

Tennessee Fire and Codes Academy
Quint Aerial Specifications

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Section 1.1: General Information

It is the intent of these specifications to provide design and functional criteria for the purchase of one (1) Quint Aerial Fire Apparatus for use by the Tennessee Fire and Codes Academy (TFACA) for the purpose of training firefighters in the use and operation of a Quint Aerial Apparatus. The apparatus must be of new construction and designed and constructed with due consideration to the nature and distribution of the load to be sustained.

These specifications detail the requirements for general design criteria of cab and chassis components, aerial device, fire pump and related components, water tank, fire body, electrical components, painting and equipment.

The completed vehicle, as well as any and all specified equipment and capabilities, shall meet or exceed the design and operational requirements of the latest edition of the National Fire Protection Associations Standard 1901, Standard for Automotive Fire Apparatus.

All items listed in the specifications are to be considered mandatory. The apparent silence of this specification as to any details or the omission from it of a detailed description concerning any point shall be regarded as meaning that only the best commercial practices are to prevail and that only materials of first quality and correct type, size and design are to be used. All workmanship is to be of the highest quality. The unit herein specified shall be constructed throughout of new parts and materials which shall have seen no service other than that necessary for the factory test. The unit bid must be the latest model.

No prototype or experimental apparatus shall be bid. The builder must demonstrate that he has successfully produced and sold apparatus of the same design and of the same material in the past two years. Total exception to bid specifications shall be cause for immediate rejection.

Section 1.2: Instructions to Bidders

Only one (1) bid shall be submitted by each manufacturer that meets or exceeds the minimum requirements as specified herein. Prototypes, demo units, or other vehicles that do not meet these specifications shall not be bid.

The bid document should not have erasures, strike over's and/or changes to prices or other responses and should any be included, they must be initialed by the bidder. Failure to initial may be cause to reject the bid as irregular and disqualified from consideration.

Section 1.3: Exceptions

Any exception or variation in construction, performance, tests, or items of equipment between the purchaser's specifications and the bidder's proposal shall be detailed and submitted on sheets provided along with the bidder's proposal, in bid sequence, and citing page and paragraph number. The bidder must explain in detail, and with full supporting data, how the proposed deviation meets or exceeds the specifications and why it is necessary. The purchaser reserves the right to determine which (if any) deviations are acceptable. Bids that contain "Clarifications" that are inconsistent with the specifications shall be considered exceptions to the bid and must be documented as previously described.

Section 1.4: Service and Parts

The manufacturer must have a 24 hour/ 7 day a week service center. The manufacturer must be capable of providing both in-house and on-site service for the specified Quint fire apparatus. The bidder shall include the location and capabilities of their service department in their bid proposal. Each bidder must be able to display that they are currently maintaining an established service center and parts depot capable of satisfying the warranty service requirements and parts requirements for the model and quantity of units bid. The bidder must be capable of submitting a current parts list covering all parts for the model of unit bid.

In order to maintain this complex piece of fire apparatus, the experience and reliability of the factory authorized service center is of major concern to the State of Tennessee. The service facility must comply with the following criteria in order to be considered:

- The facility must have a minimum of five (5) years of experience repairing and maintaining fire apparatus of the make and type of apparatus being bid.
- ASE and /or EVT certified factory trained technicians shall perform all repairs and testing.
- Fully equipped mobile service trucks must be maintained for the purpose of performing service and repair work at purchaser's facility/s

The bidder shall submit the location and description of the service center and mobile service unit(s) along with the bid.

It is the desire of the State of Tennessee that, where possible, the apparatus be constructed using parts commonly used by heavy-duty truck manufacturers and available on the open market so that replacement parts are more readily available so as to reduce down time and replacement part costs.

The bidder must ensure that a stock of routine repair parts is maintained at the service center location. The State of Tennessee reserves the right to reject bids of vendors who cannot produce satisfactory evidence that this inventory is available and that they can furnish all other parts needed for service or repair of the equipment herein specified in a timely manner.

Section 1.5: Testing and Certification

Prior to delivery, all NFPA required testing shall be completed and documentation shall be provided upon delivery of the vehicle which confirms successful completion of all required and specified testing. Vehicles that have not been tested, or have not successfully passed said testing shall not be accepted. Conditional, temporary, or partial certification test results shall not be acceptable.

