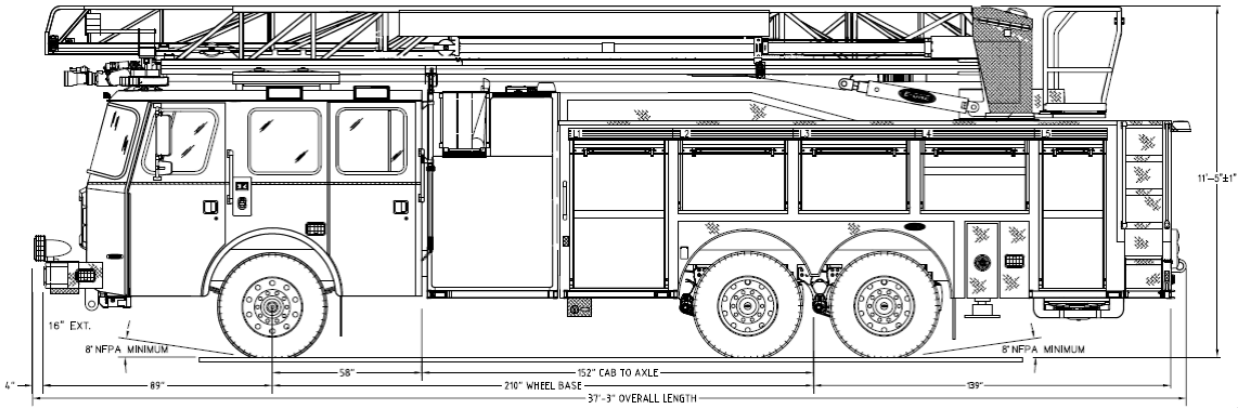
TABLE OF CONTENTS

PROPOSAL SPECIFICATIONS

JACKSON COUNTY
FIRE DISTRICT No. 5



75' QUINT

1500 GPM/470-30 GALLONS

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.

Overall Height Restriction

The apparatus shall have no overall height restrictions.

Overall Length Restriction

The unit has no overall length restrictions.

NFPA Compliance

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

Equipment Capacity

Equipment allowance on the apparatus shall be 2500 lbs. This allowance is in addition to the weight of the hoses and ground ladders listed in the shop order as applicable.

INSPECTIONS AND PENALTIES

Mid Point Inspection

A mid point inspection shall be performed at the factory by the dealer/customer.

Final Inspection

A final inspection shall be performed at the factory prior to shipment to dealer/customer.

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.

Bumper Extension

The bumper extension shall be approximately 16" 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 12" deep (11" 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.

Lid, Bumper Hose Tray

The center bumper tray shall have a diamond plate lid. The lid shall be hinged and include a D-Ring latch, rubber seal and go past the vertical centerline by at least 60 degrees to be held open.

Hose Tray Lid Notch

The front bumper hose tray lid shall be notched to allow for preconnected hose.

The notch shall be: 4" front to rear x 3" side to side centered on officer side of center tray lid.

FRAME ASSEMBLY

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:

Frame Assembly Cont'd

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 Axle
The vehicle shall utilize a Meritor FL-943, 5" drop beam front axle with a rated capacity of 21,500 lbs. It shall have "easy steer" knuckle pin bushings and 68.83" 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.

The front springs shall be parabolic tapered, minimum 4" wide x 54" long (flat), minimum three (3) leaf, progressive rate with a capacity of 21,500 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 integral model M-110 power steering gear, used in conjunction with a power assist cylinder. The steering assembly shall be rated to statically steer up to a maximum front axle load of 21,500 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.

Shock Absorbers Front
Koni model 90 shock absorbers shall be provided for the front axle. The shocks shall be three way adjustable.

The shocks shall be covered by the manufacturer`s standard warranty.

Front Axle Oil Seals
The front axle shall have Stemco oil seals with sight glass to check the lubricant level of the axle spindles.

Slack Adjusters [Qty: 2]
Haldex brand clearance sensing slack adjusters shall be provided IPOS on the S-Cam brakes.

Driver Controlled Differential
A Rockwell driver controlled main differential lock shall be supplied. Operated from within the cab, it reduces wheel spin-outs by transferring power from the slipping wheel to the wheel with traction. An indicator shall be provided visible to the driver to show when the lock is engaged.
When used in a tandem axle application, the DCDL will be installed on the rear/rear axle only.

Rear Axle
The vehicle shall utilize an Meritor MT-40-14X, 40,000 lb. capacity rear tandem axle with single reduction hypoid gearing. The axle shall be equipped with oil-lubricated wheel bearings with Meritor oil seals.

An Inter-Axle Differential (IAD) shall be provided for the rear axles. The IAD shall allow for speed differences between the forward and rear axles in a tandem while also providing equal pulling power from each axle of the tandem. The IAD shall be controlled by a switch accessible by the driver.

Rear Axle Gearing
As specified by the customer, the rear axle shall be provided with a 4.89 gear ratio.

SUSPENSIONS
Rear Suspension
The vehicle shall be equipped with a Hendrickson FIREMAAX EX model FMX-482 air ride suspension for tandem drive axles. The suspension shall include dual height control valves that allow uneven, side heavy loads to be balanced, Quik-Align for easy axle alignment and four (4) hydraulic shock absorbers. 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, Tandem 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 rebuffing policy. There shall be four (4) high hats and forty (40) lug nut covers.

Valve Stem Extensions

Each inside rear wheel on the rear axles shall have valve stem extensions.

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 eight (8) 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.

TIRE OPTIONS

Front Tires

The front tires shall be two (2) Michelin 425/65R22.5 tubeless type 20 PR radial tires with XFE highway tread. The tires with wheels shall have the following weight capacity and speed rating:

Max front rating 22,800 @ 65 mph.

Max front rating with Alco aluminum wheels - 24,400 @ 65 MPH (intermittent fire service rating if GAW is over 22,800)

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

Rear Tires

The rear tires shall be Michelin 11R22.5 tubeless type radial tires with XDN2 all weather tread.

The tires with wheels shall have the following weight capacity:

48,000 lbs. (tandem duals) @ 75 MPH

The wheels and tires 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

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 48,000 lb. axle ratings and P-Type shoes with over 48,000 lb. axle ratings.

The rear axle brakes shall be furnished with automatic slack adjusters. ArvinMeritor brand shall be supplied on RT-40-145, RT-46-160 and RT-50-160 axles, and Haldex brand shall be supplied on RT-58-185 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 brake system. The system shall meet or exceed the design and performance requirements of current FMVSS-121 and test requirements of current NFPA 1901 Standard.
Each wheel shall have a separate integral brake chamber. A dual treadle valve shall split the braking power between the front and rear systems.

The air system shall be provided with a rapid build-up feature, designed to meet current NFPA 1901 requirements. A 1/4" brass quick-release air inlet with male connection shall be located inside the driver door on the left side of the cab. The inlet shall allow a shoreline air hose to be connected to the vehicle, discharging into the wet tank.

A pressure protection valve shall be installed to prevent use of air horns or other air operated devices should the air system pressure drop below 80 psi.

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

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.

The following tank sizes shall be installed:

Tank Sizes in Cubic Inches

Suspension	Wet	Front	Rear	Rear Extension	Total
34-54K	1738	1738	2988	0	6464
58K	1738	1738	2988	1738	8202

An automatic drain valve shall be installed on the wet tank. All other tanks shall be equipped with manual drain valves.

Brake System Cont'd
A Wabco ABS system shall be provided to improve vehicle stability and control by reducing wheel lock-up during braking. This braking system shall be fitted to axles and all electrical connections shall be environmentally-sealed, water-, weather-, and vibration-resistant.

The system shall constantly monitor wheel behavior during braking. Sensors on each wheel transmit wheel speed data to an electronic processor, which shall sense approaching wheel lock and instantly modulate 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. The system circuits shall be configured in a diagonal pattern. Should a malfunction occur, that circuit shall revert to normal braking action. A warning light at the driver`s instrument panel shall indicate malfunction to the operator.

The system shall consist of a sensor clip, sensor, electronic control unit, and solenoid control valve. The sensor clip shall hold the sensor in close proximity to the tooth wheel. An inductive sensor consisting of a permanent magnet with a round pole pin and coil shall produce an alternating current with a frequency proportional to wheel speed. The unit shall be sealed, corrosion-resistant and protected from electro-magnetic interference. The electronic control unit shall monitor the speed of each wheel sensor and a microcomputer shall evaluate in milliseconds wheel slip. A deviation shall be corrected by cyclical brake application and release. If a malfunction occurs, the circuit shall signal the operator and the malfunctioning half of the system shall shut down. The system is installed in a diagonal pattern for side to side control. The system shall ensure that each wheel is braked in optimum efficiency up to five (5) times a second.

The system shall also interface with the application of the auxiliary engine, exhaust, or driveline brakes to prevent wheel lock.

To improve service trouble-shooting, 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.

Dust Brake Shields [Qty: 2]
The rear axles shall have dust shields provided for the CAM brakes.

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.

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 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 air horns. 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
Electronic speed limiting set at 60 MPH as required by NFPA 1901.

6th Gear Overdrive
The chassis transmission shall include a 6th gear with an overdrive ratio of 0.65:1.

Engine/Transmission Package
Engine
The vehicle shall utilize a Cummins X12 engine as described below:

- 500 Horsepower
- Six (6) cylinder
- Variable Geometry Turbocharged
- Charge Air Cooled (CAC) 4-cycle diesel
- Cummins XPI high pressure fuel injection system
- Fuel cooler (air to liquid)
- 720 cu.in. (11.8 liter) displacement
- 500 gross BHP at 1800 RPM and a peak torque of 1695 lb.ft. at 1000 RPM with a governed RPM of 2000
- Bore and stroke shall be 5.2 x 5.67
- Engine lubrication system shall have a minimum capacity, to include filter, of 49 quarts
- Cooled Exhaust Gas Recirculation (EGR)
- Delco-Remy 39 MD-HD 12 volt starter
- 26 cubic foot per minute air compressor
- Single module 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 2018 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 aluminized steel tubing. The muffler 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 will be provided as standard by Cummins.

Engine
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 EVS4000P, electronic, 5-speed automatic transmission.

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 up to 1850 lb. ft. and a gross input power rating of up to 600 HP.

The gear ratios shall be as follows:

1 - 3.51

2 - 1.91

3 - 1.43

4 - 1.00

5 - .74

R - 4.80

The transmission shall be equipped with a fluid level sensor (FLS) system, providing direct feedback of transmission oil level information to the operator.

The transmission shall have a lubricant capacity of 51 quarts.

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).

The transmission shall contain two engine driven PTO openings located at the 1 and 8 o`clock positions. The automatic transmission shall be equipped with a power lock-up device. The transmission lock-up shall prevent down shifting of transmission when engine speed is decreased during pump operations, thereby maintaining a constant gear ratio. Transmission lock-up shall be automatically activated when placing pump in gear. Transmission lock-up shall be automatically deactivated when disengaging pump 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.

Jacobs Engine Brake Cont'd
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) 65 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 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 65 gallons of fuel with a sufficient additional volume to allow for thermal expansion of the fuel without overflowing the vent.

A 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. The unit will alert the driver of high water content in the separator bowl.

ALTERNATOR
270 Amp Alternators
There shall be dual 270 amp Leece Neville alternators installed. The alternators shall be Leece Neville pad mount brushless type with integral rectifiers and adjustable master/slave voltage regulators with a combined output of 480 amps per NFPA 1901 rating (540 amps per SAE J56).

BATTERIES
Battery System
The manufacturer shall supply six (6) 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 three (3) batteries. The batteries shall have a minimum combined rating of 6,000 (6 x 1000) cold cranking amps (CCA) @ 0 degrees Fahrenheit and 1110 (6 x 185) 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.

Battery System Cont'd
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 three (3) 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.

Battery Isolation
The officer`s side front batteries shall be isolated for use with 12V accessory system only.

CHASSIS OPTIONS
Drivelines
Drivelines shall have a heavy duty metal tube and shall be equipped with Spicer 1810 series 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 2.5" diameter holes shall be bolted directly to the rear of the frame to allow towing (not lifting) of the apparatus. The tow eyes shall be protruding into the rear compartment or out the rear of the body. The tow eyes shall be painted chassis black.

Hydraulic Pump System
A fixed-displacement hydraulic pump system shall be provided to operate all outrigger and aerial functions as well as the chassis power steering system. This shared hydraulic system is desired because it heats the hydraulic fluid while driving to provide smoother operation to other systems in cold climate conditions, rather than utilizing a separate pump.

The hydraulic pump system shall allow the aerial system to be activated without having to shut down the water pump or reduce engine RPM`s by a switch located on the cab within easy reach of the driver. A system "engaged" indicator light shall be provided on the activation switch. Engagement of the aerial circuit shall only be allowed with the transmission in the neutral or pump gear and the parking brake engaged.

The system's hydraulic pump shall be engine mounted and able to supply thirteen (13) gpm of hydraulic fluid at a maximum pressure of 3,000 psi. The hydraulic system shall normally operate between 1,000 and 2,500 psi. It shall have flow controls to protect hydraulic components and it shall incorporate a relief valve set at 2,800 psi to prevent over-pressurization (2950 on HP78 models).

Cold Weather Cab Package
Additional insulation shall be provided on the front cab wall. The insulation shall consist of a reflective backing covered air core insulation.

Insulation shall be provided on the rear cab heater hose lines (if equipped).

A thermostatically controlled clutch type cooling fan shall be installed on the chassis engine.

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 R1 floor offset forward.

CAB MODEL
Cab Cyclone Medium
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 sub frame. 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 sub frame 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 sub frame 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 sub frame 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 sub frame 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 cross member 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 sub frame 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.

Cab Cyclone Medium Cont'd
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 sub frame 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 eight (8) 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 2,700-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.

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 (1) 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.

Cab Interior Cont'd
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 sub frame 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 engine cover shall be provided with a lift-up section to provide easy access for checking transmission fluid, power steering fluid, and engine oil without raising the cab. The engine cover insulation shall consist of 3/4" dual density fiberglass composite panels with foil backing manufactured to specifically fit the engine cover without modification to eliminate "sagging" as found with foam insulation. The insulation shall meet or exceed DOT standard MVSS 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 fenderwell.

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.

Storage areas, with hinged access doors, shall be provided below the driver and officer seats. The driver side compartment shall be approximately 20" deep x 12" wide x 3.5" high and the officer side compartment shall be approximately 14" deep x 12" wide x 11" high (height will be reduced with air or electric seat). Note: With RollTek option the compartments may be occupied by air bag system components.

The front cab steps shall be a minimum of 8" deep x 24" wide. The first step shall be no more than 24.0" above the ground with standard tires in the unloaded condition per NFPA 1901 standards. The rear cab steps shall be a minimum 12" deep x 21" wide. The first step shall be no more than 24.0" above the ground with standard tires in the unloaded condition per NFPA 1901 standards. The rear steps shall incorporate intermediate steps for easy access to the cab. The steps are to be located inside the doorsill, where they are protected against mud, snow, ice, and weather. 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
There shall be reflective signs on each cab door in compliance with all NFPA requirements.

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 71.5" high, and the rear cab door openings shall be approximately 33.75" wide x 73" high. The front doors shall open approximately 75 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.

