0.188”) wall thickness and 3/16” (0.188”) outside corner radius. The corners and sides shall be welded both internally and externally at each joint using an aluminum alloy welding wire.

The officer side body shall be completely sanded and deburred to assure a smooth finish and painted job color.

#### Officer Side Compartments

The three (3) officer side compartments shall be constructed from 3003 H14 1/8” (.125”) smooth aluminum plate. The compartments shall be modular in design and shall not be a part of the body support structure.

There shall be one (1) compartment located ahead of the rear wheel. The compartment shall be approximately 56” wide x 68” high x 26” deep in the lower 30” high section and 12” deep in the upper 38” high section. The compartment shall contain approximately 38.4 cu. ft. of combined storage space. The door opening shall be approximately 56” wide x 68” high.

There shall be one (1) compartment located over the rear wheel. The compartment shall be approximately 56” wide x 34” high x 12” deep and contain approximately 13.2 cu. ft. of storage space. The door opening shall be approximately 56” wide x 34” high.

There shall be one (1) compartment located rearward of the rear wheel. The compartment shall be approximately 48” wide x 68” high x 26” deep in the lower 30” high section and 12” deep in the upper 38” high section. The compartment shall contain approximately 34 cu. ft. of combined storage space. The door opening shall be approximately 48” wide x 68” high.

Each compartment seam shall be sealed using a permanent pliable silicone caulk. The walls of each compartment shall be machine-louvered for adequate ventilation.

An externally mounted compartment top shall be provided and constructed of a 1/8” (.125”) aluminum treadplate.

**Storage Tunnel**

The area directly behind the upper area of the officer side compartments shall be for the storage of NFPA equipment.

## BODY COMPT REAR

### Rear Body Compartment

The rear body shall be constructed entirely of aluminum extrusions and interlocking aluminum plates and includes a lower full height center rear compartment.

The rear body frame shall be 6063-T5 1.5” x 4” and 1.5” x 3”aluminum extrusions with a 3/16” (0.188”) wall thickness and 3/16” (0.188”) outside corner radius and 1/8” (0.125”) aluminum plate. The rear extrusions shall be welded both internal and external at each joint using an aluminum alloy welding wire.

#### Rear Body Compartment

The rear compartment shall be constructed from 3003 H14 1/8” (.125”) smooth aluminum plate. The compartment shall be modular in design and shall not be a part of the body support structure.

The compartment shall be approximately 38” wide and shall vary in height and depth dependent upon water tank capacity and other options.  The door opening shall be approximately 38” wide. This compartment shall be transverse through to the side rear compartments.

The compartment seams shall be sealed using a permanent pliable silicone caulk. Machined louvers shall be provided for adequate ventilation.

### Tailboard

#### Tailboard Step

 A tailboard step shall be provided at the rear of the body. The tailboard shall 10” in depth and in accordance with NFPA in both step height and stepping surface. The maximum rear step height to the tailboard shall not exceed 24”.

The tailboard step shall be formed from 3/16” (0.188”) aluminum treadplate and shall be reinforced with 6063-T5 1.5” x 3” aluminum extrusion. The tailboard shall be in accordance with current NFPA requirements and shall include a multi-directional aggressive gripping surface incorporated into the diamond plate. The surface shall extend in a vertical direction from the diamond plate sheet a minimum of 1/8” (0.125”). Gripping surfaces shall be circular in design, a minimum of 1” diameter and on centers not to exceed 4”.

The tailboard step shall be bolted on to the body from the underside assuring a clear surface and shall be easily removable for replacement in the case of damage.

#### Rear Access Handrails

Handrails shall be provided at the rear of the body to assist ground personnel accessing the tailboard step and hosebed area. Each handrail shall be constructed of 6063T5 1.25” OD anodized aluminum tube, with an integral ribbed surface to assure a good grip for personnel safety and shall be mounted between chrome stanchions.

The handrails shall be located- two (2) handrails, one (1) on each side, appropriately sized handrail mounted vertical on the trailing edge of the body and appropriately sized handrail(s) mounted horizontal below the rear hosebed opening.

## DOORS

### Roll Up Compartment Door

An AMDOR brand roll up door with satin finish shall be provided on a compartment. The door(s) shall be installed in the following location(s): B1.

The door slats shall be 1” aluminum double wall slats with continuous ball & socket hinge joint and recessed dual durometer slat seal, double wall reinforced bottom panel with stainless steel lift bar latching system, bottom panel flange with cut-outs for ease of access with gloved hands, reusable slat shoes with positive snap-in securement, smooth interior door curtain to prevent equipment hang-ups. The slats shall have interlocking end shoes on each slat. The slats shall have interlocking joints with a PVC/vinyl inner seal to prevent any metal to metal contact and inhibit moisture and dust penetration.

The track shall be a one-piece aluminum door track / side frame, top gutter with non-marring seal, non-marring recessed side seals with UV stabilizers to prevent warpage, dual leg bottom seal, with all wear component material to be Type 6 Nylon. The track shall have a replaceable side seal to prevent water and dust from entering the compartment.

Door ajar switch system shall be magnetic proximity-based components.  Door striker will include support beneath the lift bar to prevent door curtain bounce.

The door opening shall be reduced by 2” in width and approximately 8-9” in height depending on door height.

### Roll Up Compartment Door

An AMDOR brand roll up door with painted finish shall be provided on a compartment. The door(s) shall be installed in the following location(s): L1, L3, R1, R3. The door slats shall be 1” aluminum double wall slats with continuous ball & socket hinge joint and recessed dual durometer slat seal, double wall reinforced bottom panel with stainless steel lift bar latching system, bottom panel flange with cut-outs for ease of access with gloved hands, reusable slat shoes with positive snap-in securement, smooth interior door curtain to prevent equipment hang-ups. The slats shall have interlocking end shoes on each slat. The slats shall have interlocking joints with a PVC/vinyl inner seal to prevent any metal to metal contact and inhibit moisture and dust penetration.

The track shall be a one-piece painted aluminum door track / side frame, top gutter with non-marring seal, non-marring recessed side seals with UV stabilizers to prevent warpage, dual leg bottom seal, with all wear component material to be Type 6 Nylon. The track shall have a replaceable side seal to prevent water and dust from entering the compartment.

Door ajar switch system shall be magnetic proximity-based components.  Door striker will include support beneath the lift bar to prevent door curtain bounce.

The door opening shall be reduced by 2” in width and approximately 8-9” in height depending on door height.

### Roll Up Compartment Door

An AMDOR brand roll up door with painted finish shall be provided on a compartment. The door(s) shall be installed in the following location(s): L2, R2. The door slats shall be 1” aluminum double wall slats with continuous ball & socket hinge joint and recessed dual durometer slat seal, double wall reinforced bottom panel with stainless steel lift bar latching system, bottom panel flange with cut-outs for ease of access with gloved hands, reusable slat shoes with positive snap-in securement, smooth interior door curtain to prevent equipment hang-ups. The slats shall have interlocking end shoes on each slat. The slats shall have interlocking joints with a PVC/vinyl inner seal to prevent any metal to metal contact and inhibit moisture and dust penetration.

The track shall be a one-piece painted aluminum door track / side frame, top gutter with non-marring seal, non-marring recessed side seals with UV stabilizers to prevent warpage, dual leg bottom seal, with all wear component material to be Type 6 Nylon. The track shall have a replaceable side seal to prevent water and dust from entering the compartment.

Door ajar switch system shall be magnetic proximity-based components.  Door striker will include support beneath the lift bar to prevent door curtain bounce.

The door opening shall be reduced by 2” in width and approximately 8-9” in height depending on door height.

### Drip Pan

An Amdor drip pan shall be supplied for the roll-up door. The drip pan shall be made from a high strength aluminum alloy. The splashguard and end caps shall be made from extruded and injection molded high-impact plastic. Drip pan location(s): L1, L2, L3, R1, R2, R3, B1.

### Strap for Roll-Up Door

A bungee type strap shall be provided on the roll-up doors to assist in closing the door.  The strap shall be affixed to both the door and the interior, so the strap stays inside the compartment when lowering. The strap shall be provided on full height and high side (upper) compartments.

## SHELVES

### Permanent Shelf [Qty: 6]

There shall be a permanent mounted shelf provided for a compartment as specified. The shelf shall be at the offset (unless otherwise specified) within the compartment.

The shelf shall have a minimum 2” front lip for added strength and reinforcement and to accommodate optional plastic interlocking compartment tile systems.

The shelf shall be capable of holding 100 lbs.

Aluminum bodies: Material to be 3/16" (.188") thick aluminum smooth plate.

Stainless steel bodies: 12 ga. smooth plate 304L stainless steel.

### Adjustable Shelf [Qty: 2]

There shall be an aluminum adjustable shelf provided for a compartment as specified.

The shelf shall be constructed of 3/16” (.187”) smooth aluminum plate. The shelf shall have a minimum 2” front and rear lips to accommodate optional plastic interlocking compartment tile systems and shall be capable of holding 100 lbs. on compartments with tracks mounted on back wall (compartments up to approximately 12" deep) or shall be capable of holding 250 lbs. with tracks mounted on forward and rearward walls.

The shelf shall be sized, width and depth, to match the size and location in the compartment.

### Adjustable Tracks

Tracks shall be provided in the compartment as specified for use with adjustable shelves and/or trays in deep non-transverse compartments. The tracks shall be vertical mounted and attached to the side and/or rear walls of the compartments.

## COMPARTMENT DIVIDERS

### Partition Vertical Bolt-In

Partition, bolt-in vertical partition wall. Locate in a compartment as specified. Partition constructed out of 3/16" 3003 smooth plate.

## TRAYS / TOOLBOARDS

### Roll-Out/Tilt-Down Tray

A roll-out/tilt-down tray shall be adjustable mounted in a compartment as specified.

The tray shall be constructed of 3/16” (.187) aluminum with welded corners for strength and rigidity. The tray shall be sized in width and depth as applicable.

An Innovative Industries SlideMaster (model SMT) steel tip down frame and channel assembly powder coated silver shall be provided for the tray for the ease of operation and long service life. A positive twist lock shall be provided to lock the tray in the stored position. The tray shall roll out approximately 90% from its stored position and shall tip 30 degrees from horizontal.

The capacity rating of the tray, in the extended position, shall be 250 lbs. uniformly distributed load.

### Tool Board [Qty: 2]

An adjustable heavy-duty roll-out aluminum peg tool board(s) shall be provided for compartment(s) [#LOC].

The tool board shall be constructed of 3/16” (.187”) smooth aluminum plate with double re-enforcing lips on the front and rear vertical edges to increase the tool board`s rigidity. The first (inward) break shall be approximately .75" and the second (outer) break shall be approximately 1.5". The tool board shall have a sanded finish and be sized in height and depth as applicable.

The tool board shall be mounted on drawer slides, at the top and bottom, that will permit the board to roll out of the compartment for easier access to tools and/or equipment. The slide mechanisms shall have ball bearings for ease of extension and retraction operation and dependable service. The tool board shall be mounted at top and bottom on adjustable tracking for ease of placement.

The capacity rating shall be 500 lb. maximum at full extension. A pneumatic shock shall be utilized to secure the toolboard in the open or closed position.

### Running Board Suction Tray

A running board suction hose storage tray "floating style" shall be provided and located in the officer side running board.

The tray shall be "floating style" mounted and constructed of 1/8” (.125”) aluminum diamond plate (exterior) with a smooth sanded surface interior. The bottom of the tray shall have removable aluminum slats and drain holes to allow water drainage from hose stored in the tray. The tray shall have a 3" tapered front corner to protect tray against debris. The tray shall be removable for the running board.

### Swing-out Tool Board

A swing out aluminum tool peg board shall be provided for a compartment as specified.