A road test shall be conducted with the apparatus fully loaded and a continuous run of no less than ten (10) miles. During that time the apparatus shall show no loss of power nor shall it overheat. The transmission drive shafts and the axles shall run quietly and be free of abnormal vibration or noise. The apparatus shall meet NFPA 1901 acceleration and braking requirements. The apparatus when fully loaded shall not have less than 25% or more than 50% on the front axle and not less than 50% or more than 75% on the rear axles.

The road, aerial and pump tests required in NFPA 1901 shall also be conducted at the time of delivery as part of the acceptance testing process. In the event the apparatus fails to meet the test requirements on the first trials, second trials may be made at the option of the bidder within thirty (30) days of the date

of the first trials. Such trials shall be final and conclusive, and failure to comply with these requirements a second time shall be cause for rejection.

Permission to keep or store the apparatus in any building owned or occupied by the purchaser during the above specified period, with the permission of the bidder, shall not constitute acceptance. Insurance covering loss, theft, or liability shall remain the responsibility of the bidder until formal acceptance is completed

The cab design shall have successfully achieved survival of the International crash test ECE-R29, Addendum 28, Revision 1 standards. Documentation of the testing shall be provided with the bid proposal.

A third party inspection certificate for the aerial device shall be furnished upon delivery of the aerial apparatus. The certificate shall be Underwriters Laboratories, Inc. Type 1 and shall indicate that the aerial device has been inspected on the production line and after final assembly.

The NFPA 1901 electrical system tests requirements shall be performed and recorded including reserve capacity, alternator test, and low voltage alarm test.

Section 1.6: Delivery and Acceptance

The completed vehicle shall be delivered to the Tennessee Fire and Codes Academy, 2161 Unionville-Deason Road, Bell Buckle, Tennessee. Each bidder shall state the complete apparatus delivery time in calendar days, from receipt of the purchase order to delivery at the TFACA in their bid proposal. The apparatus shall be delivered by the bidder under its own power with all equipment specified.

Acceptance of the delivered apparatus and equipment shall be made after successful completion of all required tests, inspections, and receipt of all specified equipment and documentation. Equipment items not delivered at time of the tests, or construction not in conformance with the proposal, shall be cause for the accepting authority to withhold payment until delivery is complete and acceptable. Deviations shall not be tolerated and shall be cause for rejection of the apparatus unless they were originally listed in the bidder's proposal or previously approved.

Section 1.7: Contractor Specifications and Drawings

A complete set of contractor specifications of the proposed apparatus shall be submitted with the bid. The purpose of these contractor specifications is for the vendor to provide detail as to how they intend to build and supply the vehicle herein specified. Simply copying and submitting the State's specification shall not meet this requirement. Discrepancies found in the contractor's specifications shall be considered noncompliance.

The State's specifications shall, in all cases, govern the construction of the apparatus, unless a properly documented exception or deviation was approved. Any bid indicating that the manufacturer's proposal shall supersede the purchaser's specifications shall be considered a complete substitute specification and shall be rejected.

Detailed drawing/s of the apparatus being bid shall be included in the bid proposal. These drawings shall be computer generated "C" size and shall clearly indicate cab design, aerial ladder, pump location and

intakes and discharges, ground ladder storage and dimensions and compartmentation. Drawings shall be provided that show both sides, front, and rear of the vehicle. Drawings of the completed vehicle shall be provided at the time of delivery that reflect the completed vehicle and include all of the aforementioned components. All drawings shall be of the vehicle being bid. Drawings of similar units or demo units shall not be acceptable.

Section 1.8: Manuals and Documentation

The manufacturer shall provide at least two sets of complete operation and service manuals covering the completed apparatus as delivered and accepted. Documentation shall be accepted in both written and electronic format. The documentation shall include, at a minimum, the inspection, service, and operation of the Quint fire apparatus and all major components thereof. The manufacturer shall also deliver with the fire apparatus the following documentation for the entire apparatus and each major operating system or major component of the apparatus:

1. Manufacturer's name and address
2. Country of manufacture
3. Source for service and technical information
4. Parts replacement information
5. Descriptions, specifications, and ratings of the chassis, and pump
6. Wiring diagrams for low voltage and line voltage systems to include the following information:
 - a. Pictorial representations of circuit logic for all electrical components
 - b. Circuit identifications
 - c. Connector pin identification
 - d. Zone location of electrical components
 - e. Safety interlocks
 - f. Alternator-battery power distribution circuits
 - g. Input/output assignment sheets or equivalent circuit logic implemented in multiplexing systems
7. Lubricating charts
8. Operating instructions for the chassis, any major components such as the aerial device, and any auxiliary systems
9. Safety Precautions related to aerial devices
10. Instructions regarding the frequency and procedure for recommended maintenance
11. Overall apparatus operating instructions
12. Safety considerations

13. Limitations of use
14. Inspection procedures
15. Recommended service procedures
16. Troubleshooting guide
17. Apparatus body, chassis, and other component manufacturer's warranties
18. Paint confirmation with primary and secondary paint color
19. Special data required by NFPA 1901
20. A material safety data sheet (MSDS) for any fluid that is specified for use on the apparatus

Section 1.9: Pre-Bid Conference

A non-mandatory pre-bid conference shall be conducted at _____ on _____ at _____. The purpose of the Pre-bid conferences is to provide specific project information, explain all aspects of the project and address any potential bidder questions. Written minutes for the pre-bid conference shall be recorded and a copy of these minutes shall be made available to all attendees to all conference attendees and bidders.

Section 1.10: Pre-Construction Conference and Inspection trips

A pre-construction conference shall be conducted at the apparatus manufacturer's factory at which time all final design and equipment mounting locations shall be approved, prior to the beginning of construction. A factory design engineer shall be present during the pre-construction conference to answer any design, and/or engineering questions relating to the layout of the apparatus. At the Pre-construction conference, the State's specifications shall be discussed page by page. After careful review and agreement, approval to begin construction shall be granted. The State shall send a maximum of two (2) representatives to the Pre-construction conference. All costs for the travel related to the Pre-Construction Conference and Inspection trips shall be the responsibility of the State of Tennessee and therefore shall not be included in the bid price for the vehicle.

The manufacturer shall provide approval drawings which shall be reviewed at the pre-construction conference and, if correct, approved by the Purchaser. These drawings shall be signed and kept on file for future reference. The drawings shall be as detailed as possible, and shall include the following:

- The apparatus including a front, rear, top, views of both sides, and measurements
- Pump panel payout
- Interior of the cab showing seating positions, and measurements
- The dash showing switch positions and a description of their function
- Ladder storage area showing configuration of ladders.
- Aerial Ladder
- Aerial Ladder Waterway
- Lettering and striping configuration

In addition to the pre-construction conference, two (2) factory inspection trips to the apparatus manufacturer's facility for two (2) people shall be completed. All costs associated with these inspection

trips shall be the responsibility of the State. The first factory visit shall be a pre-paint inspection and the other shall be a final pre-delivery testing and inspection factory visit.

Section 1.11: Apparatus Information

The bidder shall include with their bid, the following exact measurements:

- a) Overall length
- b) Width
- c) Height
- d) Wheelbase
- e) Aerial Ladder Reach – Maximum above grade Aerial Ladder Reach – Maximum below grade
- f) Front G.A.W.R.
- g) Rear G.A.W.R.
- h) Total G.A.W.R.
- i) The inside width of the ladder including all sections
- j) The height of the handrails above the centerline of the rungs for all ladder sections.

Section 1.12: Warranties

The entire completed vehicle shall have a bumper to bumper warranty of not less than two (2) years. This warranty shall be non-prorated. In addition, the following components and systems shall be warranted as follows:

- a) Aerial Parts and Labor – 5 yr.
- b) Aerial Structure – 20 yr.
- c) Aerial Waterway and Seals – 10 yr.
- d) Apparatus Body – 10 yr.
- e) Cab Structure – 10 yr.
- f) Chassis Frame Rails - Lifetime
- g) Electrical / Electronic Systems – 2 yr.
- h) Engine – 5 yr.
- i) Fire Pump – 5 yr. (parts & labor)
- j) Front and Rear Axles – 3 yr.
- k) Paint – 10 yr.
- l) All Plumbing, Including Valves – 5 yr.
- m) Transmission – 5 yr.
- n) Water Tank – Lifetime

Section 1.13: Performance Bond

A performance bond in the amount of one hundred percent (100%) of the bid shall be furnished by the successful bidder within fourteen (14) days after receiving the official notice of award of contract. Failure of the contractor to complete delivery according to the contract and specifications shall be cause to begin action for forfeiture of performance bond.