Stainless steel 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 front door windows shall provide a minimum viewing area of 530 sq. in. each. The rear door windows shall provide a minimum viewing area of 500 sq. in. each. All windows shall have 75% light transmittance automotive safety tint. Full roll-down windows shall be provided for the front cab doors with worm gear drive cable operation for positive operation and long life. Scissors or gear-and-sector drives are not acceptable.

Cab Instruments and Controls
Two (2) pantograph-style windshield wipers with two (2) separate electric motors shall be provided for positive operation. Air-operated windshield wipers are not acceptable because of their tendency to accumulate moisture, which can lead to corrosion or to freezing in cold weather. 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 28", and the blade length approximately 20". Each arm shall have a 70 degree sweep for full coverage of the windshield.

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. Emergency warning light switches shall be installed in removable panels for ease of service. The following gauges and/or controls shall be provided:

- Master battery switch/ignition switch (rocker with integral indicator)
- Starter switch/engine stop switch (rocker)
- Heater and defroster controls with illumination
- Marker light/headlight control switch with dimmer switch
- Self-canceling turn signal control with indicators
- Windshield wiper switch with intermittent control and washer control
- Master warning light switch
- Transmission oil temperature gauge
- Air filter restriction indicator
- 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
- Cab ajar warning light on the message center enunciator

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.

Fast Idle System
A fast idle system shall be provided and controlled by the cab-mounted switch. The system shall increase engine idle speed to a preset RPM for increased alternator output.

Electrical System
The cab and chassis system shall have a centrally located electrical distribution area. All electrical components shall be located such that standard operations shall not interfere with or disrupt vehicle operation. An automatic thermal-reset master circuit breaker compatible with the alternator size shall be provided. Automatic-reset circuit breakers

shall be used for directional lights, cab heater, battery power, ignition, and other circuits. An access cover shall be provided for maintenance access to the electrical distribution area.

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.

A Vehicle Data Computer (VDC) shall be supplied within the electrical system to process and distribute engine and transmission Electronic Control Module (ECM) information to chassis system gauges, the message center, and related pump panel gauges. Communication between the VDC and chassis system gauges shall be through a 4 wire multiplexed communication system to ensure accurate engine and transmission data is provided at the cab dash and pump. The VDC shall be protected against corrosion, excessive heat, vibration, and physical damage.

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.

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.

Cab testing shall be completed using 13,776 ft-lbs of force **exceeding** testing requirements.

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 23,561 lbs of mass **exceeding** 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 117,336 lbs of mass **exceeding** testing requirements by **over five (5) 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 34,844 ft-lbs of force **exceeding** testing requirements.

Additional cab testing shall be conducted using 65,891 ft-lbs of force **exceeding** testing requirements by **over two (2) times**.

Cab Crashworthiness Requirement Cont'd
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
Cab Roof
The cab shall have a flat roof (non-vista).

CAB BADGE PACKAGE
Logo Package
The apparatus shall have manufacturer logos provided on the cab and body as applicable.

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 Front Door Windows
Driver and officer door windows shall have the support pillar located toward the front of the window. There shall be a vent that can be opened and closed within the window itself, located towards the front.

Cab Front Windows
The front windows of the cab shall have manual actuation.

Cab Door Locks
Each cab door shall have a manual operated door lock actuated from the interior of each respective door. Exterior of each cab door shall be provided with a barrel style keyed lock below the cab door handle.

Cab Door Locks
The cab shall have CH751 keyed door locks provided on exterior doors to secure the apparatus.

Cab Door Panels
The inner cab door panels shall be made from thermoformed, non-metallic, non-fiber ABS material for increased durability and sound deadening. The cab door panels shall incorporate an easily removable panel for access to the latching mechanism for maintenance or service.

Exterior Cab Door Latches
All exterior cab door latches shall be paddle style.

Cab Door Kick Plates
All cab doors shall have diamond plate aluminum kick plates installed on the interior lower portion of the doors.

Cab Door Rear Windows
The rear cab door windows shall be manually operated to raise and lower. The rear of the window opening shall have a fixed glass panel approximately 5" wide to allow the forward section of glass to roll down completely ahead of the door latching hardware.

Cab Door Reflective Material
Reflective Red/Lemon Yellow material striping shall be supplied on each of the cab doors. The stripes shall run from the lower outer corner to the upper inside corner of the panel, forming an "A" shape when viewed from the rear. The reflective material shall meet NFPA 1901 requirements for size (96 square inches) and reflectivity.

Cab Door Area Lighting
There shall be four (4) clear TecNiq model T440 4" circular LED lights provided to illuminate the cab step well area. Each light shall be mounted in a resilient shock absorbent grommet and be located on each cab door in the inboard position. Each light shall be activated by the cab door ajar circuit.

MIRRORS
Cab Mirrors
Two (2) Velvac model 2010 heated, remote controlled, stainless steel mirrors shall be installed. The west coast style mirrors shall consist of a large 7" x 16" flat and 4" x 6" wide angle convex with stainless steel break-away mounts. The adjustment of the main sections of the mirror and the heater control shall be through switches accessible to the driver.

MISC EXTERIOR CAB OPTIONS
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 (proprietary blend) 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 18" long 6063-T5 anodized aluminum tubes mounted directly behind the driver and officer rear door openings 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.

Rubber Fenderette
A rubber fenderette shall be provided in place of the standard fenderette. The rubber fenderette shall extend 2.75" out from the mounting point.

HVAC
Air Conditioning
An overhead air-conditioner / heater system with a single roof 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 ten (10) comfort discharge louvers, four (4) to the back area of the cab and six (6) to the front. These louvers will be used for AC and heat 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.

A serviceable filter shall be installed on the A/C evaporator. The filter shall consist of a steel perimeter frame with a foam filter.

The control panel shall actuate the air-distribution system with air cylinders, which are to be separated from the brake system by an 85-90 psi pressure protection valve. A three-speed blower switch shall control air speed.

The condenser shall be roof mounted and have a minimum capacity of 65,000 BTU`s and have dual fans with a built in 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.

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.

SEATS
Seating
All seats shall be Seats, Inc. 911 brand.

Seat, Driver
Seats, Inc. 911 air suspension seat shall be supplied for the driver`s position.

Features shall include:

- Universal styling
- High back seat back
- Low profile air suspension assembly with rubber accordion cover
- Weight, height and ride adjustment
- Built-in back and lumbar adjustment
- 4" fore and aft adjustment

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
Seats, Inc 911 air suspension seats shall be supplied for the officer`s position.
Features shall include:

• Universal styling
• High back seat back
• Low profile air suspension assembly with rubber accordion cover
• Weight, height and ride adjustment
• Built-in back and lumbar adjustment
• 4" fore and aft adjustment

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
One (1) Seats, Inc. 911 Universal SCBA seat shall be provided in the rear facing position over the driver side wheel well.

Features shall include:
- Universal styling.
- High back seat back.
- Easy exit, flip up, and split headrest for improved exit with SCBA.

Seat, Rear Facing Cont'd
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
One (1) Seats, Inc. 911 Universal SCBA seat shall be provided in the rear facing position over the officer side wheel well.

Features shall include:
- Universal styling.
- High back seat back.
- Easy exit, flip up, and split headrest for improved exit with SCBA.

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 Cover Material
All seats shall have Endure vinyl seat cover material.

Seat Fabric Color
All seats shall be gray in color.

Seating Capacity Tag
A tag that is in view of the driver stating seating capacity of six (6) personnel shall be provided.

Universal Bracket for Air Pack Bottles
A Ziamatic bottle bracket model KD-ULLH consisting of a back plate, short footplate, two non-mar double-coated clips and a "Load & Lock" adjustable strap assembly shall be provided. The back plate and footplate will be black thermo-plastic coated. The clips will be double coated as to not mar cylinders. The bracket shall fit all U.S. made 30 to 60 minute rated self-contained breathing apparatus.

Brackets shall be located rear facing driver's side, inboard driver's side rear wall, inboard officer's side rear wall, rear facing officer's side.

Seat, Rear Wall
One (1) fold down seat with a Seats, Inc. 911 Universal SCBA back shall be mounted on the rear wall facing forward. Location to be driver's side inboard, officer's side inboard.

Features to include:

• Universal styling
• High back seat back
• Easy exit, flip up, and split headrest for improved exit with SCBA.
• Seat bottom cushion shall be constructed of high density foam with a heavy duty, wear resistant material.
• Seat bottoms automatically fold up when not in use to provide increased room in the rear of the cab.

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.

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.

Cab Dash
All surfaces subject to repeated contact and wear -- the center and officer side dash, windshield "A" post covers and lower front kick panels -- shall be covered with thermoformed, non-metallic, non-fiber trim pieces to provide excellent scuff and abrasion resistance, as well as chemical stain resistance. The thermoformed material shall comply with Federal Motor Vehicle Safety Standard (FMVSS) 302 for flammability of interior materials.

Cab Insulation Package - Cold Climate
In order to ensure maximum cooling/heating capacity, additional insulation shall be provided inside the cab. The insulation package shall include 1" Polyester foam with Mylar facing for the front wall, rear wall, side walls, and ceiling, 1" closed cell foam insulation below the front and rear facing seat risers and Reflectex (or equal) inside each cab door.

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.

Overhead Console
A full-width front overhead console shall be mounted to the cab ceiling for placement of siren/radio heads (non-LTH cabs only) and for warning light switches. The console shall be made from a thermoformed, non-metallic material and shall have easily removable mounting plates.

The overhead HVAC shall be covered with thermoformed, non-metallic, non-fiber trim pieces to provide excellent scuff and abrasion resistance, as well as chemical stain resistance. The thermoformed material shall comply with Federal Motor Vehicle Safety Standard (FMVSS) 302 for flammability of interior materials.

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 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.

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.

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 night time operations.

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 day time operational.
Battery Charger
A Blue Sea model P12 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 7.5 amps @ 120 volts AC.

13.03" x 8.46" x 3.66" (H x W x D)

12 Volt (or 24 Volt) Outlet
A plug-in type receptacle for hand held spotlights, cell phones, chargers, etc. shall be installed driver side dash. The receptacle shall be wired battery hot.

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

Cab Headlights
FireTech model FT-4x6-4KIT LED headlights shall be provided. Headlights shall include low beam, high beam, elliptical beam and an integrated halo ring park lamp.

Cab Turn Signals
There shall be a pair of TecNiq model K60 LED (Light Emitting Diode) turn signal light heads with populated arrow pattern and amber lens mounted upper headlight bezel and wired with weatherproof connectors.

Hourmeter
The vehicle shall be equipped with an aerial PTO hourmeter mounted in the cab to comply with NFPA1901 section 19.19.8.

BODY MODEL

Aerial Body

The apparatus body shall include a single, pumper-sized hosebed with a minimum volume of 55 cubic feet of useable space and a minimum length (fore-aft) of 205" for the storage of hose. Split hosebeds which require making and/or breaking hose connections to deploy and/or reload the full hose load are not acceptable because the extra time required to perform these operations would be detrimental to the efficient performance of the apparatus. Hosebeds which are less than 205" in length are not acceptable because the extra number of hose folds involved to load the hose would take extra space and require extra effort. The hosebed shall be designed to permit the deployment of hose from the rearmost portion of the body while the vehicle is in motion without raising the aerial ladder from its stored position. Hosebeds which deploy hose from a position partway along the side of the body are not acceptable because of the possibility of snagging the hose or a hose coupling on the aerial ladder turntable or on a protruding portion of the body. The hosebed shall be designed to allow manual reloading of the hose from the rear, top, and side without raising the aerial ladder from its stored position. These requirements are deemed essential to the effective operation of the apparatus when pumper operations are required. **NO EXCEPTIONS.**

The body design shall have a rescue-style configuration with 26" deep lower compartments and 24" deep upper compartments that provide a total of 168.51 cu. ft. of storage. The cubic footage shall not include ladder tunnels or the hosebed.

The minimum water tank size to be considered acceptable shall be 500 gallons to support pumper operations.

The body design shall be modular to permit easy repair and remounting. An extruded aluminum body is required to provide a strong, lightweight, corrosion-resistant vehicle.

Body Construction

The apparatus body shall be constructed entirely of aluminum extrusions with interlocking aluminum plates. A modular aluminum body is required due to the high strength-to-weight ratio of aluminum, its corrosion resistance, its ease of repair, and its light weight for increased equipment carrying capacity.

The interlocking body framework shall be constructed from beveled 6061-T6 and 6063-T5 extrusions electrically seam welded both internally and externally at each joint using 5356 aluminum alloy welding wire.

All horizontal surfaces, running boards, rear step, and the vertical rear body surface shall be constructed from aluminum diamond plate.

Body Substructure

The body substructure shall be constructed of aluminum extrusions. Body designs that incorporate steel substructures connected to aluminum compartments are not as corrosion- resistant and are not acceptable.

Body substructure crossmember extrusions shall be at the front of the body and ahead of the rear wheel well. The extrusions shall be 3" x 3" 6061-T6 aluminum with 3/8" (0.375") wall thickness. A solid 3" x 3" "I-beam" section aluminum extrusion shall be provided the full width of the body over the rear wheel well. The crossmembers 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 two dissimilar metals come in contact.

Body Mounting System

The body shall be attached to the chassis frame rails with a series of 5/8" (0.625") diameter steel U-bolts. The U-Bolt system shall be used to allow easy removal of the body for major repair or disassembly. Body designs that weld the body to the aerial torque box or to the chassis frame rails are not acceptable because of the stress imposed on the vehicle during road travel and aerial operations.

Water Tank Mounting System
The water tank shall be mounted on an extruded aluminum framework. The booster tank mounting system shall utilize a floating design to reduce stress from road travel and vibration. To maintain a low vehicle center of gravity, the water tank bottom shall be mounted within 5" of the frame rail top. Designs that store ground ladders under the water tank and raise the center of gravity of the vehicle shall not be acceptable.

The body design shall allow the booster tank to be completely removable without disturbing or dismounting the apparatus body structure. An extruded aluminum cradle covered with rubber shock pads and corner braces shall support the tank.

Stabilizer Openings
Directly behind the rear wheel well opening on each side shall be body openings for aerial stabilizers. The openings shall be framed in aluminum extrusions and fitted with removable panels for service access to the backside of the stabilizer extension rods.

Side Aerial Access Staircase
A single access staircase to the aerial ladder turntable shall be supplied on the driver`s side of the apparatus. The staircase shall incorporate a pocket-style drop-down step in the body to reduce the ground-to-staircase step height when the unit is supported on the stabilizers. The angled staircase shall be supplied with extruded aluminum handrails on both sides of the staircase frame

Access steps shall be mounted in accordance with current NFPA requirements and shall not exceed a maximum stepping height of 18". The top surface of the step shall have a minimum of 35 sq. in. and shall have an aggressive multi-directional, slip-resistant surface. Access steps shall be able to support up to 500 lbs. Steps shall be located to provide a minimum of 8" clearance between the leading edge of the step and any obstruction.

Rear Body Design
The rear body shall be designed to provide ground ladder storage, hose deployment, and service access to aerial components. A horizontally-hinged door in the center of the rear body shall provide access to the lower turntable. An access door on each side of the service door shall provide storage for ladders and pike poles. The area under the hosebed shall provide additional storage for ground ladders. The ground ladder storage locations on the rear body shall be supplied with doors. All rear access doors shall match the rear body finish.

Fuel Fill Location
The fuel fill position shall be located at the rear of the apparatus next to the waterway inlet. The fuel tank filler neck shall be located behind a hinged door that is labeled "Diesel Fuel Only."