The tool board shall be constructed of 1/4” (.25”) smooth aluminum plate, aluminum extrusions and PAC TRAC model PM-1000 pivot mount assembly. The tool board shall have a sanded finish and be sized in height and depth as applicable. A positive latching mechanism shall be provided to hold the tool board in the closed position.

The tool board shall be mounted centered front to rear of the compartment and hinged to the forward wall (unless otherwise specified).

Toolboard shall be rated to support up to 100 lbs.

## COVERS

### Hose Bed Cover

A cover constructed of Black 18 oz. PVC vinyl coated polyester shall be installed over the apparatus hose bed. The base fabric shall be 1000 x 1300 Denier Polyester with a fabric count of 20 x 20 square inch.

The front edge of the cover shall be mechanically attached to the body. The sides of the cover shall be held in place with heavy duty Velcro strips running the length of the hose bed. The rear of the cover shall have an integral flap that extends down to cover the rear of the hose bed. This flap shall be secured in place along the lower edge with flexible cord that fasten to steel hook(s) mounted to body to comply with the latest edition of NFPA 1901.

### Speedlay Cover - Sides [Qty: 3]

A pair of covers constructed of heavy-duty black nylon cargo netting shall be installed over the side openings of the apparatus speedlay.  One pair per opening shall be provided.

The covers shall be secured in place to comply with the latest edition of NFPA 1901.

### Speedlay Cover

The speedlay module shall have a fixed aluminum diamond plate cover.

### Running Board Tray Securing Strap

A heavy-duty black nylon strap with a stainless steel quick-release buckle shall be provided for the running board hose tray(s). The strap shall be attached to the inboard side of the tray as low as practical to allow cinching of strap for securing tray contents and shall not reduce the overall tray capacity.

Location: officer side running board.

## PUMP MODULE

### Pump Module Width

Pump module shall be 76" wide.

### Speedlay Hose Storage

Preconnected hose speedlay storage shall be incorporated in the pump module forward of the pump operators’ panel.

#### Speedlay Preconnect Storage

The design shall include an area for three (3) double stacked speedlays (vertical). (2) 1.75” X 200 ft. as low as possible in the lower section and (1) 2.5” X 200 ft. in the upper section. The floor of the module shall be slotted to prevent the accumulation of water and allow for ventilation of wet hose. The unused area of the upper speedlay shall be a transverse storage area with bright treadplate doors hinged forward with latch for storage of a stokes basket..

**Removable Speedlay Hose Storage Trays [QTY 3]**

The speedlay areas shall include storage trays. The trays shall be constructed of 3/16” (.187”) smooth aluminum plate with an exterior sanded finish. The floor of the tray shall be slotted to prevent the accumulation of water and allow for ventilation of wet hose.  Protective strips of 0.375" UHMW Polyethylene shall be bolted to the bottom of outside edge speedlay tray.  UHMW (Ultra High Molecular Weight) Polyethylene is a durable, easily cleaned, and high tensile strength material that is self-lubricating, long-wearing, and shatter-, abrasion-, and corrosion-resistant.

The tray shall include two (2) 1.25" extruded aluminum handles. The handles shall be welded between the tray side walls down low toward each end of the tray.

The side walls of the tray shall include slotted cut-outs to facilitate lifting of the tray.

#### Speedlay Compartments

The area directly below the speedlay shall include two (2) compartments, one (1) each side. Each compartment shall provide approximately 1.4 cu. ft. of storage space. The compartments shall include vertically hinged 1/8” (.125”) aluminum treadplate doors with push-button latches. A switch wired to the door ajar indicator light in the cab shall be provided interlocked with the parking brake per NFPA.

### Pump Module

#### Pump Module Frame

An extruded aluminum pump module shall be provided and located forward of the apparatus body.  The pump module shall be constructed entirely of welded aluminum alloy extrusions and interlocking aluminum plates.  The pump module framework shall consist of 1.5" x 3" x .188" wall, 1.5" x 3" x .375" wall with center web and 3" x 3" x .188" wall extrusions.

The pump module design and mounting shall be separate from the body to allow the pump module and body to move independently of each other in order to reduce stress from frame twisting and vibration.

The exterior surface of the pump module framework shall have a sanded finish.

#### Pump Module Mounting

The pump module shall be attached to the chassis using four (4) center bonded isolation mounts and a steel mounting frame.  The isolation mounts shall be 2.75" diameter and mount to the chassis with two (2) 4" x 4" x .312" A36 steel angles.

#### Pump Access

A pump service access door shall be provided at the front of the pump module.  The door shall be secured with two (2) thumb latches.  (Access door not provided on fixed cab applications)

#### Pump Module Running Boards

The pump module shall include a running board on each side.  The running boards shall be in accordance with NFPA in both step height and stepping surface.  The running boards shall be formed from .125” aluminum treadplate.

#### Stepping Surface

Each running board shall include a multi-directional, aggressive gripping surface incorporated into the treadplate.  The surface shall extend vertically from the diamond plate sheet a minimum of .125”.  Gripping

surfaces shall be circular in design, a minimum of 1” diameter and on centers not to exceed 4”.  Each running board shall be bolted on to the pump module and be easily removable for replacement in the case of damage.

### Pump Panel Opening

The panel opening on the pump module shall be 39" wide.

### Pump Module Height

The pump module height shall be 80".

## PUMP PANELS

### Side Mount Pump Panels

The driver and officer side pump panels shall be constructed of 14-gauge stainless steel. Each panel shall have the ability to be removed from the module for easier access and for maintenance in the pump area.

### Pump Access Door

The officer side pump module shall include an upper horizontal hinged pump access door.

The door shall be constructed of 14 gauge brushed stainless steel. The compartment door shall be securely attached with a full-length stainless-steel piano type hinge with 1/4" pins. The hinge shall be "staked" on every other knuckle to prevent the pin from sliding. The door shall include two (2) push-button style latches to secure the door in the closed position and two (2) hold-open devices to hold the door in the open position.

## MISC PUMP PANEL OPTIONS

### Pump Panel Tags

Color coded pump panel labels shall be supplied to be in accordance with NFPA 1901 compliance.

## PUMP MODULE OPTIONS

### Air Horn Switch

A heavy duty weatherproof push-button switch shall be installed at the pump operator`s panel to operate the air horns.

The switch shall be labeled “Evacuation Alert”.

Location: driver side pump panel.

### Storage Pan

A storage pan shall be provided in the upper pump module area.  The pan shall be constructed of 3/16” (.188”) aluminum treadplate and be removable to service items in the pump module below.  Holes shall be provided in the corners of the pan to facilitate drainage of water.

## WATER TANK

### 780 Gallon Water Tank

A 780 gallon (U.S.) “L” booster tank shall be supplied.

The booster tank shall be constructed of polypropylene material. The booster tank shall be completely removable without disturbing or dismounting the apparatus body structure. The top of the booster tank is fitted with removable lifting assembly designed to facilitate tank removal.

The booster tank top, sides, and bottom shall be constructed of a minimum 1/2” (0.50”) thick black UV-stabilized copolymer polypropylene. Joints and seams shall be fused using nitrogen gas as required and tested for maximum strength and integrity. The tank construction shall include technology wherein a sealant shall be installed between the plastic components prior to being fusion welded. This sealing method will provide a liquid barrier offering leak protection in the event of a weld compromise. The tank cover shall be constructed of 1/2" thick polypropylene and UV stabilized, to incorporate a multi-piece locking design, which allows for individual removal and inspection if necessary. The tank cover(s) shall be flush or recessed 3/8" from the top of the tank and shall be fused to the tank walls and longitudinal partitions for maximum integrity. Each one of the covers shall have hold downs consisting of 2" minimum polypropylene dowels spaced a maximum of 40” apart. These dowels shall extend through the covers and will assist in keeping the covers rigid under fast filling conditions.

The tank shall have a combination vent and manual fill tower with a hinged lid. The fill tower shall be constructed of 1/2" polypropylene and shall be a typical dimension of 8" x 8" outer perimeter (subject to change for specific design applications). The fill tower shall be blue in color indicating that it is a water-only fill tower. The tower shall have a 1/4" thick removable polypropylene screen and a polypropylene hinged cover. The capacity of the tank shall be engraved on the top of the fill tower lid.

The booster tank shall have two (2) tank plumbing openings. One (1) for a tank-to-pump suction line with an anti-swirl plate, and one (1) for a tank fill line. All tank fill couplings shall be backed with flow deflectors to break up the stream of water entering the tank and be capable of withstanding sustained fill rates per the tank fill inlet size.

The sump shall be constructed of a minimum of 1/2" polypropylene. The sump shall have a minimum 3" N.P.T. threaded outlet for a drain plug per NFPA. This shall be used as a combination clean-out and drain. All tanks shall have an anti-swirl plate located approximately 3” above the inside floor.

The transverse and longitudinal swash partitions shall be manufactured of a minimum of 3/8" polypropylene. All partitions shall be equipped with vent and air holes to permit movement of air and water between compartments. The partitions shall be designed to provide maximum water flow. All swash partitions interlock with one another and are completely fused to each other as well as to the walls of the tank. All partitions and spacing shall comply with NFPA 1901. The walls shall be welded to the floor of the tank providing maximum strength.

Inside the fill tower there shall be a combination vent/overflow pipe. The vent overflow shall be a minimum of schedule 40 polypropylene pipe with an I.D. of 3" or larger that is designed to run through the tank. This outlet shall direct the draining of overflow water past the rear axle, thus reducing the possibility of freeze-up of these components in cold environments.  This drain configuration shall also assure that rear axle tire traction shall not be affected when moving forward.

The booster tank shall undergo extensive testing prior to installation in the truck. All water tanks shall be tested and certified as to capacity on a calibrated and certified tilting scale.

Each tank shall be weighed empty and full to provide precise fluid capacity. Each tank shall be delivered with a Certificate of Capacity delineating the weight empty and full and the resultant capacity based on weight. Engineering estimates for capacity calculations shall not be permitted for capacity certification. The tank must be designed and fabricated by a tank manufacturer that is ISO 9001:2008 certified in each of its locations. The ISO certification must be to the current standard in effect at the time of the design and fabrication of the tank.

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

The tank shall have a limited Lifetime warranty that provides warranty service for the life of the fire apparatus in which the tank is installed. Warranties are transferable if the apparatus ownership changes by requesting the transfer from the tank manufacturer.

Tank capacity is 780 US gallon / 649 Imperial gallons / 2952 Liters.

### Fill Tower Location

Fill tower(s) shall be located offset to officer side of water tank.

## WATER TANK OPTIONS

### Tank Sleeve

Tank sleeve for up to 3" discharge on rear of body or in hosebed (low hosebed applications) as applicable.

## TANK PLUMBING

### Tank Fill, 2.5 Akron Valve

One (1) 2.5” pump-to-tank fill line having a manually operated 2.5” Akron valve. The valve control shall be located at the pump operator`s panel and shall visually indicate the position of the valve at all times. The valve shall be controlled with a chrome handle.

The valve shall be an Akron 8800HD series with a 316 stainless steel ball and dual polymer seats for ease of operation and increased abrasion resistance. The valve shall have a self-locking ball feature using an automatic friction lock design to balance the stainless-steel ball when in a throttle position with water flowing through it.

The valve shall be of the unique Akron swing-out design to allow the valve body to be removed for servicing without disassembling the plumbing.

All fabricated piping shall be a minimum of Schedule 10 stainless steel for superior corrosion resistance and decreased friction loss.

### Tank to Pump

One (1) manually operated 3” Akron valve shall be installed between the pump suction and the booster tank.  Includes flex hose with stainless steel hose clamps for connection to the 4" tank sump outlet. The valve control shall be located at the pump operator`s panel and shall visually indicate the position of the valve at all times.