Section 1.14: Bid Bond

A bid bond or certified check in the amount of ten percent (10%) of the bid (not to exceed \$20,000) shall be furnished with the bidder's proposal. The bond shall ensure that the bidder shall enter into contract

and submit a performance bond within 14 days of notice of award of contract. The successful bidder's bid bond shall be returned or released after a contract is executed and an acceptable performance bond has been delivered. In case of failure to comply within the stated time, the bid bond shall be forfeited as liquidated damages because of the default. The bid bonds or checks of all unsuccessful bidders shall be returned after bids are opened and award is made to the successful bidder.

The bonds furnished by the successful bidder shall be from a surety company authorized to underwrite surety bonds in the State of Tennessee with a minimum A.M. Best rating of A. The purchaser may review the financial condition of the surety and accept or reject any surety at its discretion. Sureties must submit bonds in a form that shall be subject to the approval of the purchaser.

Section 1.15: Product Liability Insurance

Product liability insurance of not less than \$5,000,000 shall be supplied by the bidder. Documentation of the amount of product liability carried by the manufacturer and the name of the insurance carrier shall be provided by the bidder at the time of bid submission. The successful bidder shall defend any and all suits and assume liability for the use of patented device or article forming a part of the apparatus furnished under the contract. Failure to supply a copy of the Certificate of Insurance with the bid shall be cause for immediate rejection of the bid.

Section 1.16: Manufacturer Solvency

The solvency of the manufacturer is a prime concern to the State of Tennessee. Each bid must include a financial statement from Dun and Bradstreet or another nationally recognized accounting firm.

Section 1.17: Payment

The State of Tennessee shall not accept any bid that requires down payments, progressive payments during construction, or contracts with escalator clauses. Terms of payment shall be 100 percent payment after acceptance of the vehicle. No other terms shall be acceptable. All certificates of origin are to be transferred to the State of Tennessee with the title in the name of the State of Tennessee by the vendor and delivered with the apparatus.

Section 1.18: Training

Fire Academy personnel shall be properly instructed as to the proper use of the entire apparatus including, but not limited to, chassis, fire pump system, aerial, and all equipment. The training shall be conducted by a factory trained Delivery Engineer who shall be responsible for complete instruction as to operation and maintenance of the completed vehicle. The Delivery Engineer shall conduct the delivery training over a three (3) day period thus allowing participation of various personnel.

Section 1.19: Single Source Manufacturing

In order to protect the State from divided warranty issues between chassis, aerial, and body manufacturers, proposals shall only be considered from apparatus builders who design, fabricate, and assemble the complete apparatus at their own facilities. This shall include the cab shell, chassis assembly, aerial device, and complete body structure. Private labeling of another manufacturer's chassis, aerial, or body shall not meet the requirements of this section.

Section 1.20: ISO 9001 Certification

The manufacturer shall also be certified to operate a Quality Management System under the requirements of ISO 9001. These standards sponsored by the International organization for Standardization (ISO) specify the quality systems that shall be established by the manufacturer for design, manufacture, installation and service. A copy of the certificate of compliance shall be included with the bid. Bids from manufacturers who are not ISO 9001 certified shall not be accepted.

Section 2.0 General Design Specifications, Quint Fire Apparatus

The cab and chassis shall be a custom fire apparatus model. Converted commercial truck chassis shall not be acceptable. The cab and chassis shall be a of a single rear axle design and be designed for the use herein specified. The chassis shall be manufactured for heavy-duty service with the strength and capacity to support a fully laden apparatus, at all times. The vehicle shall include a fire pump of not less than 1500 gpm, an aerial ladder of not less than 75 feet with waterway, a water tank of not less than 500 gallons, a full NFPA compliment of ground ladders, and rescue style compartmentation.

The apparatus manufacturer shall calculate the load distribution for the apparatus, and that load distribution plan shall be delivered with the fire apparatus. The manufacturer shall engineer the fire apparatus to comply with the gross axle weight ratings (GAWR), the overall gross vehicle weight rating (GVWR), and the chassis manufacturer's load balance guidelines. The apparatus, when loaded to its estimated in-service weight, shall have a side-to-side tire load variation of no more than 7 percent of the total tire load for that axle.