Body Top
The top of the body between the left-side compartments and the hosebed shall be an open 41" wide x 42" long x 10" deep (minimum) storage area over the water tank. This area shall be framed with 3" x 3"-3/16" (3" x 3" x 0.188") extrusions. The floor of this storage area shall be made from 1/8" (0.125") embossed aluminum diamond plate.

Removable embossed diamond plate around the aerial turntable shall be supplied for top service access to check the aerial hydraulic oil level, and remove the oil tank if needed.

Hosebed Construction
A single, continuous hosebed with no chutes shall be supplied on the right-hand side of the body. The hosebed shall contain 55 cubic feet of useable space for the storage of hose. The hosebed shall measure 18" high x 26" wide x 205" long (fore-aft) to allow the use of large-diameter supply hose with a minimum number of hose folds. Shorter hosebeds shall not be acceptable as shorter hosebeds are harder to load due to the increased number of folds and dutchman.

The hosebed compartment deck shall be constructed entirely from maintenance-free, extruded aluminum slats. The slats shall have an anodized rounded ribbed top surface. The slats shall be of alternating widths -- one (1) approximately 3/4" (0.75") high x 7.5" wide and the other approximately 3/4" (0.75") high x 2.75" wide -- and shall be riveted into a one-piece grid system to prevent the accumulation of water and allow ventilation to assist in

drying hose. The hosebed compartment shall be free of sharp edges and projections to prevent hose damage. The compartment deck design shall incorporate a provision for the installation of adjustable hosebed dividers.

Hosebed Construction Cont'd
The hosebed sides shall consist of 3/16" (0.188") 3003 H14 smooth aluminum plate welded to a perimeter frame constructed of 3" x 3" x 3/16" (3" x 3" x 0.188") heavy-walled 6063-T5 aluminum extrusions for rigidity.

Compartment Construction
All compartment walls and ceilings shall be constructed from 1/8" (0.125") formed aluminum 3003 H14 alloy plate. Each compartment shall be modular in design and shall not be part of the body support structure.

Compartment floors shall be constructed of 3/16" (0.187") aluminum diamond plate welded in place. Compartment floors shall be supported by either 1.5" x 3" x 1/8" (0.125") walled aluminum extrusions or .5" x 3" aluminum flatbar. The compartment seams shall be sealed using a permanent pliable silicone caulk. The walls of each compartment shall be machine-louvered for adequate ventilation. External compartment tops shall be constructed of 1/8" (0.125") embossed aluminum diamond plate. Service access shall be provided to the main body wiring harnesses.

The compartment interior walls and ceiling shall be natural finish aluminum to provide a long-lasting, maintenance-free surface.

Compartment Sizes
The approximate compartment sizes and locations shall be as follows:

Left Side:
There shall be one (1) compartment (L1) behind the pump module. The compartment shall be approximately 38" wide x 31" high x 24" deep (upper) and 38" wide x 26" high x 26" deep (lower) and contain approximately 31.23 cubic feet of storage space. The door opening shall be approximately 38" wide x 61" high.

There shall be one (1) compartment (L2) over the tandem wheels. The compartment shall be approximately 42.625" wide x 31" high x 24" deep and contain approximately 18.35 cubic feet of storage space. The door opening shall be approximately 42.625" wide x 31" high.

There shall be one (1) compartment (L3) over the tandem wheels. The compartment shall be approximately 42.75" wide x 31" high x 24" deep and contain approximately 18.41 cubic feet of storage space. The door opening shall be approximately 42.75" wide x 31" high.

There shall be one (1) compartment (L4) over the rear jack leg opening. The compartment shall be approximately 42.625" wide x 31" high x 24" deep and contain approximately 18.35 cubic feet of storage space. The door opening shall be approximately 42.625" wide x 31" high.

There shall be one (1) compartment (L5) behind the rear stabilizer. The compartment shall be approximately 26" wide x 31" high x 24" deep (upper) and 26" wide x 26" high x 26" deep (lower) and contain approximately 21.36 cubic feet of storage space. The door opening shall be approximately 26" wide x 61" high.

Right Side:
There shall be one (1) compartment (R1) behind the pump module. The compartment shall be approximately 38" wide x 31" high x 23" deep (upper) and 38" wide x 26" high x 26" deep (lower) and contain approximately 30.53 cubic feet of storage space. The door opening shall be approximately 60" wide x 61" high.

There shall be one (1) compartment (R2) over the rear wheel. The compartment shall be approximately 40.5" wide x 22" high x 23" deep and contain approximately 11.9 cubic feet of storage space. The door opening shall be approximately 40.5" wide x 22" high.

There shall be one (1) compartment (R3) behind the rear wheels. The compartment shall be approximately 47" wide x 26" high x 26" deep and contain approximately 18.38 cubic feet of storage space. The door opening shall be approximately 47" wide x 26" high.

Handrails
Access handrails shall be provided at all step positions, including, but not limited to, the rear tailboard. All body handrails shall be constructed of maintenance-free, corrosion-resistant extruded aluminum. Handrails shall be a minimum of 1.25" diameter and shall be installed between chrome end stanchions at least 2" from the mounting surface to allow for access with a gloved hand. The extruded aluminum shall be ribbed to assure a good grip for personnel safety.

The handrails shall be installed as follows:

• Two (2) 48" handrails, one (1) on each side of the aerial access stair case

Steps, Standing, and Walking Surfaces
The maximum stepping distance shall not exceed 18", with the exception of the ground-to-first step distance, which shall not exceed 24". The maximum ground-to-first step distance shall be maintained when the stabilizers are deployed by the use of an auxiliary set of steps installed at the aerial access staircase. All steps or ladders shall sustain a minimum static load of 500 lbs. without deformation as outlined in the current edition of NFPA 1901.

All exterior steps shall be designed with a minimum slip resistance of 0.52 when tested wet using the Brungraber Mark II tester in accordance with the manufacturer's instructions.

Apparatus Warning Labels
A label shall be supplied on the rear body to warn personnel that riding in or on the rear step is prohibited as outlined in the current edition of NFPA 1901.

A label shall be applied to both sides of the apparatus and the rear to warn operators that the aerial is not insulated.

Rubrail
The body shall have a rubrail along the length of the body on each side and at the rear. The rubrail shall be constructed of minimum 3/16" (0.188") thick anodized aluminum 6463-T6 extrusion. The rubrail shall be a minimum of 2.75" high x 1.25" deep and shall extend beyond the body width to protect compartment doors and the body side.

The rubrail shall be of a C-channel design to allow marker and warning lights to be recessed inside for protection. The top surface of the rubrail shall have a minimum of five (5) serrations raised 0.1" high with cross grooves to provide a slip-resistant edge for the rear step and running boards. The rubrail shall be spaced away from the body using 3/16" (0.188") nylon spacers to prevent the accumulation of dirt, road salt, and other corrosive materials. The ends of each rubrail section shall be provided with a rounded corner piece. The vertical surface inside the rubrail C-channel shall be inset with a reflective material for increased side and rear visibility.

ISO Compliance
The manufacturer shall ensure that the construction of the apparatus aerial body 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 aerial device that is built to exacting standards, meets the customer`s expectations, and satisfies the customer`s requirements.

BODY COMPT REAR
Rear Body Panels
The rear body panels shall be smooth 1/8" un-painted aluminum plate to facilitate rear body striping. The panels shall be bolt-on for a clean appearance and easier repair in the event of damage.

AERIAL BODY OPTIONS
Triple Crosslay Hosebed
Three (3) crosslay hosebeds shall be provided at the front area of the body. Each of the three (3) crosslay sections shall have a capacity for up to 200` of 2.0" double-jacket fire hose single stacked and preconnected to the pump discharge. The crosslay decking shall be constructed entirely of maintenance-free 3/4" x 2-3/4" hollow aluminum extrusions.

Stainless steel rollers with nylon guides set in aluminum extrusions shall be installed horizontally and vertically on each end of the crosslay to allow easy deployment of the hose and help protect the body paint.

Dunnage Pan
A dunnage pan constructed of 3/16" (.188") aluminum treadplate shall be located rearward of the crosslays. The dunnage pan shall be sized to maximize available storage space.

Outrigger Covers
Two (2) piece outrigger covers constructed of .125`` aluminum tread plate shall be provided for the jack leg openings. One piece of the cover shall be sized to cover just the extending outrigger in order to require a minimal amount of set-up space. The second piece of the cover shall be fixed and mounted to the body to cover the remaining outrigger opening.

Rear Pike Pole/Attic Ladder Storage
A storage compartment shall be provided at the rear of the body for six (6) pike poles and one (1) attic ladder with feet. The storage area shall be labeled for two (2) 6` poles, two (2) 8` poles, two (2) 10` poles and one (1) 10` attic ladder. The pike poles and attic ladder shall be secured by a hinged aluminum plate door that matches the rear body finish.

Hose Bed Depth
A hose bed approximately 26" deep x 23" wide x 140" long shall be provided. The hose bed shall hold up to 800` of 5" LDH and 300-400` of 2.5" or 3" DJ hose. Hose bed capacity shall be decreased if the optional diamond plate hose bed covers are selected.

Auxiliary Ground Pads
Two (2) auxiliary ground pads shall be provided. The pads shall be 24" x 24" x 1/2" thick aluminum plate with a 20 degree formed handle with cutout for hand hold. The pads shall be stored in brackets that are welded below the body.

DOORS
Roll Up Compartment Door
A ROM brand roll up door with satin finish shall be provided on a compartment up to 45" tall. The door(s) shall be installed in the following location(s): L2, L3, L4, R2.
The Robinson door slats shall be double wall box frame and manufactured from anodized aluminum. 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 anodized aluminum with a finishing flange incorporated to provide a finished look around the perimeter of the door without additional trim or caulking. The track shall have a replaceable side seal to prevent water and dust from entering the compartment.

The doors shall be counterbalanced for ease in operation. A full width latch bar shall be operable with one hand, even with heavy gloves. Securing method shall be a positive latch device.

A magnetic type switch integral to the door shall be supplied for door ajar indication and compartment light activation.

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

Roll Up Compartment Door
A ROM brand roll up door with satin finish shall be provided on a compartment greater than 45" tall. The door(s) shall be installed in the following location(s): L1, L5, R1.
The Robinson door slats shall be double wall box frame and manufactured from anodized aluminum. 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 anodized aluminum with a finishing flange incorporated to provide a finished look around the perimeter of the door without additional trim or caulking. The track shall have a replaceable side seal to prevent water and dust from entering the compartment.

The doors shall be counterbalanced for ease in operation. A full width latch bar shall be operable with one hand, even with heavy gloves. Securing method shall be a positive latch device.

A magnetic type switch integral to the door shall be supplied for door ajar indication and compartment light activation.

Roll Up Compartment Door Cont'd
The door opening shall be reduced by 2" in width and approximately 8-9" in height depending on door height.

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.

Vinyl Crosslay Cover
A cover constructed of Black 18 oz. PVC vinyl coated polyester shall be installed on the crosslay. The base fabric shall be 1000 x 1300 Denier Polyester with a fabric count of 20 x 20 per square inch.
The cover shall be held in place across the top of the body by chrome snaps. The sides of the cover shall have integral flaps that extend down to cover the sides of the crosslay. The side flaps shall be secured in place to comply with the latest edition of NFPA 1901.

DEF Tank Cover
A cover shall be installed over the compartment mounted Diesel Exhaust Fluid (DEF) tank. Includes a hinged door to access the DEF tank fill. Material and finish of the cover to match the compartment walls.

PUMP MODULE
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.

Hose Reel Blow-Out Valve
A 1/4" Innovative Controls valve shall be installed between the chassis air system and the hose reel. This valve shall be mounted at the pump operator area. Each 1/4 turn handle grip shall feature built-in color-coding labels and a verbiage tag There shall be a check valve in the air line to prevent water from entering the chassis air system.

PUMP MODULE OPTIONS

Booster Reel Rollers

A booster reel roller assembly shall be provided.

The roller assembly shall include chrome guides with nylon bushings and shall be mounted on the side next to the booster reel.

WATER TANK

Booster Tank

The booster tank shall be T-shaped in configuration and shall have a useable capacity of 500 gallons (U.S.). 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.

75', 1500-GPM/470-30 Gallon

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.

Booster Tank Cont'd
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 PLUMBING
Tank Fill 2 Akron Valve
One (1) 2" pump-to-tank fill line having a 2" manually operated full flow 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 fill line shall be controlled using a chrome handle with an integral tag.
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 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, 3" Akron Valve
One (1) manually operated 3" Akron valve shall be installed between the pump suction and the booster tank in order to pump water from the 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.

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.

FOAM TANK
30 Gallon Foam Tank
A 30 gallon (U.S.) foam cell for Class A foam shall be supplied. The foam cell shall be integral to the water tank. The integral tank top, sides, and bottom shall be constructed of black polypropylene material. 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 copolymer polypropylene material shall be used for its high strength and corrosion resistance for a prolonged tank life.

30 Gallon Foam Tank Cont'd

The foam tank shall have a manual fill tower. 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). Foam fill tower shall be constructed of a Green colored material indicating type of foam utilized. The capacity of the tank shall be engraved on the top of the fill tower lid. The fill tower shall be located in the forward area of the tank. The tower shall have a 1/4" thick removable polypropylene screen. Inside the fill tower, approximately 1.5" down from the top, there shall be an anti-foam fill tube that extends down to the bottom of the tank. A pressure vacuum vent shall be provided in the lid of the fill tower. The foam fill tower shall be removable to facilitate the cleaning of the foam tank.

The foam tank shall undergo extensive testing prior to installation in the truck. All foam tanks shall be tested and certified as to capacity. 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.

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.

LADDER STORAGE / RACKS

Ground Ladder Storage

Two (2) ground ladder storage areas shall be provided at the rear of the apparatus. The storage areas shall be located one (1) each side of the aerial pedestal. The storage areas shall be vertical in design to allow the ladders to be stored on edge. Combined with a body or aerial mounted 14` or greater ladder, they shall provide storage for up to 115` of ground ladders in order to exceed the requirements of the current edition of NFPA 1901 for both aerial ladders and quints.

The vertical compartment under the left-hand side of the aerial ladder turntable shall be approximately 8.75" wide x 26.5" high x 205" deep and shall be accessible through a door at the rear of the apparatus. The bottom of this compartment shall be no more than 55" above the ground with the vehicle in the unloaded condition to allow easy removal of the ladders.

The vertical compartment under the right-hand side of the aerial ladder turntable shall be approximately 8.375" wide x 23.375" high x 205" deep and shall be accessible through a door at the rear of the apparatus. The bottom of this compartment shall be no more than 55" above the ground with the vehicle in the unloaded condition to allow easy removal of the ladders.

The ladders in the compartments shall be held captive top and bottom by aluminum tracks and shall slide on friction-reducing material. All ladders shall be removable individually without having to remove any other ladder.

The ladder rack shall hold: PEL-35, PEL-28 and (2)PRL-16.

HANDRAILS / STEPS

Slide-Out Platform

A slide-out platform shall be provided integral with the driver side running board adjacent to the pump panel. The platform shall be 21" deep and shall be constructed of 1/8" (0.125") aluminum treadplate with a multi-directional, aggressive gripping surface. The platform shall utilize a maintenance-free slide system incorporating stainless steel shoulder bolts that slide in slotted heavy-wall aluminum angles. Notches shall be provided at each end of the slots to hold the platform in both the extended and retracted positions.