The valve shall be an Akron 8800HD series with a 316 stainless steel ball and dual polymer seats for ease of operation and increased abrasion resistance. The valve shall have a self-locking ball feature using an automatic friction lock design to balance the stainless-steel ball when in a throttle position and water is flowing through it.

The valve shall be of the unique Akron swing-out design to allow the valve body to be removed for servicing without disassembling the plumbing.

All fabricated piping shall be a minimum of Schedule 10 stainless steel for superior corrosion resistance and decreased friction loss.

A check valve shall be provided in the tank to pump supply line to prevent the possibility of "back filling" the water tank. The valve control shall be located at the pump operator`s panel and shall visually indicate the position of the valve at all times.

## LADDER STORAGE / RACKS

### Hard Suction Racks

Two (2) hard suction hose storage racks shall be provided on the driver side of the body compartment top. The racks shall be positioned with one (1) rack located above the other.

The storage racks shall be constructed of anodized extruded aluminum and include spring-mounted latch handles with stainless steel scuff plates. The scuff plates shall be located on the hose bed side to protect the painted surface.

The storage racks shall be capable of storing one (1) 6” x 10` hard suction hose each.

### Hose Bed Officer Side Tunnel Storage

An officer side vertical storage tunnel shall be provided. The tunnel shall be for use with a low hose bed. Tunnel shall hold: 2-section 24', 14' roof, 10' attic and (2) pike poles. The tunnel shall include a vertical hinged rear smooth plate door with a push-button latch.

### Ladder Brand

The ladder brand capable of being carried on the unit shall be Alco-Lite.

### Ladders

The length of ladders capable of being stored shall be the following: 24' 2-section and 14' roof ladder.

## HANDRAILS / STEPS

### Hose Bed Folding Steps

Innovative Controls dual lighted LED folding steps shall be positioned to the driver side rear of the body. The steps shall be NFPA compliant for access to the hose bed storage area and in step height and surface area. The steps shall be staggered stepped as applicable with tailboard depth, not applicable with recessed step mounting.

Innovative Controls dual lighted folding step with LED lights integral to the step on the top to provide NFPA requirements of 2 fc (20 lx) on the stepping surface. Folding step shall also have a LED light integral to the bottom of the step to meet NFPA requirements of a stepping surface up to 18” below the step. The folding step shall sustain a minimum static load of 500 lb with a 3 to 1 safety factor. The folding step shall also meet NFPA slip resistance qualifications. Corrosion resistance shall be demonstrated by a 1000 hr salt spray test with no visible signs of deterioration of the step body or hardware.

One (1) handrail shall be installed (as applicable) in compliance with current NFPA. The handrail shall be constructed of 6063T5 1.25” OD anodized aluminum tube, with an integral ribbed surface to assure a good grip for personnel safety, mounted between chrome stanchions.

### Intermediate Rear Step

An 10" intermediate step below the hosebed shall be provided.

The step shall be constructed of 3/16” (.187”) aluminum embossed treadplate.  The step shall be bolted below the hosebed and be easily removable for replacement in the case of damage. The top rear surface of the step to have three (3) hand hold cut-outs horizontally. The step shall be the full width of the hose bed.

## MISC BODY OPTIONS

### Mud Flaps

Black mud flaps shall be provided for the body wheel wells.

### Body Height and Mainframe Construction

The body mainframe shall be entirely constructed of aluminum. The complete framework shall be constructed of 6061T6 and 6063T5 aluminum alloy extrusions welded together using 5356 aluminum alloy welding wire.

The body mainframe shall include 3” x 3” 6061-T6 aluminum 3/8” (0.375”) wall cross member extrusion or 3" x 3" I-beam section aluminum extrusion depending on the application at the front of the body. A solid 3” x 3” I-beam” section aluminum extrusion shall be provided the full width of the body forward and rearward of the rear wheel well. The cross members shall be designed to support the compartment framing and shall be welded to 1-3/16” x 3” (1.188” x 3”) solid 6063-T5 aluminum frame sill extrusions. The frame sill extrusions shall be shaped to contour with the chassis frame rails and shall be protected from contact with the chassis frame rails by 5/16” x 2” (0.31” x 2”) fiber-reinforced rubber strips to prevent wear and galvanic corrosion caused when dissimilar metals come in contact.

#### Body Mounting System

The main body shall be attached to the chassis frame rails with six (6) of 5/8” (0.625”) diameter steel U-bolts. This body mounting system shall be used to allow easy removal of the body for major repair or disassembly.

#### Water Tank Mounting System

The body design shall allow the booster tank to be completely removable without disturbing or dismounting the apparatus body structure. The water tank shall rest on top of a 3” x 3” frame assembly covered with rubber shock pads and corner braces formed from 3/16” angled plate to support the tank. The booster tank mounting system shall utilize a floating design to reduce stress from road travel and vibration. To maintain low vehicle center of gravity the water tank bottom shall be mounted within 5” of the frame rail top.

#### Hose Bed Side Assembly

The hose bed side assemblies shall be made of 3” x 3” slotted aluminum extrusion and 3/16” (.188”) smooth plate. The hose bed side assemblies shall provide a 90” high body.

The exterior hose bed side surface shall be completely sanded and deburred to assure a smooth finish and painted job color. The interior hose bed side surface shall be completely sanded and deburred to assure a smooth sanded finish.

### Hose Bed

The area above the booster tank shall have a hose storage area provided. The hose bed shall be constructed entirely from maintenance-free, 3/4” deep x 7.5” wide, extruded aluminum slats that shall be pop-riveted into a one-piece grid system. Each slat shall have all sharp edges removed and have an anodized ribbed top surface that shall prevent the accumulation of water and allow for ventilation of wet hose.

The hose bed design shall incorporate adjustable tracks in the forward area and the rearward area of the hose bed for the installation of an adjustable divider(s). The adjustable tracks shall hold an adjustable divider(s) mounting nut straight, so only a Philips head screwdriver is required to adjust a divider(s) from side to side (as is practical with other hose bed mounted equipment).

The hose bed shall be easily removable to allow access to the booster tank below.

### Storage Pan

A storage pan shall be provided in the forward area of the hose bed.

The storage pan shall be constructed of 3/16” (.188”) aluminum tread plate.

### Fuel Fill

A recessed fuel fill shall be provided at the driver side rear wheel well area.

### Fill Tower Location

The fill tower(s) shall be located inside the hose bed storage pan as applicable.

### Body Wheel Well

The body wheel well frame shall be constructed from 6063-T5 aluminum extrusion with a slot the full length to permit an internal fit of 3/16” (0.188”) aluminum smooth plate painted job color. The wheel well trim shall be constructed from 6063-T5 formed aluminum extrusion. The wheel well liners shall be constructed of a 3/16” (.187”) composite material. The liners shall be bolt-on and shall provide a maintenance-free and damage-resistant surface.

### Rub Rail

The rub rail shall be C-channel in design and constructed of 3/16” thick 6463T6 anodized aluminum extrusion. The rub rail shall be 2.75” high x 1.25” deep and shall extend beyond the body width to protect compartment doors and the body side. The rub rail depth shall allow marker and/or warning lights to be recessed inside for protection.

The top surface of the rub rail shall have minimum of five (5) raised serrations. Each serration being a minimum of .1” in height and with cross grooves to provide a slip-resistant edge for the tailboard step and pump module running board areas. The rub rail shall be mounted a minimum of 3/16” off the pump module and body with nylon spacers. The ends of each section shall be provided with a finished rounded corner piece.

### Anodize Aluminum Trim

A anodize aluminum trim shall be located at the bottom edge of all body compartment openings including pump enclosure with painted edge (as applicable). The trim shall provide added protection of the painted surface of the body when equipment is removed from the compartment.

## SCBA BOTTLE STORAGE

### SCBA Strap

Straps shall be provided in each exterior storage compartment to provide secondary means to hold each SCBA bottle in the compartment. The straps shall be constructed from 1" nylon webbing formed in a loop. The strap(s) shall be mounted to the storage compartment ceiling directly inside the door opening at each bottle location.

### SCBA 1 BOTTLE STORAGE

(1) SCBA bottle storage constructed with aluminum plate with hinged door and push button latch shall be provided in the body wheel well area.

The door shall match wheel well area material and finish.

The door shall cover the recessed fuel fill if located in the wheel well adjacent to the SCBA storage.

U-shaped trough made out of aluminum smooth plate with rubber insert shall be provided to store SCBA bottles.

Location: driver side rear wheel well offset rearward

### SCBA 3 BOTTLE STORAGE

(3) SCBA bottle storage constructed with aluminum plate with hinged door and push button latch shall be provided in the body wheel well area.

The door shall match wheel well area material and finish.

The door shall cover the recessed fuel fill if located adjacent to the SCBA storage.

U-shaped troughs made out of aluminum smooth plate with rubber inserts shall be provided to store standard size SCBA bottles up to 6.75" in diameter and 24.5" in length. The upper two troughs can also store a standard size 20lbs ABC Extinguisher or 2.5-gal Water Extinguisher in each trough.

Location: driver side rear wheel well offset forward, officer side rear wheel well offset rearward

### SPEEDY DRY STORAGE WHEEL WELL

Speedy Dry storage compartment with hinged door and push button latch shall be provided in the body wheel well area.

The door shall match wheel well area material and finish and be wired to door ajar.

The storage area shall include a slide out bin (sanded finish) with a grab handle on the front for easy deployment on scene.

The bin shall be designed with a hinged door on top for replenishing the Speedy Dry absorbent material and a gated 2" valve at the bottom for dispensing.

Capacity: 50 lbs.

Location: officer side rear wheel well offset forward

## PUMPS

### Pump Rating

The fire pump shall be rated at 1500 GPM.

### Fire Pump System

The pump shall be a midship-mounted Hale QMAX single stage centrifugal pump. The pump shall be mounted on the chassis frame rails of commercial or custom truck chassis and have the capacity of 1,250 to 2,250 gallons per minute (U.S. GPM) NFPA 1901 rated performance and shall be split shaft driven from the truck transmission.

The entire pump body and related parts shall be of fine grain alloy cast iron, with a minimum tensile strength of 30,000 psi (207 MPa). All metal moving parts in contact with water shall be of high-quality bronze or stainless steel. Pump body shall be horizontally split in two sections, for easy removal of impeller assembly including wear rings and bearings from beneath the pump without disturbing pump mounting or piping.

The pump impeller shall be hard, fine grain bronze of the mixed flow design and shall be individually ground and hand balanced. Impeller clearance rings shall be bronze, easily renewable without replacing impeller or pump volute body, and of wrap-around double labyrinth design for maximum efficiency.

The pump shaft shall be heat-treated, corrosion-resistant stainless steel and shall be rigidly supported by three (3) bearings for minimum deflection. The sleeve bearing is to be lubricated by a force fed, automatic oil lubricated design, pressure-balanced to exclude foreign material. The remaining bearings shall be heavy-duty, deep groove ball bearings in the gearbox and shall be splash-lubricated. Pump shaft must be sealed with double-lip oil seal to keep road dirt and water out of the gearbox.

Two (2) 6” diameter suction ports with 6” NST male threads and removable screens shall be provided, one each side. The ports shall be mounted one (1) on each side of the midship pump and shall extend through the side pump panels. Inlets shall come equipped with long handle chrome caps.

#### Discharge Manifold

The pump system shall utilize a stainless-steel discharge manifold system that allows a direct flow of water to discharge valves. The manifold and fabricated piping systems shall be constructed of a minimum of Schedule 10 stainless steel to reduce corrosion.

#### Pump Shift

The pump shift shall be pneumatically controlled using a power shifting cylinder.

The power shift control valve shall be mounted in the cab and be labeled “PUMP SHIFT”. The apparatus transmission shift control shall be furnished with a positive lever, preventing accidental shifting of the chassis transmission.