The NFPA pump throttle height requirement shall be measured from the top of the slide-out platform on all aerials and from the ground on side mounted pump operator panels on non-aerial apparatus.

MISC BODY OPTIONS

Mud Flaps

Black mud flaps with E-ONE logo shall be provided for the body wheel wells.

Pipe Cover

An aluminum smooth plate cover shall be provided in the compartment to cover the piping running through the compartment area. The cover shall be removable for ease of access to the piping.

Location: R1.

Side Body Platework
The painted aluminum smooth plate body side panels shall be flush with the supporting extrusions.

Anodize Aluminum Trim
A anodize aluminum trim shall be located at the bottom edge of all body compartment openings 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.

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 1/8" (0.125") aluminum tread plate. The wheel well trim shall be constructed from 6063-T5 formed aluminum extrusion.

The fenderettes shall be bolt-on and shall be easily removable. The fenderette shall be constructed from .080" aluminum with a mirror finish. The fenerette shall be 2 1/2" (2.5") wide x 2 1/4" (2.25") tall with a 26 7/8" (26.875") radius. A "P" shaped rubber gasket shall be provided between the fenerette and wheel well body panel.

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.

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.

Pump Shift Cont'd
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.

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.

Mechanical Pump Seal Cont'd
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.

Manual Master Drain
A manual master drain valve shall be installed and operated from the driver side. The master pump drain assembly shall consist of a Class 1 bronze master drain with a rubber disc seal.

The manual master drain valve shall have twelve (12) individually-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 rockerlug 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 Relief Valve

The pump shall be equipped with an Akron style 53 cast brass, variable-pressure-setting relief valve on the pump suction side. It shall be designed to operate at a maximum inlet pressure of 200 PSI. The relief valve shall be normally closed and shall be set to begin opening at 125 PSI in order to limit intake pressures in the pumping system. When the relief valve opens, the overflow water shall be directed through a plumbed outlet to discharge below the body in an area visible to the pump operator. The overflow outlet shall terminate with a male 2-1/2" NST threaded fitting to allow the overflow water to be directed away from the vehicle with a short hose (supplied by the fire department) during freezing weather or under other conditions where an accumulation of water around the apparatus might be hazardous.

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.

Left Front 2.5 Hose Bed Akron Valve

One (1) 2-1/2" preconnect outlet with a manually operated Akron valve shall be supplied to the lower left of the apparatus hose bed. The preconnect shall consist of a 2-1/2" heavy-duty hose coming from the pump discharge manifold to a 2-1/2" adapter.

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.

Waterway 4 Discharge with 3 Akron Valve

One (1) 4" discharge outlet with a 3" manually operated Akron valve shall be connected from the pump discharge to the aerial waterway.

Waterway 4 Discharge with 3 Akron Valve Cont'd
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.

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 of center tray.

1.5 Single Crosslay Akron Valve [Qty: 2]
One (1) single crosslay discharge shall be provided at the front area of the body. The crosslay shall include one (1) 2" brass swivel with a 1-1/2" hose connection to permit the use of hose from either side of the apparatus.

The crosslay hose bed shall consist of a 2" heavy-duty hose coming from the pump discharge manifold to the 2" swivel. The hose shall be connected to a manually operated 2" 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.

Location: crosslay 1 & 2, crosslay 3.

Discharge Left Panel 2.5 Akron Droop
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 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 valve control shall be located at the pump operator panel and shall visually indicate the position of the valve at all times.

The discharge shall extend out beyond the pump panel with a 30 degree downward angle with 2-1/2" NST threads to help prevent kinking of the discharge hose. The 30 degree chrome droop shall be an integral part of the discharge valve and shall be equipped with a chrome plated rocker lug cap with a retainer chain.

Discharge Left Panel 2.5 Akron Droop Cont'd
The discharge shall be supplied with a 3/4" bleeder valve assembly. The bleeder valve shall be installed to drain water from the gauge pressure line to prevent freezing of the line. The drain shall be controlled with a quarter-turn valve on the pump panel.

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.

Discharge Right Panel 2.5 Akron Droop
One (1) 2-1/2" discharge outlet with a manually operated Akron valve shall be provided at the right 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.

The discharge shall extend out beyond the pump panel with a 30 degree downward angle with chrome plated 2-1/2" NST threads to help prevent kinking of the discharge hose. The 30 degree chrome droop shall be an integral part of the discharge valve and shall be equipped with a chrome plated rocker lug cap with a retainer chain.

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

Location: right side discharge 2.

Discharge 3 Right Akron Handwheel w/Droop
One (1) 3" discharge outlet with a handwheel operated Akron valve shall be provided at the right side pump panel. The valve shall be an Akron 8600HD 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 handwheel valve control shall have the following features:

Handwheel driven worm gear rotates a gear sector for smoother and easier operation under pressure.
• A 50:1 ratio
• 4" handwheel
• 12-1/2 turns for full open/close.
• Opening and closing speed complies with the current edition of NFPA.
• Portrait position indicator which shows the position of the valve ball to meet NFPA 1901.

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 discharge shall extend out beyond the pump panel with a 30 degree downward angle with chrome plated 3" NST threads to help prevent kinking of the discharge hose. The 30 degree droop shall be an integral part of the discharge valve and shall be equipped with a chrome plated rockerlug cap with a retainer chain.

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

Location: right side discharge 1.

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: 10]

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 bezel 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.

BOOSTER REEL

Booster Reel

One (1) booster reel to hold 200` of .75" or 100` of 1" hose (not included) shall be provided. Includes rollers mounted on reel side and air blowout. Locate over R1 compartment. Foot switch to be located under R1 compartment.

Hannay # EF4038-17-18

PRESSURE GOVERNORS

FRC PumpBoss Pressure Governor

Fire Research PumpBoss model PBA400 series pressure governor and monitoring display kit shall be installed. The standard kit shall include a control module, pump discharge pressure sensor, and cables. The control module case shall be waterproof and have dimensions not to exceed 6-3/4" high by 4-5/8" wide by 1-3/4" deep. Inputs for engine information shall be from a J1939 databus or from independent sensors and pump discharge pressure input shall be from a pressure sensor.

The following continuous displays shall be provided:

* CHECK ENGINE and STOP ENGINE warning LEDs.
* Engine RPM; shown with four daylight bright LED digits more than 1/2" high.
* Engine OIL PRESSURE; shown on an LED bar graph display in 10 psi increments.
* Engine TEMPERATURE; shown on an LED bar graph display in 10 degree increments.
* BATTERY VOLTAGE; shown on an LED bar graph display in 0.5 volt increments.
* PSI / RPM setting; shown on a dot matrix message display.
* PSI and RPM mode LEDs.
* THROTTLE READY LED.

A dot-matrix message display shall show diagnostic and warning messages as they occur. It shall show monitored apparatus information, stored data, and program options when selected by the operator.

The program shall store the accumulated operating hours for the pump and engine, previous incident hours, and current incident hours in a non-volatile memory. Stored elapsed hours shall be displayed at the push of a button. It shall monitor inputs and support audible and visual warning alarms for the following conditions:

** Low Oil Pressure*
** High Engine Coolant Temperature*
FRC PumpBoss Pressure Governor Cont'd
* High Transmission Temperature
* Low Battery Voltage (Engine Off)
* Low Battery Voltage (Engine Running)
* High Battery Voltage
* High Engine RPM

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 control knob that uses optical technology shall adjust pressure or RPM settings. It shall be 2" in diameter with no mechanical stops, a serrated grip, and have a red idle push button in the center.

A throttle ready LED shall light when the pump engaged interlock signal is recognized. The governor shall be in pressure mode and set the engine RPM to idle. In pressure mode the governor shall automatically regulate the discharge pressure at the level set by the operator. In RPM mode the governor shall maintain the engine RPM at the level set by the operator except in the event of a discharge pressure increase. The governor shall limit a discharge pressure increase in RPM mode to a maximum of 30 PSI. Other safety features shall include recognition of no water conditions with an automatic programmed response and a push button to return the engine to idle.

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

The display module shall be mounted at the pump operator`s panel.

GAUGES
2.5 [Qty: 10]
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.

4" Master Pressure Gauges w/Bezel
The master intake and master discharge gauges shall be 4"(101mm) diameter IC 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 meet ANSI B40.1 Grade 1A requirements with an accuracy of +/- 1% 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.

The two master gauges shall be installed into decorative chrome-plated zinc mounting bezel that also incorporates a test port manifold and a graphic overlay that identifies the master intake and discharge gauges, the vacuum test

port, and the pressure test port. The test port manifold is solid cast brass with chrome plated plugs. The master gauges shall be installed on the pump panel no more than 6 inches apart. The gauge on the left shall be the master pump intake gauge and display a range from 30" vac to 400 psi with black graphics on a white background. The gauge on the right shall be the master pump discharge gauge and display a range from 0 to 400 psi with black graphics on a white background.

GAUGE IC SL PLUS LED WATER TANK LEVEL
An Innovative Controls SL Plus Tank Level Monitor System shall be installed. The system shall include [1] electronic display module(s), a stainless steel pressure transducer sender unit, and the necessary wiring with water-tight plug terminations that do not require sealing grease.

GAUGE IC SL PLUS LED WATER TANK LEVEL CONT'D
The master display module shall show the tank level using 16 super-bright easy-to-see LEDs. Tank level indication shall be achieved by the appropriate illumination of 4 horizontal rows of LEDs, with 4 LEDs per row. Full and near-full levels shall be indicated with the illumination of all 4 rows of LEDs, including the illumination of the top row of 4 green LEDs. Tank levels between ½ and ¾ full shall be indicated with the illumination of the bottom 3 rows of LEDs, including the illumination of the top row of 4 blue LEDs. Tank levels between ¼ and ½ full shall be indicated with the illumination of the bottom 2 rows of LEDs, including the illumination of the top row of 4 amber LEDs. Tank levels between ¼ full and near empty shall be indicated with the illumination of the bottom row of 4 red LEDs only. Tank levels between near empty and empty shall be indicated by flashing the bottom row of 4 red LEDs.

The master display shall have a backlit area above at the top with illuminated [water icon/ foam icon / foam A icon / foam B icon / WATER LEVEL text / FOAM LEVEL text / FOAM A text / FOAM B text] and a backlit area at the bottom with illuminated [tank capacity / IC logo / OEM logo].

A wide-angle polycarbonate diffusion lens in front of the LEDs shall produce a 180° viewing angle. The electronic display module shall be waterproof and shock resistant being encapsulated in a urethane-based potting compound. The potted display electronics shall be integral to a chrome-plated panel-mount reflector that is secured to the apparatus panel with 4 screws installed from the inside of the panel or optional decorative bezel, through the reflector, and into 4 threaded inserts in the outer diffusion lens.

GAUGE IC SL PLUS LED FOAM A TANK LEVEL
An Innovative Controls SL Plus Tank Level Monitor System shall be installed. The system shall include [1] electronic display module(s), a stainless steel pressure transducer sender unit, and the necessary wiring with water-tight plug terminations that do not require sealing grease.

The master display module shall show the tank level using 16 super-bright easy-to-see LEDs. Tank level indication shall be achieved by the appropriate illumination of 4 horizontal rows of LEDs, with 4 LEDs per row. Full and near-full levels shall be indicated with the illumination of all 4 rows of LEDs, including the illumination of the top row of 4 green LEDs. Tank levels between ½ and ¾ full shall be indicated with the illumination of the bottom 3 rows of LEDs, including the illumination of the top row of 4 blue LEDs. Tank levels between ¼ and ½ full shall be indicated with the illumination of the bottom 2 rows of LEDs, including the illumination of the top row of 4 amber LEDs. Tank levels between ¼ full and near empty shall be indicated with the illumination of the bottom row of 4 red LEDs only. Tank levels between near empty and empty shall be indicated by flashing the bottom row of 4 red LEDs.

The master display shall have a backlit area above at the top with illuminated [foam A icon / FOAM A text] and a backlit area at the bottom with illuminated [tank capacity / OEM logo].

A wide-angle polycarbonate diffusion lens in front of the LEDs shall produce a 180° viewing angle. The electronic display module shall be waterproof and shock resistant being encapsulated in a urethane-based potting compound. The potted display electronics shall be integral to a chrome-plated panel-mount reflector that is secured to the apparatus panel with 4 screws installed from the inside of the panel or optional decorative bezel, through the reflector, and into 4 threaded inserts in the outer diffusion lens.

FOAM SYSTEMS

Foam System Certification

The foam system performance shall be tested and certified in compliance with the applicable NFPA 1901 requirements.

Foam System

A Class 1 SmartFoam 3.3, 12 volt DC powered variable-speed electronic direct-injection foam-concentrate proportioning system with a 3.3 gpm foam concentrate pump shall be integrated into the apparatus to provide foam proportioning. The foam proportioning system shall be compatible with Class A foam concentrates and most high viscosity normal hydrocarbon or polar solvent Class B foam concentrates. The foam proportioning system shall be capable of delivering the rated foam concentrate flow with the above mentioned foam concentrate types. Foam system manufacturer shall provide a list of foam chemicals that have been tested for compatibility with the foam pump.

Foam System Cont'd

A paddlewheel type flowmeter with a stainless steel impeller wheel shall monitor waterflow in foam capable discharges. The flowmeter shall have a 500 psig (34 BAR) pressure rating per NFPA requirements.

One (1) flowmeter is required for proper operation of the foam proportioning system. Power for the flowmeter sensor will be provided through the cable set from the control unit. Flowmeters shall have saddle clamp mounting shall be used to mount in stainless steel, brass or iron OEM manifold assembles.

The flowmeter selected shall be sized to adequately monitor the minimum and maximum flow expected in the foam capable discharges.

The foam proportioning system shall be equipped with a panel mounted digital display control unit with a microprocessor that monitors total water flow and foam concentrate pump output to provide the operator preset proportional amount of foam concentrate injected on the discharge side of the fire pump. Total foam concentrate pump concentrate output shall be 3.3 gallons per minute. Proportioning rate is push-button set by the pump operator on the digital display from 0.1% to 1%, in 0.1% increments.

The foam system shall be equipped with a Class1 UltraViewSmartFOAMController. The SmartFOAM Controller will show the water flow per minute, foam percentage, total water flowed, and total foam flowed on the main screen without having to press any buttons.The SmartFOAM Controller will maintain a running total of the amount of water and foam used during the current power cycle. The SmartFOAM Controller shall provide on-screen tutorials to assist the user during calibration. The SmartFOAM Controller will allow push-button modification of the foam proportioning rate from 0.1% to 10.0% in 0.1% increments. The Controller will always begin operation at the preset foam proportioning rate which is configured with a password protected set-upscreen.

The foam concentrate pump shall be fed concentrate by a non-metallic housing foam concentrate strainer that is equipped with a service shut-off valve.

The unit will be fed 12 volt DC power from the apparatus electrical system, and be equipped with a chassis frame ground strap, per the foam proportioner manufacturer`s installation and operating instruction manual.

FOAM SYSTEM OPTIONS

Foam System Plumbing

The specified foam system shall be plumbed to left rear discharge, driver's side hose bed preconnect 1, 1.5 first crosslay, 1.5 second crosslay, 1.5 third crosslay, officer's side front jump line, booster reel dunnage pan officer's side, booster reel.

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 1901standards.

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 8ga and smaller shall be SXL, GXL, or TXL per SAE J1128. Conductors 6ga and larger shall be SXL or SGT per SAE J1127.