A green indicator light shall be located in the cab and be labeled “PUMP ENGAGED”. The light shall not activate until the pump shift has completed its full travel into pump engagement position.

A second green indicator light shall be located in the cab and be labeled “OK TO PUMP”. This light shall be energized when both the pump shift has been completed and the chassis automatic transmission has obtained converter lock-up (4th gear lock-up).

#### Test Ports

Two (2) test plugs shall be pump panel mounted for third party testing of vacuum and pressures of the pump.

#### Gearbox Cooler

A gearbox cooler shall be provided to maintain safe operating temperatures during prolonged pumping operations for pump rating 1500 GPM and over.

## PUMP CERTIFICATION

### Pump Certification

The pump, when dry, shall be capable of taking suction and discharging water in accordance with current NFPA 1901. The pump shall be tested at the manufacturer`s facility by an independent, third-party testing service. The conditions of the pump test shall be as outlined in current NFPA 1901.

The tests shall include, at a minimum, the pump test, the pumping engine overload test, the pressure control system test, the priming device tests, the vacuum test, and the water tank to pump flow test as outlined in current NFPA 1901.

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

The pump shall deliver the percentage of rated capacities 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

A test plate, installed at the pump panel, shall provide the rated discharges and pressures together with the speed of the engine as determined by the certification test, and the no-load governed speed of the engine.

A Certificate of Inspection certifying performance of the pump and all related components shall be provided at time of delivery. Additional certification documents shall include, but not limited to, Certificate of Hydrostatic Test, Electrical System Performance Test, Manufacturer`s Record of Pumper Construction, and Certificate of Pump Performance from the pump manufacturer.

## PUMP OPTIONS

### Steamers, Flush+1

The pump 6" steamer intake(s) shall be mounted approximately 1” from the pump panel to back of cap when installed. The "Flush+1" dimension can vary + or - 1-1/4" or as practicable depending on the pump module width and options selected.  (Example 72" or 76" modules.)

Location: driver's side, officer's side.

### Zinc Anodes

The zinc anodes help prevent damage caused by galvanic corrosion within the fire pump. The system provides a sacrificial metal which helps to diminish or prevent pump and pump shaft galvanic corrosion. One anode will be located on the suction side and one will be located on the discharge side of the pump.

### Thermal Relief Valve

A Hale TRVL-120 thermal relief valve shall be provided.

The valve shall help protect the pump by automatically monitoring pump water temperature. The relief valve shall automatically dump a controlled amount of water to the ground when the pump water exceeds the pre-set temperature of the relief valve.

A pump panel mounted indicator shall be installed at the pump operator`s panel.

### Mechanical Pump Seal

The midship pump shall be equipped with a high quality, spring loaded, self-adjusting mechanical seal capable of providing a positive seal to atmosphere under all pumping conditions. This positive seal to atmosphere must be achievable under vacuum conditions up to 26 Hg (draft) or positive suction pressures up to 250 psi.

The mechanical seal assembly shall be 2 inches in diameter and consist of a carbon sealing ring, stainless steel coil spring, Viton rubber boot, and a tungsten carbide seat, with a Teflon back-up seal provided.

Only one mechanical seal shall be required, located on the first stage suction (inboard) side of the pump and be designed to be compatible with a one-piece pump shaft (no exceptions). A continuous cooling flow of water from the pump shall be directed through the seal chamber when the pump is in operation.

### Master Drain Valve

A manual master drain valve shall be installed on the pump panel. The master pump drain assembly shall consist of a Class 1 bronze master drain with a rubber disc seal. The master drain shall have a rubber seal to prevent water from running out on the running board.

The manual master drain valve shall have twelve (12) individual-sealed ports that allow quick and simultaneous draining of multiple intake and discharge lines. It shall be constructed of corrosion-resistant material and be capable of operating at a pressure of up to 600 PSI.

The master drain shall provide independent ports for low point drainage of the fire pump and auxiliary devices.

### Pump Cooler

The pump shall have a 3/8” line installed from the pump discharge to the booster tank to allow a small amount of water to circulate through the pump casing in order to cool the pump during sustained periods of pump operation when water is not being discharged. The pump cooler line shall be controlled from the pump operator`s panel by a Innovative Controls 1/4 turn valve with "T" handle. Each 1/4 turn handle grip shall feature built-in color-coding labels and a verbiage tag

### Priming System

An electrically driven Hale ESP priming pump shall be provided for the water pump. The primer shall be positive displacement rotary vane type that requires no lubricant. The primer motor shall be heat-treated, anodized aluminum specially coated for wear and corrosion resistance.

One (1) priming control, located at the pump operator`s position, shall open the priming valve and start the priming motor. The priming valve shall be electronically interlocked to the “Park Brake” circuit to allow priming of the pump before the pump is placed in gear.

## INTAKES

### Left Intake 2.5 Akron Valve

One (1) 2-1/2” suction inlet with a manually operated 2-1/2” Akron valve shall be provided on the left side pump panel.

The valve shall be an Akron 8800HD series with a 316 stainless steel ball and dual polymer seats for ease of operation and increased abrasion resistance. The valve shall have a self-locking ball feature using an automatic friction lock design to balance the stainless-steel ball when in a throttle position and water is flowing through it.

The valve shall be of the unique Akron swing-out design to allow the valve body to be removed for servicing without disassembling the plumbing.

The outlet of the valve shall be connected to the suction side of the pump with the valve body located behind the pump panel. The valve shall come equipped with a brass inlet strainer, 2-1/2” NST female chrome inlet swivel, and shall be equipped with a chrome plated rocker lug plug with a retainer device.

The valve control shall be located at the pump operator`s panel and shall visually indicate the position of the valve at all times.

All fabricated piping shall be a minimum of Schedule 10 stainless steel for superior corrosion resistance, and decreased friction loss.

A 3/4” bleeder valve assembly will be installed on the left side pump panel.

## INTAKE OPTIONS

### Intake Pressure Relief

A18 Series - PRESSURE RELIEF VALVE - TFT`s pressure relief valve is adjustable from 50 to 250 psi (3 to 14 bar) with easy to see 25 psi (2 bar) increments. The aluminum casting is plastic impregnated, hard coat anodized, and TFT powder coat finished inside and out for maximum corrosion protection. Works with Darley, Waterous, or Hale bolt hole patterns for direct use on pump flanges.

## DISCHARGES AND PRECONNECTS

### Front Jump Line 1.5 Akron Valve

One (1) 1-1/2” preconnect outlet with a manually operated Akron valve shall be supplied to the extended front bumper. The preconnect shall consist of a 2” heavy duty hose coming from the pump discharge manifold to a 2” FNPT x 1-1/2” MNST mechanical swivel hose connection to permit the use of the hose from either side of the apparatus.

The valve shall be an Akron 8800HD series with a 316 stainless steel ball and dual polymer seats for ease of operation and increased abrasion resistance. The valve shall have a self-locking ball feature using an automatic friction lock design to balance the stainless-steel ball when in a throttle position with water flowing through it.

The valve shall be of the unique Akron swing-out design to allow the valve body to be removed for servicing without disassembling the plumbing.

An air blow-out valve shall be installed between the chassis air reservoir and the front jump line. The control shall be installed on the pump operator`s panel.

The discharge shall be supplied with a Class 1 automatic 3/4” drain valve assembly. The automatic drain shall have an all-brass body with stainless steel check assembly. The drain shall normally be open and automatically close when the pressure is greater than 6 psi.

The valve control shall be located at the pump operator panel and shall visually indicate the position of the valve at all times.

All fabricated piping shall be a minimum of Schedule 10 stainless steel for superior corrosion resistance and decreased friction loss.

### Swivel Elbow, Polished Stainless Steel

There shall be a polished stainless-steel swivel elbow provided for the front bumper discharge located on top of the bumper officer's side outboard.

### Triple Speedlay 1.5 Top Mount Akron Valve

One (1) triple speedlay discharge shall be provided. Each speedlay section shall include one (1) 2” brass swivel with a 1-1/2” NST male hose connection to permit the use of the hose from either side of the apparatus.

Each speedlay shall consist of a 2” heavy duty hose from the pump discharge manifold to the 2” swivel. The discharge shall include a 2” manually-operated Akron valve.

The valve shall be an Akron 8800HD series with a 316 stainless steel ball and dual polymer seats for ease of operation and increased abrasion resistance. The valve shall have a self-locking ball feature using an automatic friction lock design to balance the stainless-steel ball when in a throttle position with water flowing through it.

The valve shall be of the unique Akron swing-out design to allow the valve body to be removed for servicing without disassembling the plumbing.

The valve control shall be located at the pump operator`s panel and shall visually indicate the position of the valve at all times.

All fabricated piping shall be a minimum of Schedule 10 stainless steel for superior corrosion resistance and decreased friction loss.

### Left Panel 2.5 Discharge Akron Valve

One (1) 2-1/2” discharge outlet with a manually operated Akron valve shall be provided at the left-hand side pump panel.

The valve shall be an Akron 8800HD series with a 316 stainless steel ball and dual polymer seats for ease of operation and increased abrasion resistance. The valve shall have a self-locking ball feature using an automatic friction lock design to balance the stainless-steel ball when in a throttle position with water flowing through it.

The valve shall be of the unique Akron swing-out design to allow the valve body to be removed for servicing without disassembling the plumbing.

The valve control shall be located at the pump operator panel and shall visually indicate the position of the valve at all times.

All fabricated piping shall be a minimum of Schedule 10 stainless steel for superior corrosion resistance and decreased friction loss.

Location: left side discharge 1, left side discharge 2.

### Right Panel 2.5 Discharge Akron Valve

One (1) 2-1/2” discharge outlet with a manually operated Akron valve shall be provided at the left-hand side pump panel.

The valve shall be an Akron 8800HD series with a 316 stainless steel ball and dual polymer seats for ease of operation and increased abrasion resistance. The valve shall have a self-locking ball feature using an automatic friction lock design to balance the stainless-steel ball when in a throttle position with water flowing through it.

The valve shall be of the unique Akron swing-out design to allow the valve body to be removed for servicing without disassembling the plumbing.

The valve control shall be located at the pump operator panel and shall visually indicate the position of the valve at all times.

All fabricated piping shall be a minimum of Schedule 10 stainless steel for superior corrosion resistance and decreased friction loss.

Location: Right side discharge 1,

### Right Rear 2.5 Discharge Akron Valve

One (1) 2.5" discharge outlet with a manually operated Akron valve shall supplied to the right rear of the apparatus by a 3” stainless steel pipe.

The valve shall be an Akron 8800HD series with a 316 stainless steel ball and dual polymer seats for ease of operation and increased abrasion resistance. The valve shall have a self-locking ball feature using an automatic friction lock design to balance the stainless-steel ball when in a throttle position with water flowing through it.

The valve shall be of the unique Akron swing-out design to allow the valve body to be removed for servicing without disassembling the plumbing.

The valve control shall be located at the pump operator`s panel and shall visually indicate the position of the valve at all times.

All fabricated piping shall be a minimum of Schedule 10 stainless steel for superior corrosion resistance and decreased friction loss.

Location: right rear discharge.

### 5'' Panel Discharge 4'' Electric Akron

One (1) 5” panel discharge with a 4” electrically actuated Akron valve shall be provided. The discharge shall consist of a 4” connected to a 4” FNPT x 5” MNST chrome adapter. The adapter shall protrude through the pump panel and be equipped with a chrome-plated, rocker-lug cap with a retainer.

The valve shall be 4" Akron 8800HD series with brass flat ball and polymer seals for ease of operation and increased abrasion resistance. The valve shall have a self-locking ball feature using an automatic friction lock design to balance the brass ball when in a throttle position with water flowing. The valve shall be of the unique Akron Swing-out design to allow the valve body to be removed for servicing without disassembling the plumbing.

The valve shall utilize an electric driven worm gear actuator. The valve may also be operated manually in case of electrical system failure.

All fabricated piping shall be a minimum of Schedule 10 stainless steel for superior corrosion resistance and decreased friction loss.

Location: right side discharge 1

### Deck Gun Location

Deck gun piping shall be positioned centered in deck gun channel. This location shall allow for optimal operation of a deck gun monitor once installed.

**Remote Control Telescoping Monitor Pipe**

Task Force Tips model # XGA38VL-RL 3" electrically telescoping waterway shall be installed. The waterway shall be capable of being lowered to deck level (or into a monitor well) for storage and transportation and shall be capable of being raised to an extended height of 18" using Auxiliary 1 push button and retract after the monitor has been parked by pressing the Park button on Task Force Tips RC monitor control stations or from optional panel mounted push buttons. The unit shall include a 12-volt motor capable of moving the waterway to either the raised or lowered position while maintaining the ability to horizontally rotate the monitor device up to 450 degrees. The motor shall be weatherproof in design and have an accessible manual override control for use in the event power failure occurs. An interface box with cables and waterproof plugs shall be provided for connection of power, monitor, Extend-A-Gun RC and optional push button controls.

A sensor shall be located on the waterway that signals a 12-volt indicator light installed in the cab to illuminate to indicate that the monitor is raised.

The aluminum riser shall have a 3" waterway; hard coat anodized finish and be furnished with a 3" Victaulic inlet coupling and a TFT Code RLM male connection for a TFT remote control monitor with TFT Code RLF female inlet. The unit shall have a unique serial number and be covered by a five-year warranty.

**TFT Electric Valve Under Monitor**

Task Force Tips VUM, model # AKE11 electrically controlled monitor valve shall be provided under the monitor. The valve shall be controlled by one or more Task Force Tips monitor controllers using the electronics interface enclosure that is included. 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 position indicator shall be provided on the valve to allow for quick visualization of the status of the valve in the open, closed or partial positions. The unit shall have a flow capability of up to 2000 GPM with friction loss no more than 6 psi. For maximum corrosion protection the aluminum casting shall be hard coat anodized, with a silver powder coat internal and external finish. The valve ball shall be hard coat anodized aluminum alloy with corrosion resistant coating and have an automatic drain for draining waterway when valve is closed and unpressurized. The unit shall have a unique serial number and be covered by a five-year warranty.

The valve shall be configured with a 4" ANSI 150 flange inlet and male for a Task Force Tips Extend-A-Gun inlet.

**TFT Hurricane 1250 GPM Remote Controlled Monitor**

Task Force Tips Hurricane RC, model # XFIH-EP1A remote controlled monitor shall be installed. The monitor shall be controlled by a monitor mounted operator station with functions that control rotation, elevation and nozzle patterns, oscillate, park, auxiliary 1 and auxiliary 2.

The monitor shall have the following travel capabilities: full 450 degrees of horizontal rotation with travel 225 degrees left and right of center, full 135 degrees of vertical travel with stops at 90 degrees above and 45 degrees below horizontal, field changeable rotation stops shall be provided at 45, 90 and 135 degrees left and/or right of center, flow capability of 1250 GPM, maximum operating pressure of 200 PSI.

The electrical components for the monitor and switch enclosures shall be compatible with 12 and 24 volt DC systems, shall be weatherproof and shall utilize weatherproof components such as a membrane switch, silicone seal, hardware with O-rings and liquid tight electrical connections with strain relief fittings. Monitor shall have current limiting and position encoders to protect the drive train at the ends of travel. Monitor shall have waterproof plug for power and control cable connection for easy removal. Thirty feet of ultra-flex robotic power cable shall be provided and include a unique cable guide for 450 degrees of monitor rotation. A six-pin electrical connection for a TFT remote control nozzle shall be provided. Electrical enclosure systems shall have a rating of IP66/IP67 per IEC 65029. The monitor shall be compatible with optional wired and wireless control panels and monitor position display. The monitor shall be equipped with manual override knobs for use in the event of power failure. The motors and knobs control stainless steel worm gears for rotation and elevation adjustment.

For resistance to corrosion the monitor shall be constructed from hard coat anodized aluminum with a silver powder coat interior and exterior finish. A built-in automatic drain designed to protect the monitor from freezing and a threaded port for an optional pressure gauge shall be provided.

The monitor shall be configured with a Task Force Tips code RPF female threaded inlet to mount directly on Task Force Tips Extend-A-Gun RC4 telescoping deck pipe and 2-1/2" male NH outlet. The unit shall have a unique serial number and be covered by a five-year warranty.

**Remote Electric Master Stream Nozzle**

Task Force Tips Master Stream 1250, model # M-ERP1250SNJ automatic nozzle with electrically operated pattern control shall be provided. The nozzle design shall allow for straight stream through dense wide fog patterns.

The electric drive unit shall develop over 400 pounds of torque, be enclosed in a waterproof aluminum housing and include a manual override device in the event the power source fails. The unit shall be compatible with 12 or 24-volt power systems and require no more than a 3-amp power draw and include a 6" connection cable with plug. Electrical actuator systems shall have a rating of IP66/IP67 per IEC 65029.

Nozzle stream shaper actuator shall have position encoder for smooth transition between straight stream and fog pattern with fine stream adjustment.

For corrosion resistance and durability, the nozzle and actuator shall be constructed from hard coat anodized aluminum alloy, include a protective rubber bumper with fog teeth, laser engraved serial number, reflective labeling and a five-year warranty.

The nozzle shall have a 2-1/2" female NH swivel rocker lug coupling and a flow range of 150-1250 GPM at 100 PSI. A waterproof six-pin electrical connection for use with TFT remote control monitors shall be included. The nozzle shall be designed to accept the TFT FJ-LX-M FoamJet low expansion air aspirating attachment.

## DISCHARGE OPTIONS

### IC Push/Pull Control

 The apparatus pump panel shall be equipped with Innovative Controls Side Mount Valve Controls. The ergonomically designed ¼ turn push-pull T-handle shall be chrome-plated zinc with recessed labels for color-coding and verbiage. An 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 zinc panel-mounting bezel with areas for color-coding and/or FOAM and CAFS identification labels.

### Bleeder Drain Valve [Qty: 9]

 The bleeder/drain valves shall be Innovative Controls ¾” ball brass drain valves with chrome-plated lift lever handles and ergonomic grips. Each lift handle grip shall feature built-in color-coding labels and a verbiage tag identifying each valve, also supplied by Innovative Controls. The color labels shall also include valve open and close verbiage.

### Discharge/Intake Bezel

Innovative Controls intake and/or discharge swing handle bezels shall be installed to the apparatus with mounting bolts. These bezel assemblies will be used to identify intake and/or discharge ports with color and verbiage. These bezels are 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 specified assemblies feature a chrome-plated panel-mount bezel with durable UV resistant polycarbonate inserts. These UV resistant polycarbonate graphic inserts shall be sub-surface screen printed to eliminate the possibility of wear and protect the inks from fading. All insert labels shall be backed with 3M permanent adhesive (200MP), which meets UL969 and NFPA standards.

### Akron Electric Valve 9333 Controller

An Akron Brass Style 9333 Valve Controller shall be provided with a five-year manufacturer warranty. The display shall be a full color LCD display with a backlight and manual adjustment of the brightness as well as an auto-dimming option. The electric controls shall provide true position feedback, requiring no clutches in the motor or current limiting. The unit shall be sealed with momentary open, close as well as an optional one touch full open feature to operate the actuator. The controller will provide an LCD display showing valve position indication and have up to three preset locations that can be user set and easily recalled upon each use. Valve position indication will be determined from true position feedback and indicate the exact position of the valve.

Two additional buttons shall be available to be used for preset selection, preset activation and menu navigation.

Locate on pump operator panel to control deck gun, right side discharge 1.

## PRESSURE GOVERNORS

### FRC TGA400 Governor

Fire Research InControl series TGA400-A00 pressure governor and monitoring display kit shall be installed. The kit shall include a control module, intake pressure sensor, discharge pressure sensor, and cables. The control module case shall be waterproof and have dimensions not to exceed 5-1/2" high by 10-1/2" wide by 2" deep. The control knob shall be 2" in diameter with no mechanical stops, have a serrated grip, and a red idle push button in the center. It shall not extend more than 1-3/4" from the front of the control module. Inputs for monitored information shall be from a J1939 databus or independent sensors. Outputs for engine control shall be on the J1939 databus or engine specific wiring.

The following continuous displays shall be provided:
Pump discharge; shown with four daylight bright LED digits more than 1/2" high
Pump Intake; shown with four daylight bright LED digits more than 1/2" high
Pressure / RPM setting; shown on a dot matrix message display
Pressure and RPM operating mode LEDs
Throttle ready LED
Engine RPM; shown with four daylight bright LED digits more than 1/2" high
Check engine and stop engine warning LEDs
Oil pressure; shown on a dual color (green/red) LED bar graph display
Engine coolant temperature; shown on a dual color (green/red) LED bar graph display
Transmission Temperature: shown on a dual color (green/red) LED bar graph display
Battery voltage; shown on a dual color (green/red) LED bar graph display.
The dot-matrix message display shall show diagnostic and warning messages as they occur. It shall show monitored apparatus information, stored data, and program options when selected by the operator. All LED intensity shall be automatically adjusted for day and nighttime operation.

The program shall store the accumulated operating hours for the pump and engine to be displayed with the push of a button. It shall monitor inputs and support audible and visual warning alarms for the following conditions:
High Battery Voltage
Low Battery Voltage (Engine Off)
Low Battery Voltage (Engine Running)
High Transmission Temperature
Low Engine Oil Pressure
High Engine Coolant Temperature
Out of Water (visual alarm only)
No Engine Response (visual alarm only).
The program features shall be accessed via push buttons and a control knob located on the front of the control panel. There shall be a USB port located at the rear of the control module to upload future firmware enhancements.

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

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

The pressure governor, monitoring and master pressure display shall be programmed to interface with a specific engine.

Location of the governor and monitoring display shall be: Pump Operator`s Panel.

## GAUGES

### 2.5 [Qty: 9]

The valve discharge gauges shall be 2 ½” (63mm) diameter Innovative Controls pressure gauges. Each gauge shall have a rugged corrosion free stainless-steel case and clear scratch resistant molded crystals with captive O-ring seals to ensure distortion free viewing and seal the gauge. The gauges shall be filled with a synthetic mixture to dampen shock and vibration, lubricate the internal mechanisms, prevent lens condensation and ensure proper operation from –40F to +160F. Each gauge shall exceed ANSI B40.1 Grade A requirements with an accuracy of +/- 1.5% full scale and include a size appropriate phosphorous bronze bourdon tube with a reinforced lap joint and large tube base to increase the tube life and gauge accuracy.

A polished chrome-plated stainless-steel bezel shall be provided to prevent corrosion and protect the lens and gauge case. The gauges shall be installed into decorative chrome-plated mounting bezels that incorporate valve-identifying verbiage and/or color labels. The gauges shall display a range from 0 to 400 psi with black graphics on a white background.

### GAUGE IC 10 LED TANK LEVEL WATER/PS2TANK

One (1) Innovative Controls brand water tank level gauge shall be located at the pump operator`s panel to provide a high-visibility display of the water tank level. Ten (10) high-intensity light emitting diodes (LEDs) on the display module shall have a 3-dimensional lens allowing the full, 3/4, 1/2, 1/4, and refill levels to be easily distinguished at a glance within full 180-degree visibility.