All wiring shall be colored coded and imprinted with the circuit's 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 22lbs. 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 conditions 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.

User Interface Cont'd
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
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 Mount
One (1) pair of Whelen 1.5" tall (model MKEZ7) mounts shall be provided on each front mini light bars.

Light Bars
A pair of Whelen Mini Freedom IV Series 21.5" LED light bars shall be provided.

Each light bar shall contain two (2) corner LED modules forward facing, two (2) forward facing Long LED modules and one (1) outward facing Short LED module. No rear facing LEDs.

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

The light bars shall be installed in the following location: front cab corners at 20 degree angle.

WARNING LIGHT PACKAGES

Lower Level Warning Light Package

Ten (10) Whelen C-Series model C6L Super LED light heads shall be provided. Lights shall be Red with red 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) lights on the front of the apparatus facing forward.
• Two (2) lights on the rear of the apparatus facing rearward.
• Two (2) lights each side of the apparatus, one (1) each side at the forward most point (as practical), and one (1) each side at the rearward most point (as practical).
• One (1) 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, on side of cab down low just ahead of rear door, and on rear fixed outrigger cover.

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

WARNING LIGHTS

Upper Rear Warning Lights

Two (2) Whelen model L31H Super LED beacons with Red, Red domes shall be supplied.

The lights shall be located each side of pump module offset to the rear, rear upper body on aerial style brackets to meet Zone C upper requirements.

Hazard (Door Ajar) Light

There shall be a 2" red LED hazard light installed as specified.
The light shall be located center overhead.

DIRECTIONAL LIGHT BARS

Directional Light Bar Control Location

The directional light bar control head shall be located in the center overhead console offset to officer side.

Directional Traffic Warning Light

One (1) Whelen model TAM83 LED Traffic Advisor™ with clear lenses shall be provided. The light bar shall include Eight (8) TIR3™ Super-LED® lamps.

The directional bar shall include a TACTLD1 control head. The control head shall include a remote flash control and end lamp enable/disable feature.

The light shall be installed at rear of body to direct traffic around the apparatus.

Dimensions: 2.875" high x 2.25" wide x 30.36" long.

SIRENS

Electronic Siren

A Whelen 295SLSA1 electronic siren shall be installed in the cab. The siren amplifier and control panel module shall include a rotary selector for six (6) functions, on/off switch, push button switch for manual siren or air horn tones, and noise canceling microphone.

Electronic Siren Control Location

The electronic siren control shall be located in the center overhead.

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 officer side front bumper.

SPEAKERS

Siren Speaker

One (1) Whelen model SP123BMC, 100 watt speaker with chrome grill shall be recessed in the front bumper.

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 driver 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 rubrail.
• One (1) red Trucklite LED clearance light each side at the trailing edge of the apparatus body, recessed in the rubrail.
• One (1) amber Trucklite LED clearance light each side front of body just in front of rear wheels, recessed in the rubrail.
• One (1) amber Trucklite LED clearance/auxiliary turn light each side front of body, recessed in the rubrail.

Tail Lights

Three (3) TecNiq model K60 LED (Light Emitting Diode) lights shall be installed in a Cast 3 housing in a vertical position each side at the rear and wired with weatherproof connectors.

Light functions shall be as follows:

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

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

LIGHTS - COMPARTMENT, STEP & GROUND

Compartment Light Package

One (1) Amdor Luma-Bar LED compartment light strip shall be mounted in each body compartment greater than 4 cu. ft. Transverse compartments shall have two (2) lights, located one each side.

Compartment lights shall be wired to a master on/off rocker switch on the cab switch panel.

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 when the compartment door is open.

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.

Step Lights
The apparatus shall be equipped with a sufficient quantity of lights to properly illuminate the steps 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 (a smaller light may be used if space is limited). The wiring connections shall be made with a weather resistant plug in style connector.

The step lights shall be switched from the cab dash with the work light switch.

Ladder Tunnel Light [Qty: 3]
An EON LED light shall be provided to illuminate the ladder tunnel at the opening. The light shall be wired through the door ajar circuit on the ladder tunnel door.

LIGHTS - DECK AND SCENE
Hose Bed Light
An Optronics round LED light model TLL44 shall be installed at the front area of the hose bed to provide hose bed lighting per current NFPA 1901. The light shall provide 720 lm effective output. The light shall have a powder coated, die cast aluminum housing and stainless steel hardware with a weatherproof rating of IP69K.

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

LED Deck Lights
Two (2) Rigid-Dually D2 LED floodlights model 50151 shall be installed as location specified. Each light shall provide 2,600 lumens of light and 50,000 hours of lamp life.

Location: Specifications include:

- 60 degree diffusion lens.
- 9-36VDC.
- 1.25 pounds each.
- 28 watts.
- Amp draw of 1.9 amps.
- Six (6) LEDS.
- 2600 Raw lumens.
- Reverse polarity protection.
- Unbreakable poly carbonate lens.
- A360 high purity aluminum cast housing.
- Sealed Deutsch connector.
- Operating temperature range -40 +145 degree F.
- MIL810-STDG vibration certified.
- ASTMB117 salt/fog certified.
- ROHS compliant.
- Instant on/off (no warm up).
- 50,000 + Hour life span.

Scene Lights
Fire Research model SPA900-Q70 surface mount lights shall be installed. The lights shall be mounted with four (4) screws to a flat surface. It shall be 6-3/4" high by 9" wide and have a profile of less than 1-3/4" beyond the mounting surface. Wiring shall extend from a weatherproof strain relief at the rear of the light.

Each light shall have twenty-four (24) white LEDs that generate a rated 7000 lumens at 12 or 24 volts DC. The lens shall redirect the light along the vehicle and out onto the working area. The light housing shall be aluminum with a chrome colored bezel.

Lights shall be located up high on rear access door.

Crosslay Light
An Optronics round LED light model TLL44 shall be installed at the rear area of the crosslay to provide crosslay lighting per current NFPA 1901. The light shall provide 720 lm effective output. The light shall have a powder coated, die cast aluminum housing and stainless steel hardware with a weatherproof rating of IP69K.

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

Scene Lights
Two (2) Whelen model C6SL SurfaceMax series Super LED clear scene lights shall be provided.

Each shall have 6 Super LED diodes, a clear non optic hard coated polycarbonate lens and utilize a metalized SurfaceMax reflector with integrated optic collimators for maximum output. The C6SL shall have 1200 useable lumens.

Lights shall be located up high on rear access door and switched in cab (side facing lights switched separately).

LIGHTS - NON-WARNING
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 work light switch in the cab shall activate the lights when the park brake is set.

Engine Compartment Light
There shall be lighting provided to illuminate the engine compartment area in compliance with NFPA 1901. The light shall be an Optronics ILL22 Series LED that has a polycarbonate lense, sealed / waterproof housing and integral switch. The light wiring circuit shall activate when the cab is tilted and master power is switched on.

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 air horns. It shall be located driver's side.

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

Additional Switch
A 12 volt switch shall be provided.

The switch shall be located driver rear of body for rear work lights, officer's side switch panel for Q2B brake.

CAMERAS / INTERCOM

Intercom 4 Cab

A Setcom intercom package shall be installed within the cab interior. Intercom headsets provide hearing loss protection that can occur from exposure to high noise levels.

The system contains:

- One (1) Setcom model IM-900 master station shall be provided in the cab (two (2) year limited warranty). Station includes two (2) radio interface outlets; one (1) for driver and one (1) for officer.
- One (1) Setcom model JS-900-20 jump seat station shall be provided for the two (2) additional seating locations.
- Four (4) headset hooks

Headsets shall be ordered separately and are not included as part of the Intercom package.

Three-Way Intercom

A Fire Research ACT three-way intercom system shall be installed to provide communications between the turntable control station the aerial tip and driver side pump panel. The intercom system shall include three (3) speakers and three (3) control modules; one (1) with a push-to-talk button at the turntable control station, one (1) with a push-to-talk button at the pump operator`s panel and one (1) hands free at the aerial tip.

The control modules shall have push-button volume control and a LED volume display. The hands free module shall constantly transmit to the other module unless the push-to-talk button is pressed.

The intercom shall have active noise cancellation and be designed for exterior use.

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.

GENERATOR

Hydraulic Generator

A Harrison model MCR 8KW hydraulic generator system shall be supplied and installed in dunnage pan offset to driver side. The generator shall come with an axial piston hydraulic pump, reservoir, cooler, voltage regulator and a gauge panel.

The gauge panel shall display voltage, hour meter, frequency, and amperage.

The hydraulic motor-generator system shall be modular design with dimensions of approximately 33" long x 14.2" wide x 18.1" high and shall be permanently mounted on the apparatus.

The hydraulic pump shall be driven by a chassis transmission mounted power take off (PTO).

A generator control / PTO engage switch shall be mounted on the cab instrument panel to engage the PTO and start the generator.

Ratings and Capacity

Rating: 8,000 watts continuous
Volts: 120/240 volts
Phase: Single, 4-wire
Frequency: 60 Hz
Amps: 34 amps at 240 volts, 68 amps at 120 volts
Engine Speed at Engagement: Idle
Pump Speed Operating Range: 980 to 3300 RPM
Weight: Approximately 267 lbs.

Testing
The generator shall be tested in accordance with current NFPA 1901 standards.

Notes:
*All ratings and capacities shall be derived utilizing current NFPA 1901 test parameters.
*Extreme ambient temperatures could affect generator performance.

GENERATOR TEST
3rd Party Generator Testing
The generator shall be tested at the manufacturer`s facility by an independent, third-party testing service. The conditions and testing of the generator shall be as outlined in current NFPA 1901.

The test shall include operating the generator for two hours at 100% of the rated load. Power source voltage, amps, frequency shall be monitored. The prime mover`s oil pressure, water temperature, transmission temperature (if applicable) and power source hydraulic fluid temperature (if applicable) shall be monitored during testing.

The results of the test shall be recorded and provided with delivery documentation.

BREAKER BOXES
Circuit Breaker Panel
An eight (8) place breaker box with up to six (6) appropriately sized ground-fault interrupter circuit breakers shall be supplied. The breaker box will include a master breaker sized according to the generator output which will occupy two (2) places. The breaker box will be located in the specified compartment, not to exceed 12` run of wire.
Dimensions: 12.50" high x 8.88" wide x 3.80" deep.

Location: L1 forward wall.

LIGHTS - QUARTZ
120V LED Flood Light
Fire Research Spectra model SPA530-K20-SW-H side mount push-up telescopic light shall be installed. The light pole shall be anodized aluminum and have a knurled twist lock mechanism to secure the extension pole in position. The extension pole shall rotate 360 degrees. The outer pole shall be a grooved aluminum extrusion and qualify as an NFPA compliant hand rail.

The pole mounting brackets shall have a 3-1/2" offset. Wiring shall extend from the pole bottom with a 4 ft. retractile cord.

The lamp head shall have sixty (60) ultra-bright white LEDs, 48 for flood lighting and 12 to provide a spot light beam pattern. It shall operate at 120 volts AC, draw 2 amps, and generate 20,000 lumens of light. The lamp head shall have a unique lens that directs flood lighting onto the work area and focuses the spot light beam into the distance. The lamp head shall be no more than 5-7/8" high by 14" wide by 3-1/2" deep and have a heat resistant handle. The lamp head and mounting arm shall be powder coated. The LED scene light shall be for fire service use.

Fire Research Spectra-SW option raised pole hazard light switch for a 530 pole shall be installed. The magnetic switch shall be in a cylindrical housing clamped on the outer pole. A magnet shall be mounted in the extension pole. The switch contacts shall close when the pole is raised.

Location: officer side back of cab, driver side back of cab.

12V LED Flood Light [Qty: 2]
Fire Research Spectra model SPA802-Q20-02 contour roof mount light. Includes switch in cab. The mounting brackets shall attach to the lamp head and attached to the roof radius. Wiring shall extend from a weatherproof strain relief at the rear of the lamp head.

12V LED Flood Light Cont'd
The lamp head shall have eighty-four (84) ultra-bright white LEDs, 72 for flood lighting and 12 to provide a spot light beam pattern. It shall operate at 12/24 volts DC, draw 18/9 amps, and generate 20,000 lumens of light. The lamp head shall have a unique lens that directs flood lighting onto the work area and focuses the spot light beam into the distance. The lamp head shall be no more than 5-7/8" high by 14" wide by 3-1/2" deep and have a heat resistant handle. The lamp head and mounting arm shall be powder coated. The LED scene light shall be for fire service use.

Location: driver and officer side over rear cab door.

120V LED Flood Light [Qty: 2]
Fire Research Spectra model SPA802-K20-02 contour roof mount light. The mounting brackets shall attach to the lamp head and attached to the roof radius. Wiring shall extend from a weatherproof strain relief at the rear of the lamp head.

The lamp head shall have sixty (60) ultra-bright white LEDs, 48 for flood lighting and 12 to provide a spot light beam pattern. It shall operate at 120 volts AC, draw 2 amps, and generate 20,000 lumens of light. The lamp head shall have a unique lens that directs flood lighting onto the work area and focuses the spot light beam into the distance. The lamp head shall be no more than 5-7/8" high by 14" wide by 3-1/2" deep and have a heat resistant handle. The lamp head and mounting arm shall be powder coated. The LED scene light shall be for fire service use.

Location: driver and officer side over canopy area.

Cab Brow Light
One (1) FireTech 12V LED model FT-B-72-ML-W 72" white housing brow light with integral marker lights shall be provided. The light shall be installed on the front cab brow in place of the standard DOT marker lights. the light shall feature 54 LEDs` producing 19,665 usable lumens and five (5) DOT approved marker lights. The 285W 12V light shall draw 23.75 amps.

RECEPTACLES
Receptacle
A 20 amp, 110 volt 3 prong straight blade NEMA #5-20 GFCI duplex receptacle with a weatherproof cover plate shall be installed.
Location: driver side rear wheel well offset forward, officer side rear wheel well offset forward, driver side rear of body, officer side rear of body.

Receptacle
A 20 amp, 110 volt 3-prong straight blade GFCI 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 back wall of cab.

MISC ELECTRICAL 110V
Inverter
A Vanner Bravo 2600 watt AC inverter, (NFPA rating at 1400 watts) shall be installed.

The inverter shall produce 2600 watts continuous and 3 sec 7150 watts surge. The unit shall include an internal transfer relay, low battery cut-off feature and include over-temperature and overload protection.

A remote control on/off switch assembly shall be installed in the L1, forward wall up high.

The inverter shall be mounted in a body compartment as close to the chassis batteries as practical (20` max cable length).

Dimensions: 8.4" high x 17.5" wide x 14.0" deep

Current Draw: Up to 260 amps 12v

75', 1500-GPM/470-30 Gallon

Warranty: 2 Years

AERIAL MODEL
HP75 Aerial Ladder

Performance
A 75` telescopic aerial ladder of the open-truss design shall be installed at the rear of the vehicle with the aerial ladder pointed forward when it is in the travel position. The aerial ladder shall meet or exceed the requirements of NFPA 1901 (2016 edition), Sections 19.2 through 19.6 and Sections 19.17 through 19.25.

The aerial ladder shall consist of three (3) telescopic ladder sections capable of operating from minus (-) 8 degrees to plus (+) 76 degrees elevation at any ladder extension to give a full range of movement. The aerial ladder shall be designed to provide continuous egress for firefighters and civilians from any angle of elevation to the ground as defined in the current edition of NFPA 1901.

The aerial ladder shall have a rated vertical height of 75` measured in a vertical plane from the outermost rung of the outermost fly section to the ground with the ladder at maximum elevation and extension as defined in the current edition of NFPA 1901.

The aerial ladder shall have a rated horizontal reach of 68` measured in a horizontal plane from the centerline of the turntable rotation to the outermost rung of the outermost fly section with the aerial ladder extended to its maximum horizontal reach as defined in the current edition of NFPA 1901.

The aerial ladder shall utilize a single pair of stabilizers - one (1) on the left and one (1) on the right opposite each other - with a maximum horizontal stabilizer spread of 16` across the centerlines of the footpads. Aerial ladders which require two (2) sets of extending stabilizers or that have a maximum stabilizer spread greater than 16` are not acceptable because of the need to utilize the aerial ladder in confined areas. Aerial ladders that require a set of drop down jacks behind the cab are not acceptable. This type of configuration decreases compartment space and increases the overall vehicle weight, causing increased bending load on the chassis. In addition, it raises the water tank, which affects the overall center of gravity of the truck. **NO EXCEPTIONS.**

The aerial ladder shall have a rated tip capacity of 550 lbs. when the ladder is unsupported at full extension and 0 degrees elevation as defined by the current edition of NFPA 1901. This capacity may take the form of firefighters wearing personal protective gear, people being rescued, equipment, or any combination of loads not to exceed the rated tip capacity. The rated tip capacity shall include to an allowance of 50 lbs. for equipment mounted at the tip of the ladder. Ladders which have a rated NFPA tip capacity of less than 550 lbs. are not acceptable because of the need to utilize the aerial ladder for rescue operations in which two (2) personnel may be on the tip at the same time. **NO EXCEPTIONS.**

The ladder shall be able to provide full operating capacities in up to 35 mph wind conditions.

Aerial Ladder Construction
To ensure a high strength-to-weight ratio, high heat resistance, and an inherent corrosion resistance, the aerial ladder shall be constructed entirely of extruded high-strength aluminum alloy. **NO EXCEPTIONS**.

All side rails, rungs, handrails, uprights and K-braces shall be made of structural 6061-T6 aluminum alloy extrusions. All material shall be tested and certified by the material supplier. All ladder sections shall be semi-automatically welded by inert gas shielded-arc welding methods using 5356 aluminum alloy welding wire. Structural rivets or bolts shall not be utilized in the ladder weldment sections.

Due to the unpredictable nature of fireground operations, a minimum safety factor of 2.5 to 1 is desired. This structural safety factor shall apply to all structural aerial components including turntable and torque box stabilizer components. Definition of the structural safety factor shall be as outlined in NFPA 1901 A.19.20.1: **NO EXCEPTIONS**

DL = Dead load stress. Stress produced by the weight of the aerial device and all permanently attached components.
RL = Rated capacity stress. Stress produced by the rated capacity load of the ladder.

WL= Water load stress. Stress produced by nozzle reaction force and the weight of water in the water delivery system.
FY = Material yield strength. The stress at which material exhibits permanent deformation.

2.5 x DL + 2.5 x RL + WL equal to/less than FY

Aerial Ladder Construction Cont'd
The minimum NFPA specification is exceeded in this paragraph by requiring safety margin above 2 to 1 while flowing water.

The stability factor or tip over safety margin shall be a minimum of 1.5 to 1 as defined by NFPA 1901 19.21.

An independent, third-party engineering firm shall verify both the structural safety factor and the stability factor. Design verification shall include computer modeling and analysis, and extensive strain gauge testing performed by an independent registered professional engineer. Written certification from the independent, third-party engineering firm shall be made available by the manufacturer upon request from the purchaser. **NO EXCEPTIONS**

All welding of aerial components -- including the aerial ladder sections, turntable, torque box, and outriggers -- shall be performed by welders who are certified to American Welding Society Standards D1.1, D1.2 and D1.3 as outlined in the current edition of NFPA 1901. **NO EXCEPTIONS**.

The weldment assemblies of each production unit shall be tested visually and mechanically by an ASNT-certified level II non-destructive test technician to comply with the current edition of NFPA 1901. Testing procedures shall conform to the American Welding Society Standard B1.10 Guide for non-destructive testing. Test methods include a thorough visual inspection of each weld and the use of dye penetrates where applicable.

Each ladder section shall consist of two (2) extruded aluminum side rails and a combination of aluminum rungs, tubular diagonals, verticals, and two (2) full-length handrails. The rungs on all sections shall be K-braced for maximum lateral stability. This K-bracing shall extend to the center of each rung to minimize ladder side deflection.

The ladder rungs shall be spaced on 14" centers and shall be designed with an integral skid-resistant surface to eliminate the need for rubber rung covers. A "D" shaped rung shall be utilized to provide a larger step surface at low angles and a more comfortable grip at elevated positions. The larger step surface is critical to distribute the load on the bottom of the firefighters` foot. Round rungs are not acceptable as they increase the stress load on the foot and are more likely to cause bruising. The minimum design load of each rung shall be 500 lbs. distributed over a 3-1/2" (3.5")-wide area in the center of the length of the rung as required in the current edition of NFPA 1901. **NO EXCEPTIONS.**

To provide a wide working area with an easy-to-grasp handrail, the aerial ladder shall exceed the requirements of the current edition of NFPA 1901 regarding the minimum ladder section inside width and the minimum handrail height by providing the following inside widths and handrail heights:

A fly section width of at least 25" is required to allow a 24" wide stokes basket to fit between the handrails.

Section	Width	Height
Base Section	37-5/8"	22-7/8"
Second Section	30-3/4"	19-3/8"
Fly Section	25-3/16"	16-1/4"

Ladder Extension/Retraction Mechanism
Both power extension and power retraction shall be furnished and shall meet the requirements of the current edition of NFPA 1901. Extension and retraction shall be by way of two (2) hydraulic cylinders mounted on each side of the base section of the aerial ladder. Each cylinder shall have a 3-1/4" (3.25") bore and a 59-1/2" (59.5") stroke.

The cylinders shall operate through a block and tackle cable arrangement to extend and retract the ladder. Maximum extension of the ladder is to be automatically limited by the stroke of the cylinders. The normal operating cable safety factor shall be 5.0 to 1 and the stall safety factor shall be 2.0 to 1 based on the breaking strength of the cables. The minimum ratio of the diameter of the block and tackle sheave to the diameter of the

cable shall be 12.0 to 1 to allow smooth operation and reduce bending stresses on the cables. The cables shall be treated with Pre-Lube 6 for increased service life.

The cable sizes shall be as follows:

2nd section (4 cables - 2 extend, 2 retract)	7/16" 6 x 19 galvanized cable
Fly section (4 cables - 2 extend, 2 retract)	1/4" 7 x 19 galvanized cable

Ladder Extension/Retraction Mechanism Cont'd
The aerial ladder sections shall slide within each other. Nylatron NSM pads shall be utilized between each section to minimize friction. Four (4) C-type interlocking load transfer stations shall enclose the pads. The transfer stations shall be located at the upper portion of the base and the second ladder sections.

Aerial Extension Indicator
Reflective tape stripes shall be installed on the aerial ladder handrail of the base section to indicate extension in 10` increments. A reflective dot on the base of the second section shall provide a visual reference for the operator to estimate aerial elevation.

Aerial Finish
To reduce maintenance expense, the aerial ladder shall have a natural aluminum swirled finish. This will also allow visible inspection of all ladder weld joints without having to remove paint or body filler to reveal the weld bead. Ladders finished with paint or with any other material that covers the base metal and weld joints are not acceptable. **NO EXCEPTIONS.**

Operation Times
The aerial ladder shall complete the elevation-extension-rotation test described in the current edition of NFPA 1901 in not more than 120 seconds or less. **NO EXCEPTIONS.** This test involves raising the aerial from the bedded position to full elevation and extension and rotating it 90 degrees. This test is to begin with the stabilizers deployed.

In addition to completing the test described above, the aerial ladder shall be capable of performing the following operations in the times noted:

Time to extend ladder	maximum 35 seconds
Time to retract ladder	maximum 25 seconds
Time to raise ladder	maximum 20 seconds
Time to lower ladder	maximum 30 seconds
Time to rotate 180 degrees	maximum 55 seconds

Aerial Ladder Rated Capacities
The aerial ladder shall have a rated capacity of 550 lbs. when the ladder is unsupported at full extension and 0 degrees elevation as defined by the current edition of NFPA 1901. This rated capacity consists of a 500 lb personnel rating and a 50 lb. equipment rating. The 50 lb. capacity for the equipment is for mounted equipment at the tip. This capacity may take the form of firefighters wearing personal protective gear, people being rescued, equipment, or any combination of loads not to exceed the rated tip capacity. The rated tip capacity shall be in addition to an allowance of 50 lbs. for equipment mounted at the tip of the ladder.

A sign mounted at the base of the aerial ladder shall communicate the aerial ladder capacity ratings for the following configurations when the ladder is in the unsupported, fully extended configuration while maintaining a 2.5 to 1 safety margin. These capacities may take the form of firefighters wearing personal protective gear, people being rescued, equipment, or any combination of loads not to exceed the rated capacities. For purposes of this sign, it shall be assumed that each person weighs 250 lbs. In no case shall the actual combined weights of personnel, equipment, and other loads exceed the rated capacities. The loads for each configuration are in addition to an allowance of 50 lbs. for equipment mounted at the tip of the ladder.

Condition #1- Tip load only, no water flowing

Elevation	**Capacity**	**Pounds**
-8 to 40 degrees	2 people	500 lbs.

41 to 49 degrees	3 people	750 lbs.
50 to 76 degrees	4 people	1000 lbs.

Condition #2- Distributed loads no water flowing (These include one person at the tip)

Elevation	Capacity	Pounds
-8 to 30 degrees	3 people	750 lbs.
31 to 45 degrees	5 people	1250 lbs.
46 to 76 degrees	8 people	2000 lbs.

Aerial Ladder Rated Capacities Cont'd

Condition #3- Ladder tip load while flowing 1000 gpm with pre-piped waterway

Elevation	Capacity	Pounds
-8 to 76 degrees	2 people	500 lbs.

Hydraulic System

The hydraulic fluid reservoir shall consist of a 52 gallon tank mounted to the torque box and plumbed to the suction side of the hydraulic pump. The tank shall be supplied with a removable top to allow access to the tank strainer filter. There shall be ports for a return line and a tank drain on the reservoir. The reservoir fill cap shall be marked " Hydraulic Oil Only". Gated valves under the tank shall facilitate filter changes. The hydraulic fluid reservoir shall have sufficient volume and be mounted in such a manner to minimize heat build up and meet the performance requirement in the current edition of NFPA 1901.

An interlock device shall be provided to prevent activation of the aerial ladder hydraulic pump until either the transmission is placed in neutral and the parking brake is set, or the transmission is placed in drive and the rear driveline is disengaged as outlined in NFPA 19.17.3.

All hydraulic components with non-sealing moving parts, whose failure could result in the movement of the aerial, shall have a minimum burst strength of four (4) times the maximum operating pressure to which the component is subjected in order to comply with the current edition of NFPA 1901.

All hydraulic components with dynamic sealing parts, whose failure could result in the movement of the aerial, shall not begin to extrude or otherwise fail at pressures at or below two (2) times the maximum operating pressure to which the component is subjected in order to comply with the current edition of NFPA 1901.

All hydraulic hoses and fittings shall have a minimum burst strength of at least three (3) times the maximum operating pressure to which the component is subjected in order to comply with the current edition of NFPA 1901.

All hydraulic tubing shall be made of stainless steel whenever possible. It shall have a minimum burst strength of four (4) times the maximum operating pressure to which it is subjected in order to exceed the requirements of the current edition of NFPA 1901. Hydraulic systems composed primarily of hose or galvanized steel lines shall not be acceptable due to the higher maintenance requirements of the system over the life of the vehicle. **NO EXCEPTIONS**

A hydraulic oil pressure gauge shall be supplied at the aerial ladder control station as required by the current edition of NFPA 1901.

The hydraulic system shall use 5w-20 multi-weight, SAE 32 grade oil. It shall incorporate the following filters in order to remove contaminants and provide dependable service:

Reservoir Breather:	10-micron
Magnetic Reservoir Strainer:	125-mesh
Pressure Filter (Torque Box):	3-micron
Return Filter:	10-micron

The aerial ladder hydraulic system shall be designed in such a manner that a hydraulic pump failure or line rupture shall not allow the aerial or outriggers to lose position. Hydraulic holding valves shall be mounted directly on the

hydraulic cylinders. To ensure reliable performance of holding valves, hoses shall not be permitted between a holding valve and cylinder. **NO EXCEPTIONS.**

The aerial shall incorporate the use of stainless steel tubes inside the torque box and jack legs to minimize the possibility of hydraulic leaks.

Hydraulic power to the ladder shall be transferred from the torque box by a hydraulic swivel fitting.

Auxiliary Hydraulic Pump
The hydraulic system shall include an auxiliary 12-volt hydraulic pump powered by the chassis electrical system in case the vehicle engine or the primary hydraulic pump fails . The auxiliary pump shall allow operation at reduced speeds to store the aerial device and retract the outriggers for road transportation. Self-centering switches shall be provided at the turntable and at each stabilizer control station to operate the auxiliary system.

Forward Aerial Support
The aerial ladder support shall be constructed from 7/8" thick steel plate. Bolt-in diagonal bracing shall be installed on the support structure in an "X" pattern to restrict to side movement. This design shall allow for a pre-determined amount of flex preventing premature failure that can be found in an overly rigid structure. The support shall be located behind the rear wall of the cab and shall be bolted to the frame rails to allow removal in case of accidental damage.

Aerial Torque Box
In order to maximize structural strength and vehicle stability while minimizing rear axle weight, a vertical cylindrical aerial torque box shall be used. Vehicles utilizing horizontal square aerial torque boxes are not acceptable because the heavy weight of these designs conflicts with the goal of utilizing a single rear axle.

The aerial torque box shall be welded from 10" x 28.5 lbs./ft. A36 grade structural steel channels with 3/8" (0.375") thick top and bottom plates and 3/8" (0.375") thick integral bulkheads. The pedestal shall be a 24" outside diameter cylinder with a 3/8" (0.375") wall and shall connect the rotation bearing mounting plate to the torque box.

The aerial torque box pedestal assembly shall be bolted to the chassis frame with sixteen (16) 3/4" (0.75") diameter Grade 8 bolts. It shall be utilized to mount the stabilizers and the reservoir for the aerial hydraulic system.

Stabilization System
The vehicle shall come equipped with an out-and-down stabilization system. The system shall consist of two (2) hydraulically-operated out-and-down style stabilizers welded to the torque box and mounted under the frame for a low center of gravity.

The stabilizers shall have a maximum spread of 16` across the centerlines of the footpads when fully extended. The internal stabilizer tubes shall be 8" x 10" with 1/2" thick top and bottom plates and 5/8" thick sides. They shall be made of steel with a 100,000-psi minimum yield strength and shall be extended out by hydraulic cylinders. The external stabilizer tubes shall be 9-3/4" x 11-3/4" with 3/8" wall thickness. The internal tubes shall slide on low friction pads.

The stabilizers shall provide the vehicle with a tip-over safety margin of 1.5 times the rated aerial ladder load in any position the aerial ladder can be placed when the vehicle is on a firm and level surface.