The display module shall be protected from vibration and contamination with the components being encased in an encapsulated plastic housing. The long life and extreme durability of LED indicators eliminates light bulb replacement and maintenance. Color coded cover plates shall complete the assembly of the display module to the pump panel. System calibration shall be accomplished via supplied magnet. Each display level can be set independently for maximum reliability.

The display shall provide a steady indication of fluid level despite sloshing inside of the tank when the vehicle is in motion due to an “anti-slosh” feature.

The system shall be controlled by an Innovative Control tank level driver module that is integral of the NFPA required pump panel mounted tank level light assembly.

## ELECTRICAL SYSTEMS

### Multiplex Electrical System

#### Electrical System

The apparatus shall incorporate a Weldon V-MUX multiplex 12-volt electrical system. The system shall have the capability of delivering multiple signals via a CAN bus. The electrical system installed by the apparatus manufacturer shall conform to current SAE standards, the latest FMVSS standards, and the requirements of the applicable NFPA 1901 standards.

The electrical system shall be pre-wired for optional computer modem accessibility to allow service personnel to easily plug in a modem to allow remote diagnostics.

The electrical circuits shall be provided with low voltage over-current protective devices. Such devices shall be accessible and located in required terminal connection locations or weather-resistant enclosures. The over-current protection shall be suitable for electrical equipment and shall be automatic reset type and meet SAE standards. All electrical equipment, switches, relays, terminals, and connectors shall have a direct current rating of 125 percent of maximum current for which the circuit is protected. The system shall have electro-magnetic interference suppression provided as required in applicable SAE standards.

Any electrical junction or terminal boxes shall be weather-resistant and located away from water spray conditions.

#### Multiplex System

For superior system integrity, the networked multiplex system shall meet the following minimum component requirements:

* The network system must be Peer to Peer technology based on RS485 protocol. No one module shall hold the programming for other modules. One or two modules on a network referred to as Peer to Peer, while the rest of the network consists of a one master and several slaves is not considered Peer to Peer for this application.
* Modules shall be IP67 rated to handle the extreme operating environment found in the fire service industry.
* All modules shall be solid state circuitry utilizing MOS-FET technology and utilize Deutsch series input/output connectors.
* Each module that controls a device shall hold its own configuration program.
* Each module should be able to function as a standalone module. No “add-on” module will be acceptable to achieve this form of operation.
* Load shedding power management (8 levels).
* Switch input capability for chassis functions.
* Responsible for lighting device activation.
* Self-contained diagnostic indicators.
* Wire harness needed to interface electrical devices with multiplex modules.
* The grounds from each device should return to main ground trunk in each sub harness by the use of ultrasonic splices.

#### Wiring

All harnessing, wiring and connectors shall be manufactured to the following standards/guidelines. No exceptions.

* NFPA 1901-Standard for Automotive Fire Apparatus
* SAE J1127 and J1127
* IPC/WHMA-A-620 – Requirements and Acceptance for Cable and Wire Harness Assemblies. (Class 3 – High Performance Electronic Products)

All wiring shall be copper, or copper alloys of a gauge rated to carry 125 of the maximum current for which the circuit is protected. Insulated wire and cable 8 gauge and smaller shall be SXL, GXL, or TXL per SAE J1128. Conductors 6 gauge and larger shall be SXL or SGT per SAE J1127.

All wiring shall be colored coded and imprinted with the circuits function. Minimum height of imprinted characters shall not be less than .082” plus or minus .01”. The imprinted characters shall repeat at a distance not greater than 3”.

A coil of wire shall be provided behind electrical appliances to allow them to be pulled away from mounting area for inspection and service work.

#### Wiring Protection

The overall covering of the conductors shall be loom or braid.

Braid style wiring covers shall be constructed using a woven PVC-coated nylon multifilament braiding yarn. The yarn shall have a diameter of no less than .04” and a tensile strength of 22 lbs. The yarn shall have a service temperature rating of -65 F to 194 F. The braid shall consist of 24 strands of yarn with 21 black and 3 yellow. The yellow shall be oriented the same and be next to each other.

Wiring loom shall be flame retardant black nylon. The loom shall have a service temperature of -40 F to 300 F and be secured to the wire bundle with adhesive-backed vinyl tape.

#### Wiring Connectors

All connectors shall be Deutsch series unless a different series of connector is needed to mate to a supplier’s component. The connectors and terminals shall be assembled per the connector/terminal manufacturer’s specification. Crimble/Solderless terminals shall be acceptable. Heat shrink style shall be utilized unless used within the confines of the cab.

#### NFPA Required Testing of Electrical System

The apparatus shall be electrical tested upon completion of the vehicle and prior to delivery. The electrical testing, certifications, and test results shall be submitted with delivery documentation per requirements of NFPA 1901. The following minimum testing shall be completed by the apparatus manufacturer:

**1. Reserve capacity test:**

The engine shall be started and kept running until the engine and engine compartment temperatures are stabilized at normal operating temperatures and the battery system is fully charged. The engine shall be shut off and the minimum continuous electrical load shall be activated for ten (10) minutes. All electrical loads shall be turned off prior to attempting to restart the engine. The battery system shall then be capable of restarting the engine. Failure to restart the engine shall be considered a test fail.

**2. 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.

**3. 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 two (2) hours. Activation of the load management system shall be permitted during this test. However, an alarm sounded by excessive battery discharge, as detected by the system required in NFPA 1901 Standard, or a system voltage of less than 11.7 volts DC for a 12 volt nominal system, for more than 120 seconds, shall be considered a test failure.

**4. Low voltage alarm test:**

Following the completion of the above tests, the engine shall be 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. With the load still applied, a reading of less than 11.7 volts DC for a 12-volt nominal system shall be considered a test failure. The battery system shall then be able to restart the engine. Failure to restart the engine shall be considered a test failure.

#### NFPA Required Documentation

The following documentation shall be provided on delivery of the apparatus:

    A. Documentation of the electrical system performance tests required above.

    B. A written load analysis, including:

        a. The nameplate rating of the alternator.
        b. The alternator rating under the conditions.
        c. Each specified component load.
        d. Individual intermittent loads.

### Vehicle Data Recorder

A vehicle data recorder system shall be provided to comply with the 2009 and 2016 editions of NFPA 1901. The following data shall be monitored:

* Vehicle speed MPH
* Acceleration (from speedometer) MPH/Sec.
* Deceleration (from speedometer) MPH/Sec.
* Engine speed RPM
* Engine throttle position % of full throttle
* ABS Event On/Off
* Seat occupied status Occupied Yes/No by position
* Seat belt status Buckled Yes/No by position
* Master Optical Warning Device Switch On/Off
* Time: 24-hour time
* Date: Year/Month/Day

#### Occupant Detection System

There shall be a visual and audible warning system installed in the cab that indicates the occupant buckle status of all cab seating positions that are designed to be occupied during vehicle movement.

The audible warning shall activate when the vehicle’s park brake is released, and a seat position is not in a valid state. A valid state is defined as a seat that is unoccupied and the seat belt is unbuckled, or one that has the seat belt buckled after the seat has been occupied.

The visual warning shall consist of a graphical representation of each cab seat in the multiplex display screen that will continuously indicate the validity of each seat position.

The system shall include a seat sensor and safety belt latch switch for each cab seating position, audible alarm and braided wiring harness.

### Multiplex Display

The V-MUX multiplex electrical system shall include a Vista IV color display.

The display shall have the following features:

* Aspect ratio of 16:9 (Wide Screen)
* Diagonal measurement of no less than 7”
* Master warning switch
* Engine high idle switch
* Five (5) tactile switches to access secondary menus
* Eight (8) multi-function programmable tactile switches
* Specific door ajar indication
* Real time clock
* Provides access to the multiplex system diagnostics
* Video capability for optional back-up camera(s) and GPS display

The display shall be located driver's side engine cover.

### Electrical Connection Protection

The vehicle electrical system shall be made more robust by the application of a corrosion inhibiting spray coating on all exposed electrical connections on the chassis and body. If equipped with an aerial device, the exposed connections on the aerial components shall also be protected.

The coating shall use nanotechnology to penetrate at the molecular level into uneven surfaces to create a protective water repellant film. The coating shall protect electrical connections against the environmental condition’s apparatus are commonly exposed to.

### Smart Truck Technology

#### User Interface

The apparatus shall be equipped with a smart truck technology system designed specifically for first responder apparatus. The system shall interconnect major apparatus CAN networks including but not limited to the chassis J1939/OBD2 data, vehicle multiplex system, water pump pressure governor, electric valves and electric actuated deck gun. The system shall securely report real-time vehicle information from these systems via cellular data to a globally supported cloud computing service for storage and real time access via web dashboards. The dashboards shall be accessible by the department's computers, tablets and smartphones.

The smart truck technology installed on the apparatus shall provide real-time notification via text or e-mail when a check engine light is displayed. The notification shall include the fault code and brief explanation for the code to reduce down-time.

The system shall feature a truck down feature on the web-based user interface to allow instant notification of needed apparatus service to both the authorized dealership and OEM via text or e-mail.

The system shall provide remote diagnostics of vehicle subsystems such as VMUX, pressure governors, electric monitors and electric valves.

By use of the web-based user interface, the system shall allow for over the air programming updates to various subsystems should the need arise.

The web-based user interface shall also provide the following:

* Fuel and DEF levels
* GPS tracking
* Data logging for apparatus multiplex system
* Easy access to the NFPA VDR data

The smart truck technology shall also feature seamless integration to the HAAS ALERT Safety Cloud providing Responder to Vehicle (R2V) alerts to motorists using navigation apps such as WAZE.

The system shall be designed with an open architecture to incorporate future growth with new technology partners designed to enhance fireground operations

#### Hardware

**Vehicle Gateway**

The vehicle gateway module shall be rugged in construction using a durable cast aluminum enclosure designed for emergency vehicle applications. The module shall have sealed Deutsch connectors providing four (4) CAN network ports, one (1) RS-485 port, one (1) Ethernet RJ45 port, embedded cellular modem, Bluetooth, and GPS capability. The IoT Core Vehicle Gateway shall be capable of 2-way vehicle telemetry, supporting both remote diagnostics and remote over-the-air software updates.

**Antenna**

A low-profile cellular antenna shall be installed on the cab roof.

#### Data Plan

A 5-year data plan shall be provided with the initial vehicle purchase. At the end of the 5-year period the department shall be given the option to extend service.

## LIGHT BARS

### Light Bar Mount

One (1) pair of Whelen 1.5" tall (model MKEZ7) mounts shall be provided on the front light bar.

### Front Light Bar Color(s)

The front light bar shall be provided with the following color LED modules: Red/White with clear lenses

If applicable, includes side facing light bars when colors are the same.

### Light Bar

A Whelen Freedom IV Series 72” LED light bar model F4X7 with ten (10) LED modules shall be provided; two (2) front corner mounted LED modules, six (6) forward facing LED modules and two (2) side facing LED modules (with front vista windows) or two (2) rear corner LED modules (without front vista windows).

No rear facing LEDs.

The light bars shall have clear lenses.

The white LEDs (if equipped) shall be switched off in blocking right of way mode.

The light bar shall be installed centered on the front cab roof.

LED light colors shall be determined at pre-build.

## WARNING LIGHT PACKAGES

### Lower Level Warning Light Package

Eight (8) Whelen C-Series Super LED model C6L light heads and two (2) Whelen ION-T Series Super LED model TLI light heads shall be provided. The lights shall be Red and blue with clear lenses.

The rectangular lights shall include chrome flanges where applicable. The lights shall be wired with weatherproof connectors and shall be mounted as close to the corner points of the apparatus as is practical as follows:

• Two (2) C6L lights on the front of the apparatus facing forward.
• Two (2) C6L lights on the rear of the apparatus facing rearward.
• Two (2) lights each side of the apparatus, one (1) C6L each side at the forward most point (as practical), and one (1) TLI each side at the rearward most point (as practical).
• One (1) C6L light each side of the apparatus centrally located to provide mid ship warning light.

The side facing lights shall be located at forward most position, centered in rear wheel well, and side facing at rear of body in rubrail if equipped.

All warning devices shall be surface mounted in compliance with NFPA standards.

## WARNING LIGHTS

### Hazard (Door Ajar) Light

There shall be a 2” red LED hazard light installed as specified.

The light shall be located center overhead.

### Warning Lights

Two (2) Whelen M6 Series Linear Super LED red light heads with clear lens shall be provided. The rectangular lights shall include chrome flanges where applicable.

Location: (1) each side in front quad inboard of NFPA warning light.

### Upper Rear Warning Lights

Whelen model M9 surface mount LED warning light with clear lens and chrome trim.

Location: One (1) M9ECZ blue light shall be located driver side of body on rearward compartment top. One (1) M9DCZ red light shall be located driver side of body on rearward compartment top to meet upper Zone C requirements.

The lights shall have Scan-Lock flash patterns and synchronize feature.

## SIRENS

### Electronic Siren Control Location

The electronic siren control shall be located in the center overhead console offset to officer side.

### Electronic Siren

A Powercall model UDX7 siren shall be installed in the cab. The siren shall feature an illuminated control panel with rotary switch for mode selection, three (3) push button switches for air horn, phaser and intersection modes, and a noise cancelling PA microphone. The siren shall also feature a USB port for additional tones from an external source.

Operating modes include Manual, USB, Wail, Yelp, Hi-Lo, Powercall, Whoop and shall include a Tap feature.

Siren is to be connected to one (1) 200 watt or up to two (2) 100W RMS speaker(s).

### Mechanical Siren

A chrome plated and pedestal mounted Federal Q2B-P coaster siren shall be installed on top of the front bumper extension.  An electric siren brake switch shall be located in the cab accessible to the driver.

The siren shall be located driver side front bumper.

## SPEAKERS

### Speaker

One (1) Cast Products SA3501, 100-watt siren speaker shall be recessed behind the front bumper. Includes polished aluminum trim bezel.

The speaker dimension: 5.625” high 11.50” wide 5.00” deep.

The speaker shall produce a minimum sound output of 120 dB at 10 feet to meet current NFPA 1901 requirements.

The speaker shall be located officer side front bumper.

## DOT LIGHTING

### License Plate Light

One (1) Truck-Lite model 15905 white LED license plate light mounted in a Truck-Lite model 15732 chrome plated plastic license plate housing shall be mounted at the rear of the body.

### LED Marker Lights

LED clearance/marker lights shall be installed as specified.

**Upper Cab:**

* Five (5) amber LED clearance lights on the cab roof.

**Lower Cab:**

* One (1) amber LED side turn/marker each side of cab ahead of the front door hinge.

**Upper Body:**

* One (1) red Trucklite LED clearance light each side, rear of body to the side.

**Lower Body:**

* Three (3) red Trucklite LED clearance lights centered at rear, recessed in the rub rail.
* One (1) red Trucklite LED clearance light each side at the trailing edge of the apparatus body, recessed in the rub rail.
* One (1) amber Trucklite LED clearance/auxiliary turn light each side front of body/module, recessed in the rub rail.

### License Plate Bracket

There shall be bracket fabricated from aluminum diamond plate, secured to rear of the body to accommodate a license plate.

### Taillights

Three (3) Whelen model M6 series LED (Light Emitting Diode) lights shall be installed in a vertical 3 light housing each side at rear.

Light functions shall be as follows:

• LED red running light with red brake light in upper position.
• LED amber populated arrow pattern turn signal in middle position.
• LED clear back-up light in lower position.

A one-piece chrome plastic trim shall be mounted around the three (3) individual lights in a vertical position.

## LIGHTS - COMPARTMENT, STEP & GROUND

### Compartment Light Package

There shall be a minimum of one (1) 4” circular LED (Light Emitting Diode) mounted in each body compartment greater than 4 cu. ft. Compartments over 36” in height shall have a minimum of two (2) lights, one (1) high and one (1) low. Transverse compartments shall have a minimum of two (2) lights, located one (1) each side.

Compartment lights shall be wired to a master on/off rocker switch on the cab switch panel. Each light shall be in a resilient shock-absorbent mount for improved bulb life.

The wiring connection for the compartment lights shall be made with a weather-resistant plug in style connector. A single water and corrosion-resistant switch with a polycarbonate actuator and sealed contacts shall control each compartment light. The switch shall allow the light to illuminate if the compartment door is open.

### Medical Cabinet Lighting

One (1) ROM V4 LED compartment light strip shall be mounted in the medical cabinet(s).

The light bar shall include super bright white LEDs mounted to circuit boards that have acrylic conformal coating for corrosion protection. The LED circuit boards shall be mounted to an extruded aluminum base with Lexan lens. The light shall produce 250 lumens per foot and be waterproof up to 1 meter (3.3 feet).

The light shall be controlled by a compartment door switch.

### Ground Lights

The apparatus shall be equipped with a sufficient quantity of lights to properly illuminate the ground areas around the apparatus in accordance with current NFPA requirements. The lights shall be TecNiq model T440 4” circular LED (Light Emitting Diode) with clear lenses mounted in a resilient shock absorbent mount for improved bulb life. The wiring connections shall be made with a weather resistant plug in style connector.

Ground area lights shall be switched from the cab dash with the work light switch.

One (1) ground light shall be supplied under each side of the front bumper extension if equipped.

Lights in areas under the driver and crew area exits shall be activated automatically when the exit doors are opened.

### Cab Ground / Auxiliary Step Lights

The cab shall be equipped with a sufficient quantity of lights to properly illuminate the auxiliary steps and the ground areas below them in accordance with current NFPA requirements. The lights shall be EON LED (Light Emitting Diode) with clear lenses. The wiring connections shall be made with a weather resistant plug in style connector.

The lights shall be switched from the cab dash with the work light switch. The lights shall also be activated automatically when the exit doors are opened.

## LIGHTS - DECK AND SCENE

### Cab Scene Light Switching

The cab scene lights shall be wired to activate through the appropriate side cab door ajar switch. This application allows the cab scene lights to be used as additional illumination of the ground area for personnel entering or exiting the vehicle. The switching for this application is in addition to the standard cab scene light switching.

### Scene Lights, Cab

Two (2) Whelen model M6ZC series Linear Super LED clear scene lights with chrome trim shall be provided.

Each shall have Linear Super LED diodes with internal light deflecting optics. The internal light deflecting optics shall redirect the light without the use of angle brackets.

The lights shall be located (1) each side of cab, rearward of forward doors, up high and be controlled by a switch in cab accessible to driver (lights on sides of apparatus to be switched separately).

### Scene Lights, Rear Body

Two (2) Whelen model M9LZC series Linear Super LED clear scene lights with chrome trim shall be provided.

Each shall have Linear Super LED diodes with internal light deflecting optics. The internal light deflecting optics shall redirect the light without the use of angle brackets.

The lights shall be located (1) each side rear compartment face up high, below upper rear warning lights, controlled by a switch in cab accessible to driver (lights on sides of apparatus to be switched separately). The rear scene lights shall also switch on when the transmission is placed in reverse gear to provide additional lighting while backing the apparatus.

### Hose Bed Light [Qty: 1]

One (1) Truck-Light model 8160 rectangular LED light with a clear lens shall be installed at the front area of the hose bed to provide hose bed lighting per current NFPA 1901. All electrical connectors are to be enclosed in the housing providing protection against the elements.

The hose bed light shall be switched with work light switch in the cab.

### Scene Lights

Four (4) FireTech model FT-GESM, Guardian Elite LED Surface Mount scene lights with chrome flanges shall be provided.

Lights shall be located driver side upper forward body corner, officer side upper forward body corner, driver side upper rearward body corner, officer side upper rearward body corner and switched in cab (side facing lights switched separately).

## LIGHTS - NON-WARNING

### Engine Compartment Light

There shall be lighting provided in compliance with NFPA to illuminate the engine compartment area. The light wiring circuit shall activate when the cab is tilted, and master power is switched on.

### Light Wiring

Forward pump panel light at the pump operator`s panel shall be wired to the pump shift to provide pump panel illumination when the pump is placed into gear. Top mount application center light at the pump operator`s panel shall be wired to the pump shift to provide pump panel illumination when the pump is placed into gear.

### Pump Compartment Light

An incandescent light shall be provided in the pump compartment area for NFPA compliance. The light shall be wired to operate with the work light switch in the cab.

### LED Pump Panel Light Package

Three (3) TecNiq model E10 LED lights shall be mounted under a light shield directly above each side pump panel.

The pump panel light shall be switched on with a switch on the pump panel labeled panel lights. One light module shall activate when the fire pump is engaged.

## CONTROLS / SWITCHES

### Door Ajar Alarm

An audible alarm shall be provided through the multiplex display(s) in the cab wired into the door ajar or indicator.

### Foot Switch

A heavy-duty metal floor mounted foot switch shall be installed to operate the Q2B siren. It shall be located officer's side.

## CAMERAS / INTERCOM

### Camera, Officer Side

A Safety Vision model SV-622RS camera will be located on the officer side front corner of the cab. This camera will be interlocked with the turn indicator. The system shall include a cable with metallic waterproof threaded O-ring seal connectors to ensure positive connection between video cable and camera to prevent unplugging due to vibration resulting in video loss to vehicle operator.

Requires the option for the Safety Vision back-up camera system which consists of the colored monitor, back-up camera and control box.

### Camera, Driver Side

A Safety Vision model SV-622LS camera will be located on the driver side front corner of the cab. This camera will be interlocked with the turn indicator. The system shall include a cable with metallic waterproof threaded O-ring seal connectors to ensure positive connection between video cable and camera to prevent unplugging due to vibration resulting in video loss to vehicle operator.

Requires the option for the Safety Vision back-up camera system which consists of the colored monitor, back-up camera and control box.

### Camera Back-Up

There shall be a Safety Vision camera model number SV-625B-KIT provided. The camera shall be mounted up high at the rear of the vehicle to provide a wide-angle rear view with audio. The camera shall include a cable with metallic waterproof threaded O-ring seal connectors to ensure positive connection between video cable and camera to prevent unplugging due to vibration resulting in video loss to vehicle operator. The camera shall be interlocked with the chassis transmission. When the apparatus is placed in reverse the camera shall automatically be activated and when the transmission is placed in any other gear the screen shall return to the previously displayed screen.

## MISC ELECTRICAL

### Back-Up Alarm

An electronic back-up alarm shall be supplied. The 97 dB alarm shall be wired into the chassis back-up lights to signal when the vehicle is in reverse gear.

## LIGHTS - AREA

### Cab Brow Light

One (1) FireTech 12V LED model FT-B-46-ML3-B 50" black housing brow light with three (3) marker lights shall be provided on the front cab brow. The light shall feature 39 LEDs` producing 13,305.6 usable lumens. The 180W 12V light shall draw 15 amps. A switch shall be provided, accessible to driver, for activation of light.

## LIGHT TOWERS

### LED Light Tower

A Command Light model KL415D light tower shall be provided. The light tower shall be a two-stage articulating device with a lighting bank on top of a second stage capable of 360 degrees continuous rotation. The light shall be elevated by electric linear actuators, one (1) actuator shall elevate the light bank, and one (1) actuator shall adjust the light bank angle from 0 to 110 degrees. The overall extended height from the base to the top pair of lights shall be 87.5”.

The light bank shall have four (4) Whelen Pioneer PFH2 150-watt output 12V LED lights. Light heads shall be mounted in two (2) pairs, giving two (2) vertical lines of two (2) when the lights are in the upright position. Power for light bank shall be transmitted through power collecting rings thus allowing 360+ degrees rotation in either direction, NO EXCEPTIONS.