The aerial shall be able to sustain a 1-1/3 to 1 rated load on a 5 degree slope downward in the position most likely to cause overturning as outlined in NFPA 1901 19.21.3.1. The maximum grade the apparatus can be set up on is 6.8 degrees (12 percent). On a 6.8-degree (12 percent) grade, the apparatus can be leveled within a 3.4 degree (6 percent) operating range with the apparatus cab facing uphill.

The stabilizer extension cylinders shall have a 2.5" bore and a 51.5" stroke. The stabilizer lift cylinders shall be mounted on the end of the stabilizer tube and shall have a 4" bore and a 22" stroke.

The stabilizer cylinders shall be supplied with dual pilot-operated check valves on each stabilizer cylinder to hold the cylinder either in the retracted (stowed) or the extended (working) position should a hydraulic line be severed at any point in the hydraulic system. Stabilizers shall contain safety lock valves. This assures there will be no "leak down" of stabilizer legs. Mechanical pins are not required. This feature contributes to efficient set-up and field operation.

Each stabilizer leg shall have a 1/8" thick bright aluminum diamond plate shield, full height and width of the stabilizer opening, attached to the end of the leg. This plate shall serve as a protective guard and a mounting surface for the stabilizer warning lights. The top, forward, and rear edges shall be flanged for added strength. Each stabilizer shall have one (1) red warning light mounted on the outboard face of the protective guard.

Stabilization System Cont'd
The stabilizers shall be connected to a warning light in the cab to warn the operator when the stabilizers are deployed. A floodlight shall be provided in each stabilizer body opening to illuminate the stabilizer and the ground. The light shall automatically come on with the deployment of a stabilizer.

The ground contact area for each stabilizer shall be a 12" diameter circular disc without auxiliary stabilizer pads and a 24" x 24" square plate with auxiliary stabilizer pads deployed. The ground pressure shall not exceed 75 psi when the apparatus is fully loaded and the aerial device is carrying its rated capacity in every position. This shall be accomplished with the auxiliary stabilizer pads deployed.

Stabilizer Controls
The main stabilizer control panel shall be located on the rear of the apparatus to control the operation of the stabilization system. The panel shall be labels "JACKS" and shall provide a master on-off power switch and indicator light, two (2) yellow indicator lights - one (1) for the left jack and one (1) for the right jack - to signify when each jack is fully extended and is in firm contact with the ground, a green interlock indicator light to signify when both jacks (stabilizers) are set, and a manual transfer switch to allow the operator to manually shift the hydraulic power from the jacks (stabilizers) to the ladder once the interlock light is green.

Horizontal extension and vertical lift of the stabilizers shall be controlled by two (2) switches - one (1) for the left stabilizer and one (1) for the right stabilizer - located at the rear of the apparatus just above the brake light on each side, so that the operator may observe the stabilizers during deployment. In operation, the stabilizer on each side must be fully extended horizontally before hydraulic power is automatically shifted to the vertical lift cylinder to level the vehicle. An audible alarm with a minimum 87 dbA shall sound while the stabilizers are in motion as required by the current edition of NFPA 1901. Stabilizer deployment from the stored position to the operating position shall be completed in less than 60 seconds. **NO EXCEPTION**

Two (2) switches to activate the auxiliary hydraulic pump shall also be provided - one (1) on each side below the stabilizer switch - to retract the stabilizers in case the main hydraulic pump fails. The stabilizer switch and the auxiliary hydraulic pump switch on each side shall be protected from impacts by an inverted U-shaped guard made from aluminum diamond plate.

Two (2) switches - one (1) on each stabilizer leg - shall sense when the leg is in firm contact with the ground. This condition shall be indicated on the main stabilizer control panel by a yellow indicator light for each side.

Leveling of the apparatus shall be performed manually by the operator using two (2) color-coded level indicators at the rear of the apparatus in order to ensure a visual confirmation that it is safe to operate the aerial ladder. The indicator for the front-to-rear level shall be located inside the aerial ladder turntable stairwell on the left side of the vehicle near the rear. The indicator for the side-to-side level shall be located above the rubrail on the rear of the vehicle near the rear suction inlet. **NO EXCEPTIONS**

The aerial ladder hydraulic system shall be provided with an interlock that prevents rotation of the aerial ladder until both the stabilizers are down and properly set. Additionally, the system shall not permit stabilizer movement unless the aerial ladder is seated in the forward aerial support cradle in the travel position. Th e interlock system shall have a manual override with access through a door at the rear of the truck.

Upper Turntable
The upper turntable assembly shall connect the aerial ladder to the turntable bearing. It shall be fabricated from 3/8" A-572 grade 50 steel and shall have a mounting position for the aerial elevation cylinders, the ladder connecting pins, and the upper turntable operator`s position.

One (1) 34-1/4" diameter turntable bearing with a 3" drive gear face shall be bolted to the top of the bearing mounting plate with twenty-six (26) 3/4" diameter Grade 8 plated bolts. Gear teeth shall be stub tooth form. The rated overturning moment of the turntable bearing shall be a minimum of 238,000 ft-lbs.

Upper Turntable Cont'd
The operator`s turntable platform shall be constructed of 3/16" aluminum treadplate with "Gator Grip" non-skid integral surface mounted on a tubular frame. The platform shall extend from the left side of the aerial control station to the right side ladder rail. The platform shall extend 23" from the pedestal control station base, with a width of approximately 18". The rear of the platform shall extend approximately 19" back from the turntable gear pedestal and shall be approximately 40" wide at the rear. The platform shall be fastened by grade 8 bolts. Two (2) tubular steel handrails, each with an anti-slip finish, shall be installed on the on the right and left sides of the turntable platform. Two (2) Fire Research brand ManSaver bars, equipped with tubular padding, shall be installed between the railings. The bars shall lift up and inward (towards the ladder) permitting easy entrance to the ladder and control console. The rails shall be a minimum 39-3/4" high and shall not increase the overall travel height of the vehicle.

Elevation Mechanism
Two (2) 5" diameter elevating cylinders shall be mounted on the underside of the base section of the aerial ladder. A 1-3/4" pin shall fasten each cylinder to the turntable and a 2" pin shall fasten each cylinder to the aerial ladder. The elevating cylinders shall be mounted utilizing spherical bearings on both ends of the cylinders. The cylinders shall function only to elevate the ladder and not as a structural member to stabilize the ladder side movement. The elevating cylinders shall be provided with pilot-operated check valves to prevent movement of the ladder in case of a loss of hydraulic pressure. The elevating cylinders shall be able to raise and lower the aerial ladder to any angle from -8 degrees to +76 degrees.

The elevation system shall be designed following the current edition of NFPA 1901. The elevation cylinders shall incorporate cushions on the upper limit of travel. The elevation cylinders shall also serve as a locking device to hold the aerial in the stored position for road travel.

Rotation Mechanism
The aerial shall be supplied with a powered rotation system as outlined in the current edition of NFPA 1901. This system shall provide continuous rotation under all rated conditions and shall be supplied with a brake to prevent unintentional rotation.

Rotation shall be accomplished by a high-torque hydraulic motor driven through a spring-engaged, hydraulically-released, multiple-disc brake into a planetary gear box. The gear box shall have a minimum continuous torque rating of 60,000 in. lbs. and a minimum intermittent torque rating of 120,000 in. lbs. The turntable bearing, ring gear teeth, spur gear, planetary gear box, and output shaft shall have a minimum safety factor of 2.5 to 1.

Hydraulic Swivel
A hydraulic swivel shall be installed to provide hydraulic fluid transfer to the aerial ladder cylinders, electrical power to the aerial ladder, and water delivery to the pre-plumbed waterway while permitting continuous 360-degree rotation. The swivel shall be environmentally-sealed to prevent contamination of the hydraulic fluid. The swivel shall include a 4" passage for waterflow. The number of hydraulic ports and electrical circuits shall be dependent on the type of aerial control system as noted below:

Control System	Hydraulic Ports	Electrical Circuits
Direct hydraulic controls	8	24
Advanced Aerial Control System	5	28
Advanced Aerial Control System - Deluxe	5	36

Aerial Ladder Control Station
An aerial ladder control station shall be supplied as outlined in the current edition of NFPA 1901. The control station shall be located on the left side of the aerial turntable. The apparatus shall be supplied with labels to warn of electrocution hazard. The control console shall provide a service access door on the front and side of the console to access hydraulic and electrical connections. The electrical panel shall be contained in a junction box with labeled wires. The control console shall be angled, labeled, and supplied with lights for night operation.

Console Cover
A diamond plate contoured hinged cover shall be supplied to protect the console from the elements. The cover shall latch in the stored position and swing away from the console so as not to interfere with sight of the aerial device.

Aerial Ladder Control Levers
The control levers shall be arranged as outlined in the current edition of NFPA 1901. The first lever from the left shall be the extension control (forward for extend and back for retract). The second lever shall be the rotation control (forward for clockwise and back for counter clockwise). The third handle shall be the elevation control (forward for down and back for up). The aerial shall employ direct hydraulic controls for precise control and dependable service with minimal electrical functions. A ring around the control levers shall be provided to prevent unintentional movement.

Rung Alignment Indicator
A light on the control console shall indicate when the ladder rungs are aligned for climbing.

Aerial Ladder Alignment Indicator
A reflective arrow mounted to the body and the turntable shall indicate when the aerial ladder is aligned with the forward aerial ladder support.

Load Indication System
A lighted elevation/safe-load indicator diagram shall be located on the lower left side of the base section to indicate safe load capacity at any angle of elevation. The safe load indicator shall be 15" x 15" in size and shall clearly communicate the aerial ladder capacity in any one of the following conditions: tipload, tipload with water flowing, and distributed load at full extension. The chart shall identify capacity using graphic characters to indicate each 250 lb. increment. The chart shall be equipped with lighting and warn of electrocution hazards from power lines and lightning.

An extension indicator shall be located on the handrails of the base section to indicate feet of extension. The control pedestal shall also come equipped with a hydraulic oil pressure gauge and lights for night operation.

Aerial Waterway
One (1) 1,000 gpm pre-piped waterway shall be supplied as outlined in the current edition of NFPA 1901. The waterway shall telescope to the end of the fly section. A waterway of 4" internal diameter shall pass through the turntable and a swivel joint to connect to the tubular aerial waterway. The tubular waterway shall run under the aerial ladder. The waterway tubes shall have the following sizes:

Base Section: 4-1/2" OD
Mid Section: 4" OD
3rd Section: 3-1/2" OD

The base section shall be constructed of regular aluminum and the second and third sections of the waterway shall be constructed of hard coat anodized aluminum and shall telescopic with the aerial ladder through sealed slip joints. The slip joints shall be designed with grease zerk fittings to facilitate lubrication.

A 1-1/2" drain valve shall be installed and operated from the rear of the apparatus to drain the waterway.

The water system shall be capable of flowing 1,000 gpm at 100 psi nozzle pressure at full elevation and extension. The friction loss between the tip and below the swivel shall not exceed 100 psi while flowing 1,000 gpm as outlined in NFPA 1901.

Waterway Relief Valve
An automatic relief valve preset at 250 psi shall be installed in the aerial waterway to prevent over-pressurization of waterway system. The relief valve shall be mounted in the lower portion of the waterway where it enters the aerial torque box frame and dumps under the apparatus.

Ladder Tip Steps
Two (2) folding steps shall be located near the ladder tip to provide a position for a firefighter using the ladder pipe/ monitor as outlined in the current edition of NFPA 1901. The steps shall have a raised surface for traction and cut outs for easy manual deployment. Each step shall have a minimum load rating of 500 lbs. and shall have a minimum step area of 35 sq. in.

ISO Compliance
The manufacturer shall operate a Quality Management System meeting the requirements of ISO 9001:2000.

The International Organization for Standardization (ISO) is a recognized world leader in establishing and maintaining stringent manufacturing standards and values. The manufacturer`s certificate of compliance affirms that these principles form the basis for a quality system that unswervingly controls design, manufacture, installation, and service.

The manufacturer`s quality systems shall consist of, but not be limited to, all written quality procedures (aka QOP) 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 products or processes. In addition, all apparatus assembly processes shall be documented for traceability and reference. The manufacturer shall also engage the services of a certified third party for testing purposes where required.

If the manufacturer operates more than one manufacturing facility each facility must be ISO certified.

By virtue of its ISO compliance the manufacturer shall provide an apparatus that is built to exacting standards, meets the customer`s expectations, and satisfies the customer`s requirements.

A copy of the manufacturer`s certificate of ISO compliance for each manufacturing facility shall be provided with the bid.

AERIAL HYDRAULIC SYSTEM OPTIONS
Aerial Hydraulic Oil Level Gauge
A hydraulic oil level gauge shall be supplied for easy fluid level verification. The three-light system shall indicate full oil level with a green light, acceptable oil level with yellow light, and low oil level with a red light. The display shall be located on pump operator's panel.

AERIAL CONTROLS
Pump Panel Aerial Controls
An additional aerial control station shall be located at the pump panel. The control station shall be contained within the pump panel and not reduce body compartment space. A selector valve shall be supplied to permit the operator to change aerial controls between the rear controls and the pump panel. The control station shall be supplied with a high idle switch, disabled during pump mode. The control panel shall also include a hydraulic pressure gauge, monitor controls if equipped with waterway, and three (3) aerial hydraulic control handles protected by a guard which encircles the handles.

Aerial Control System
The aerial shall employ direct hydraulic controls for precise control and dependable service with minimal electrical functions. The control valve shall be located just below the turntable console with the levers extending up through the panel.

MONITORS
Monitor Finish
The aerial monitor(s) shall be ordered from the OEM manufacturer painted silver.

1000 GPM Electric Monitor
The aerial ladder shall be equipped with an Akron style 3480 StreamMaster II electrically controlled monitor. The monitor shall be made from Akron`s unique lightweight Pyrolite construction to minimize ladder tip loads. The monitor shall be equipped with an Akron style 5177 Akromatic electrically controlled automatic nozzle capable of discharging 250-1,250 gpm at 80 psi nozzle pressure. This waterflow capability shall be available at any extension, elevation, or position without any restrictions while flowing 1,000 gpm. A minimum stability factor of 1.5 to 1 shall be maintained in this configuration.
The operational range of the electric monitor and nozzle shall be 135 degrees through the vertical plane (90 degrees upwards from a line perpendicular to the aerial ladder and 45 degrees downward), and 180 degrees through the horizontal plane (90 degrees to either side of the aerial ladder center line). The monitor shall be able to move in the horizontal and vertical axis simultaneously.

1000 GPM Electric Monitor Cont'd
The monitor relay box shall include an electronic control system that is attached to the inlet base of the monitor and be totally encapsulated to prevent moisture intrusion. The monitor shall have fully enclosed motors and gears with built in manual override capability and quick-attach handles. A battery, which continuously charges from the vehicle power system shall provide power for monitor movement. Systems which do not utilize a battery shall not be acceptable due to the higher incidence of failure with this type of system. **NO EXCEPTIONS.**

Control switches for horizontal movement, vertical movement and pattern selection shall be located at the control panel.

Monitor Tip Controls

In addition to the controls at the operator console, electric monitor directional and stream controls shall be installed in close proximity to the monitor on the ladder to allow operation by a firefighter on the ladder.

AERIAL WARNING LIGHTS
LED Outrigger Lights (PR)
Two (2) Truck-Lite model 91 LED outrigger warning lights with red lenses shall be provided.
The lights shall be surface mounted on the outrigger covers in compliance with current NFPA 1901.