Light tower shall be controlled with a handheld umbilical line remote control. The storage station for the remote-control unit shall be equipped with a button to activate the “Auto-Park” automatic nesting feature. The controls on the remote box shall be:

1. Three (3) switches, one (1) for each light bank.
2. One (1) light bank rotation switch.
3. One (1) switch for elevating lower stage.
4. One (1) switch for elevating upper stage.
5. One (1) indicator light to indicate when light bank is out of roof nest position.
6. One (1) indicator light to indicate when light bank is rotated to proper nest position.
7. One (1) on/off switch for the top mounted strobe.

The controls shall be located next to the breaker box.

The tower base shall have a light the illuminates the envelope of motion during any movements of the light tower mast.

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

The overall size of nested light tower shall be approximately 33” wide x 47” long x 13” high and weigh approximately 310 lbs.

The hose bed dunnage area side to side and hinged to officer side.

## RECEPTACLES

### Receptacle

A 20-amp, 110 volt 3-prong straight blade NEMA 5-20 duplex household receptacle with stainless steel cover plate shall be installed in a non-weather exposed area as specified by the department. The receptacle shall be wired to the inlet receptacle where it will have overcurrent protection from an external source.

Location: center rear wall of center rear medical compartment up high.

## MISC LOOSE EQUIPMENT

### DOT Required Drive Away Kit

Three (3) triangular warning reflectors with carrying case shall be supplied to satisfy the DOT requirement.

## EXTERIOR PAINT

### Paint Custom Cab

The apparatus cab shall be painted Sikkens FLNA10159 Yellow. The paint process shall meet or exceed current state regulations concerning paint operations. Pollution control shall include measures to protect the atmosphere, water, and soil. Contractor shall, upon demand, provide evidence that the manufacturing facility is in compliance with State EPA rules and regulations.

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

Paint process shall feature Sikkens high solid LV products and be performed in the following steps:

* Corrosion Prevention - all aluminum surfaces shall be pre-treated with the Alodine 5700 conversion coating to provide superior corrosion resistance and excellent adhesion of the base coat.
* Sikkens Sealer/Primer LV - acrylic urethane sealer/primer shall be applied to guarantee excellent gloss hold-out, chip resistance and a uniform base color.
* Sikkens High Solid LVBT650 (Base coat) - a lead-free, chromate-free high solid acrylic urethane base coat shall be applied, providing excellent coverage and durability. A minimum of two (2) coats shall be applied.
* Sikkens High Solid LVBT650 (Clear coat) - high solid LV clear coat shall be applied as the final step in order to ensure full gloss and color retention and durability. A minimum of two (2) coats shall be applied.

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

After the paint process is complete, the gloss rating of the unit shall be tested with a 20-degree gloss meter. Coating thickness shall be measured with a digital MIL gauge and the orange peel with a digital wave scan device.

### Pain Paint Cab Two-Tone Color

The upper section of the cab shall be painted FLNA4145 Black.

The paint process of the secondary cab color shall be the same as the primary color.

### Paint Body Small

The apparatus body shall be painted Sikkens FLNA10159 Yellow. The paint process shall meet or exceed current state regulations concerning paint operations. Pollution control shall include measures to protect the atmosphere, water, and soil. Contractor shall, upon demand, provide evidence that the manufacturing facility is in compliance with State EPA rules and regulations.

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

Paint process shall feature Sikkens high solid LV products and be performed in the following steps:

* Corrosion Prevention - all aluminum surfaces shall be pre-treated with the Alodine 5700 conversion coating to provide superior corrosion resistance and excellent adhesion of the base coat.
* Sikkens Sealer/Primer LV - acrylic urethane sealer/primer shall be applied to guarantee excellent gloss hold-out, chip resistance and a uniform base color.
* Sikkens High Solid LVBT650 (Base coat) - a lead-free, chromate-free high solid acrylic urethane base coat shall be applied, providing excellent coverage and durability. A minimum of two (2) coats shall be applied.
* Sikkens High Solid LVBT650 (Clear coat) - high solid LV clear coat shall be applied as the final step in order to ensure full gloss and color retention and durability. A minimum of two (2) coats shall be applied.

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

After the paint process is complete, the gloss rating of the unit shall be tested with a 20-degree gloss meter. Coating thickness shall be measured with a digital MIL gauge and the orange peel with a digital wave scan device.

## INTERIOR PAINT

### Cab Interior Paint

The interior of the cab shall be painted Zolatone gray #20-64.  Prior to painting, all exposed interior metal surfaces shall be pretreated using a corrosion prevention system.

## STRIPING

### Reflective Stripe in Rubrail

The reflective stripe in the body rubrail shall be black.

### Cab and Body Stripe

A single Scotchlite stripe, up to 10 inches in width shall be installed on the cab and body. The stripe shall have a hockey style, Z or S style or any other customer specific design style.

The stripe shall be NFPA compliant and the size, color and location shall be as specified by the customer.

### Rear Body 3M Diamond Grade Striping

Chevron style 3M Diamond Grade striping shall be provided on the rear of the apparatus. The stripes shall consist of 6" Red/Fluorescent Yellow Green alternating stripes in an "A" pattern. The striping shall be located on the rear facing extrusions, panels and doors inboard and outboard of the beavertails if applicable.

### Designated Standing / Walking Area Indication

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

## GRAPHICS

### Graphics Drawing

A graphics drawing shall be provided for the apparatus. The drawing shall include striping, lettering and logos meeting NFPA guidelines. The drawing shall be presented for review and approval by the end user prior to application of the graphics.

## WARRANTY / STANDARD & EXTENDED

### Standard 1 Year Warranty

The apparatus manufacturer shall provide a full 1-year standard warranty. All components manufactured by the apparatus manufacturer shall be covered against defects in materials or workmanship for a 1-year period. All components covered by separate suppliers such as engines, transmissions, tires, and batteries shall maintain the warranty as provided by the component supplier. A copy of the warranty document shall be provided with the proposal.

### Lifetime Frame Warranty

The apparatus manufacturer shall provide a full lifetime frame structural warranty. This warranty shall cover all apparatus manufacturer designed frame, frame members, and cross-members against defects in materials or workmanship for the lifetime of the covered apparatus. A copy of the warranty document shall be provided with the proposal. Frame warranties that do not cover cross-members for the life of the vehicle shall not be acceptable.

### 10 Year 100,000 Mile Structural Warranty

The apparatus manufacturer shall provide a comprehensive 10 year/100,000-mile structural warranty. This warranty shall cover all structural components of the cab and/or body manufactured by the apparatus manufacturer against defects in materials or workmanship for 10 years or 100,000 miles, whichever occurs first. Excluded from this warranty are all hardware, mechanical items, electrical items, or paint finishes. A copy of the warranty document shall be provided with the proposal.

### 10 Year Stainless Steel Plumbing Warranty

The apparatus manufacturer shall provide a full 10-year stainless steel plumbing components warranty. This warranty shall cover defects in materials or workmanship of apparatus manufacturer designed foam/water plumbing system stainless steel components for 10 years. A copy of the warranty document shall be provided with the proposal.

### 10 Year Paint and Corrosion Warranty

The apparatus manufacturer shall provide a 10-year limited paint and corrosion perforation warranty. This warranty shall cover paint peeling, cracking, blistering, and corrosion provided the vehicle is used in a normal and reasonable manner.

The paint shall be prorated for 10 years as follows:

**Topcoat & Appearance:**
(Gloss, Color Retention, Cracking)
0 to 72 months                 100%
73 to 120 months               50%

**Coating System, Adhesion & Corrosion:**
(Includes Dissimilar metal corrosion, Flaking, Blistering, Bubbling)
0 to 36 months            100%
37 to 84 months            50%
85 to 120 months           25%

Corrosion perforation shall be covered 100% for 10 years. Corrosion perforation is defined as complete penetration through the exterior metal of the apparatus.

The warranty period shall begin upon delivery of the apparatus to the original user-purchaser. A copy of the warranty document shall be provided with the proposal.

UV paint fade shall be covered in a separate warranty supplied by Akzo Nobel (Sikkens) and shall be for a minimum of 10 years.

### 25 Year Frame Rail Corrosion Warranty

The chassis manufacturer shall provide a 25-year corrosion warranty on the chassis frame rails. This warranty shall cover the chassis frame rails, including frame rail liners (if equipped), for a period of 25 years after the date on which the vehicle is delivered to the original purchaser. A copy of the warranty document shall be provided with the proposal. Please refer to warranty document for complete details and exclusions.

### Meritor Front Axle Warranty

A warranty shall be provided for the front axle by Meritor Automotive. The warranty period shall be as follows based on axle type:

* FL-941, FL-943 and MFS up to 21,500: 5-year / unlimited miles parts and labor
* MFS rated at 22,800: 2-year / 200,000 miles parts and labor
* Front drive axle: 2-year / unlimited miles parts and labor

### Meritor Rear Axle Warranty

A 5-year/unlimited miles, 5-year parts and 5-year labor rear drive single or rear drive tandem axle warranty shall be provided by Meritor Automotive.

## SUPPORT, DELIVERY, INSPECTIONS AND MANUALS

### Pump Panel Approval Drawing

A detailed large-scale approval drawing of the pump panel(s) shall be provided. The drawing shall be provided on a purchased unit prior to the construction process.

### Approval Drawings

A general arrangement drawing depicting the vehicles appearance shall be provided. The drawing shall consist of left side, right side, front, and rear elevation views.

Vehicles requiring pump controls shall include a general arrangement view of the pump operator`s position, scaled the same as the elevation views.

### Approval Drawings - Dash Panel Layout

A detailed large-scale approval drawing of the dash/console panel layout shall be provided. The drawing shall be provided on a purchased unit prior to the construction process.

### Electronic Manuals

Two (2) copies of all operator, service, and parts manuals MUST be supplied at the time of delivery in digital format -NO EXCEPTIONS! The electronic manuals shall include the following information:

* Operating Instructions, descriptions, specifications, and ratings of the cab, chassis, body, aerial (if applicable), installed components, and auxiliary systems.
* Warnings and cautions pertaining to the operation and maintenance of the fire apparatus and firefighting systems.
* Charts, tables, checklists, and illustrations relating to lubrication, cleaning, troubleshooting, diagnostics, and inspections.
* Instructions regarding the frequency and procedure for recommended maintenance.
* Maintenance instructions for the repair and replacement of installed components.
* Parts listing with descriptions and illustrations for identification.
* Warranty descriptions and coverage.

The electronic document shall incorporate a navigation page with electronic links to the operator`s manual, service manual, parts manual, and warranty information, as well as instructions on how to use the manual. Each copy shall include a table of contents with links to the specified documents or illustrations.

The electronic document must be formatted in such a manner as to allow not only the printing of the entire manual, but to also the cutting, pasting, or copying of individual documents to other electronic media, such as electronic mail, memos, and the like.

A find feature shall be included to allow for searches by text or by part number.

These electronic manuals shall be accessible from any computer operating system capable of supporting portable document format (PDF). Permanent copies of all pertinent data shall be kept file at both the local dealership and at the manufacturer`s location.

NOTE: Engine overhaul, engine parts, transmission overhaul, and transmission parts manuals are not included.

### Fire Apparatus Safety Guide

Fire Apparatus Safety Guide published by FAMA, latest edition.  This safety manual is intended to point out some of the basic safety situations that may be encountered during the normal operation and maintenance of a fire apparatus and to suggest possible ways of dealing with these situations.  This manual is NOT a substitute for the manufacturer`s fire apparatus operator and maintenance manuals or commercial chassis manufacturer`s operator and maintenance manuals.