Ladder Tip Warning Lights
Two (2) Whelen Vertex model VTC6G Super-LED green light heads with clear lenses shall be supplied and mounted one each side at the ladder tip. The lights shall include model VTCFC chrome flanges.

The lights shall be wired to activate with the aerial master power switch.

AERIAL LIGHTING
Base Spot Light
A pair of 12V Rigid Industries model 244213 LED spot lights shall be provided on the base section of the aerial device. Includes hardwired switch at turntable console.

12V LED Flood Light
A Rigid Industries 12V LED floodlight model 244113 shall be provided on a stainless steel bail mount. The light head shall measure 6.75" wide by 6.79" high by 3.42" deep and have a black powder coat finish. The light fixture shall draw 8.8 amps and produce 12,672 raw lumens.

Location(s): left side tip, right side tip.

If platform mounted a weather-resistant switch shall be provided on the platform control panel to control the light when the aerial power circuit is activated.

If aerial tip mounted a weather-resistant switch shall be provided on the aerial turntable console to control the light when the aerial power circuit is activated.

WATERWAY OPTIONS
Pinned Waterway Upgrade
A remote-controlled monitor/nozzle assembly shall be attached to a ladder fly section through C-channel slide pads which shall allow the monitor/nozzle assembly to be positioned at the tip of a section for maximum master stream reach or at the tip of the next section down for unobstructed rescue capabilities. The monitor/ nozzle assembly shall be pinned at either operating location with a single stainless steel "T" handle locking ball pin. A monitor control station shall be attached to the sliding monitor/nozzle assembly and shall move with it.
The turntable monitor controls shall be connected to the sliding monitor system using an electronic multiplexing system that sends all monitor control signals over a shielded pair of wires through a spring retract electric cable reel. The collector rings in the cable reel shall be specifically designed for accurate transmission of electronic signals.

A gel-cell rechargeable battery shall be located on the sliding monitor assembly. A dedicated ground wire and 12VDC positive charging wire shall be routed from the turntable control station through the electric cable reel to

the monitor battery. The charging wire shall be directly connected to the chassis 12VDC battery system through a 20 amp auto reset circuit breaker.

Pinned Waterway Upgrade Cont'd
The moveable monitor/nozzle assembly shall be capable of flowing from 300 gpm to 1000 gpm while maintaining a constant 80-100 psi nozzle pressure for maximum stream projection.

Waterway Inlet
One (1) 4" inlet shall be provided at the rear of the apparatus and shall be connected to the vertical pedestal waterway piping to supply water to the aerial waterway from an outside source. All fabricated piping shall be constructed of a minimum of Schedule 10 stainless steel piping to help prevent corrosion. The threads shall be NST. A long handle chrome plated 4" NST cap shall be installed on the inlet.

Flowminder
The aerial shall be equipped with one (1) Class 1 brand Flowminder for the aerial waterway to digitally display the actual volume of water being discharged in gallons per minute and the total volume of water that has flowed through the waterway.
The readout shall be mounted at the turntable control station.

The Flowminder shall consist of:

• Weatherproof digital flow display with super-bright digits at least 1/2" (0.5") high. The display shall read actual flow and shall switch to total flow when the totalizer button is depressed and held.
• Flow transmitter mounted in the aerial waterway pipe above the swivel. The transmitter shall consist of a weather-resistant black-anodized housing with brass wetted parts with a double paddle wheel.
• Connecting cables to connect the digital display to the flow transmitter and apparatus power.
• Machined mounting hardware to hold the transmitter in position in the discharge line.

The flow meter shall be checked and calibrated prior to delivery of the apparatus.

Waterway Pressure Gauge
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.

MISC AERIAL ELECTRICAL
Aerial Tip Receptacle
A 110 volt twist lock 20 amp receptacle outlet shall be installed at the tip of the aerial device and wired into an apparatus breaker box with a 30 amp breaker. The breaker shall be fitted with a GFI protection feature. The receptacle box shall be fitted with a weather-resistant cover.

SIGN PLATES
Aerial Sign Plate
Two (2) 10" x 144" x 1/8" (0.125") thick smooth aluminum plates shall be provided. The plates shall have 1" lips top and bottom for rigidity. Each sign plate shall be bolted on either side of the base section, approximately at the

midpoint. The plates shall be provided to display the department`s name or other information. The plates shall be painted Job Color as specified by the customer.

AERIAL TESTING

Third-Party Flow Test

A flow test shall be conducted to determine that the water system is capable of flowing 1,000 gpm at 100 psi nozzle pressure with the aerial device at full extension and elevation. When the aerial apparatus is equipped with a fire pump, the test shall be conducted using the onboard pump. Intake pressure for the onboard pump shall not exceed 20 psi.

In addition to the flow test, a hydrostatic test shall be done on the waterway system. The permanent water system, piping, and monitor shall be hydrostatically tested at the maximum operating pressure required to flow 1,000 gpm at 100 psi nozzle pressure at maximum elevation and extension.

These results shall be certified by an independent, third-party testing organization, per NFPA 16.13.1 through 16.13.1.3.

Aerial Certification

All certification shall be performed by a certification organization that is accredited for inspection and testing systems on fire apparatus in accordance with ISO/IEC 17020.

The aerial ladder shall be tested in compliance with the current editions of NFPA 1901 and NFPA 1911. All critical structural components of the aerial shall include 100% nondestructive testing (NDT) before assembly and body mounting. All NDT testing shall be performed by Level II or Level III technicians who have been certified in the test methods used in accordance with ANSI/ASNT CP-189.

Welds for structural load-supporting elements shall be performed by certified welders under the guidelines of AWS. Each aluminum ladder section shall be subjected to 100% NDT visual weld inspection followed by Liquid Penetrant NDT inspection as required to qualify suspected weld defect indications. Each steel ladder section shall be subjected to 100% Magnetic Particle NDT weld inspection to assure the structural integrity of the welds.

A 100% Magnetic Particle weld inspection shall be conducted on the torque box, aerial support structure, outriggers, outrigger support structure and all other structural ferrous aerial components. This test shall be performed to assure the structural integrity of the weldment.

After the aerial is assembled and installed on the vehicle, an operational inspection shall be made and the aerial shall be tested to comply with the applicable standards in the current editions of NFPA 1901 and NFPA 1911.

In addition to the above tests, the aerial shall successfully complete the following operational tests:

1) The completed apparatus shall be placed on a firm, level surface with the aerial stabilizers extended and down. The aerial shall lift a test weight equal to the rated tip load capacity, as specified herein, with the aerial at full extension, 0 degrees elevation, and rotated 90 degrees to either side of the truck chassis. The test weight shall be lifted from 0 degrees to 15-20 degrees. The test weight shall be suspended from a position equal to the position of the outermost rung of the fly section or the center of the platform when so equipped. The aerial shall lift the test weight smoothly and evenly with no twisting or jerking. This test shall be performed at the normal hydraulic system relief valve setting. No temporary adjustments to the relief valve shall be allowed.

2) The completed apparatus shall be placed on a firm, level surface with the aerial ladder stabilizers extended and down. A test weight equal to 1.5 times the aerial`s rated tip load capacity, shall be suspended from a position equal to the position of the outermost rung of the fly section (or center of the platform when so equipped), with the aerial in the straight-ahead position. The aerial shall then be rotated a full 360 degrees around the vehicle with the aerial at full extension and at 0 degrees elevation (or high enough to clear vehicle-mounted equipment). The aerial and vehicle shall show no signs of instability. This test shall be performed with no water in the tank, or hose, ladders, or removable equipment that would act as a counterbalance in order to simulate a worst-case condition.

Aerial Certification Cont'd
3) The completed apparatus shall be placed on a firm surface having a minimum 5 degrees side slope with the aerial stabilizers extended and down. A test weight equal to 1.5 times the aerial`s rated tip load capacity, shall be suspended from a position equal to the position of the outermost rung of the fly section (or center of the platform when so equipped), with the aerial in the straight-ahead position. The aerial shall then be rotated 90 degrees to the downhill side with the aerial at full extension, 0 degrees elevation (or high enough to clear vehicle-mounted equipment). The aerial and vehicle shall show no signs of instability, and all of the stabilizers shall remain firmly on the ground. This test shall be performed with no water in the tank, or hose, ladders, or removable equipment that would act as a counterbalance in order to simulate a worst-case condition.

4) The completed apparatus shall be placed on a firm, level surface with the aerial stabilizers extended and down. A test weight equal to 2.0 times the aerial`s rated tip load capacity, shall be suspended from a position equal to the position of the outermost rung of the fly section (or center of the platform when so equipped), with the aerial in the straight-ahead position at full extension and at 8 degrees elevation (or high enough to clear vehicle-mounted equipment). After ten (10) minutes, the weight shall be removed, and the aerial shall be inspected for any abnormal twist or deflection.

5) The completed apparatus shall be placed on a firm, level surface with the aerial stabilizers extended and down. The aerial will be positioned at full extension at 0 degrees elevation at some position out of the travel rest and off the side or rear of the truck. For units without a pre-piped waterway to the tip, a test weight of 220# shall be applied horizontally and perpendicular to the tip of the aerial at the location of the outermost rung. The rotation brake shall not release nor shall the aerial`s deflection exceed the manufacturer`s accepted tolerances. For aerials with pre-piped waterways, a test weight of 350# will be applied at the location of water nozzle.

Upon satisfactory completion of all inspections and tests, an independent third-party inspection firm shall submit a certificate indicating that all specified standards have been met.

LOOSE EQUIPMENT
TFT Jumbo Intake Valve
TFT AX8NP-NX-PS Intake Valve 4"FNST x 4" Storz with cap. With A1621-KIT Vent drain kit.

GROUND LADDERS
Duo-Safety Folding Ladder
A Duo-Safety 585-A, 10` folding attic ladder shall be provided.

Duo-Safety Roof Ladder
A Duo-Safety 775-A, 14` roof ladder shall be provided. Folding steel roof hooks shall be attached to one end of the ladder with steel spikes on the other.

Duo-Safety Roof Ladder
A Duo-Safety 875-A, 16` roof ladder shall be provided. Folding steel roof hooks shall be attached to one end of the ladder with steel spikes on the other.

Duo-Safety 2-Section Extension Ladder
A Duo-Safety 900-A, 24` 2-section extension ladder shall be provided.

Duo Safety 2 Section Extension Ladder
A Duo-Safety model 1200-A 35` two-section extension ladder without poles shall be supplied

MISC LOOSE EQUIPMENT
DOT Required Drive Away Kit
Three (3) triangular warning reflectors with carrying case shall be supplied to satisfy the DOT requirement.
Headset [Qty: 4]

A Setcom intercom only headset shall complement the intercom system selected.
One (1) model CSB-901 "under the helmet" headset.
The intercom shall be ordered separately and is not included as part of the headset(s).

Controls include:

- Push to talk intercom.
- Adjustable boom.
- Volume control
- 15` coiled cord.

EXTERIOR PAINT

Paint Break

The cab shall have a two-tone paint break. The break line shall be located as follows based on cab model.

Typhoon X and CII X cabs: 31.5" below the drip rail.

Pre-07` emission Typhoon cab: 33.5" below the drip rail.

Quest cab: 41.375" up from bottom of cab.

Tip Paint

The tip of the aerial ladder shall be painted job color to assist firefighters in locating the ladder tip. The last three rungs, uprights and beams from the tip shall be painted; including nozzle guard (if equipped).

Un-Painted Pump/Pre-Connect Module(s)

All applicable pump application modules shall have a sanded finish (not painted job color). Includes upper and lower pump modules, crosswalk module and/or speedlay/pre-connect module (as applicable). Rear mounted body/pump module shall be painted job color.

Paint Custom Cab

The apparatus cab shall be painted Sikkens FLNA3225E-1 Red. 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.

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

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

Paint Cab Two-Tone Color
The upper section of the cab shall be painted As Specified (Does not include metallic paint).

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

Paint Body Large
The apparatus body shall be painted Sikkens FLNA3225E-1 Red. 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, hand rails, doors, lights, or other specified components shall be treated at the point of penetration with a corrosion inhibiting pre-treatment (ECK Corrosion Control). The pre-treatment shall be applied to the aluminum sheet metal or aluminum extrusions in all locations where the aluminum has been penetrated. All hardware used in mounting steps, hand rails, doors, lights, or other specified components shall be individually treated with the corrosion inhibiting pre-treatment.

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

Aerial Paint
The lift cylinders, extension cylinders and upper turntable steelwork (less turntable) shall be painted FLNA4006 white.

Air Conditioning Condenser(s)
The air conditioning condenser cover(s) mounted on the roof of the cab shall be painted color: Job Color.

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.

PROTECTIVE COATINGS

LINE-X package for custom cab roof

LINE-X package for custom cab roof: All roof plate sufaces including the rear lip over the backwall and trough plates if applicable shall have LINE-X coating. All platework (risers, boxes, etc) fabricated at E-ONE and installed on the roof shall be included in this package.

LETTERING

Scotchlite Letter [Qty: 50]

Scotchlite letters upto 6" tall shall be applied.

The exact size, color and location of the letters shall be as specified by the customer.

STRIPING

Reflective Tape on Stabilizers

The two aerial ladder stabilizers which protrude beyond the side of the body shall be striped with white reflective tape. The tape shall be visible from the front and rear of the unit.

Reflective Stripe in Rubrail

The reflective stripe in the body rubrail shall be white.

Cab and Body Stripe

A single Scotchlite stripe, upto 6 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.

Scotchlite Cab Stripe

Scotchlite cab stripe shall be 3/4" in width. Stripe shall be centrally located and shall contour with the cab, following the paint break. Color of the stripe shall be as specified by the customer.

Rear Body Scotchlite Striping

Individual chevron style Scotchlite striping shall be provided on the rear of the apparatus. The stripes shall consist of 6" Yellow/Red 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

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.

75', 1500-GPM/470-30 Gallon

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.

20 Year Aerial Device Structural Warranty
The aerial manufacturer shall provide a 20 year structural integrity warranty on the aerial device. This warranty shall cover structural components and shall be extended for a period of 20 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.

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 5-year/unlimited miles, 5-year parts and 5-year labor **front non-drive steer** axle warranty shall be provided by Meritor Automotive or a 2-year/unlimited miles, 2-year parts and 2-year labor **front drive steer** axle warranty shall be provided by Meritor Automotive.

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

Training
The manufacturer shall provide three (3) days of training covering vehicle maintenance and operational familiarization.
This training shall be provided by a full time, manufacturer employee trainer who specializes in aerial training.

Approval Drawings
A general arrangement drawing depicting the vehicle`s 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.
The customer shall provide signed approval of the drawing prior to order release to production.

If a pre-build conference is held at the factory, the drawing shall be available for the meeting.

Pump Panel Approval Drawing
A detailed large scale approval drawing of the pump panel(s) shall be provided. The drawing shall be provided on an 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 an purchased unit prior to the construction process.

Electrical Drawings
Three (3) sets of "AS BUILT" electrical drawings shall be provided.

Plumbing Drawings
Three (3) sets of "AS BUILT" plumbing drawings shall be provided.

Training Manual
One (1) printed aerial training manual shall be supplied.

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.

Electronic Manuals Cont'd
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 E-ONE`s fire apparatus operator and maintenance manuals or commercial chassis manufacturer`s operator and maintenance manuals.