Section 3.0: Chassis and Associated Components

The chassis, and all associated components, shall be of new manufacture and suitable for heavy duty service having adequate strength and capacity for the intended load and shall have the following rated capacities:

- Gross Axle Weight Rating Front: The front gross axle weight rating (GAWR) of the chassis shall be not less than 21,500 pounds.
- Gross Axle Weight Rating Rear: The rear gross axle weight rating (GAWR) of the chassis shall be not less than 31,000 pounds.
- Combined GVWR shall be approximately 52,500 pounds which shall be adequate to carry the weight of the completed apparatus including all equipment and personnel.

The front and rear axles shall be laser aligned. The front tires and wheels shall be aligned and toe-in set on the front tires by the chassis manufacturer. All wheels and tires shall be balanced prior to delivery. Cramp angle shall be set to achieve the greatest turning radius possible with the selected components of the vehicle. The cramp angle shall be not less than 45 degrees to left and right.

Section 3.1: Front Axle

The front axle shall be of the conventional design with a ground rating of not less than 21,500 pounds. Oil seals with viewing windows shall be provided on the front axle. Front Suspension shall be a conventional suspension with a capacity of not less than 21,500 pound. Double acting shock absorbers shall be installed on the front suspension.

Section 3.2: Rear Axle

The rear axle shall be of the conventional design with a ground rating of 31,000 lbs. The rear axle suspension shall leaf spring type rated at not less than 31,000 pounds capacity. The suspension shall be a torque leaf, variable rate, self-leveling slipper type. The grease fittings shall be 90-degree type and shall be accessible without removing the wheels or cutting any sheet metal. Two (2) top leaves shall wrap the forward spring hanger pin and the top leaf shall wrap the rear spring hanger pin on both the front and rear suspensions.

The spring pins shall be provided, with double figure-eight grease grooves. The bushing that holds the spring pin in place shall also have a grease groove.

Section 3.3: Air Brake System

The vehicle brake system shall include the following:

- Front disc brakes with a minimum of 17" rotors.
- The rear axle shall be equipped with, the largest available for the specified axle, S-Cam air operated brakes with automatic slack adjusters.
- The air brake system shall meet the requirements of FMVSS-121. The system shall consist of three-(3) reservoirs with a total capacity of not less than 5100 cubic inches. The system shall be of dual circuit and quick build up design powered by an engine mounted gear driven air compressor. The air compressor shall have a rated capacity of not less than 18.00 cubic feet per minute output at 1,250 rpm. The system shall be protected by a heated air dryer with heated automatic moisture ejector on the wet tank and quarter turn brass drain valves on the other tanks.
- The brake system shall be equipped with a valve to provide modulated spring brakes in the event there is low air pressure in the rear axle air supply reservoir and/or service brake air system failure.
- The parking brake system is to be the spring set type operated by control valve on driver's console.
- The vehicle shall be equipped with an anti-lock braking system. The ABS shall provide a 4-channel anti-lock braking control on both the front and rear wheels. A digitally controlled system that utilizes microprocessor technology shall control the anti-lock braking system. Each wheel shall be monitored by the system. The anti-lock brake system shall eliminate the lockup of any wheel thus helping to prevent the apparatus from skidding out of control.
- The system shall be plumbed using color-coded nylon airlines with brass push-lock fittings.
- Dual brake treadle valve with vinyl covered foot surface
- Heated automatic moisture ejector on air dryer
- Two (2) air pressure gauges with a red warning light and an audible alarm that activates when air pressure falls below 60 psi
- A parking "brake on" indicator light on instrument panel
- Park brake relay/inversion and anti-compounding valve, in conjunction with a double check valve system, with an automatic spring brake application at 40 psi
- A pressure protection valve to prevent all air operated accessories from drawing air from the air system when the system pressure drops below 80 psi.
- The air tank/s shall be primed and painted high gloss black.

- The air tank/s shall be mounted with stainless steel brackets.
- One (1) air inlet with male coupling shall be provided. It shall allow station air to be supplied to the apparatus brake system through a shoreline hose. The inlet shall be located in the driver side lower step well of cab. A check valve shall be provided to prevent reverse flow of air. The inlet shall discharge into the "wet" tank of the brake system. A mating female coupling shall also be provided with the loose equipment.
- One (1) air outlet shall be installed with a female coupling and shut off valve, located on the driver side pump panel. This system shall tie into the "wet" tank of the brake system and include an 85-psi pressure protection valve in the outlet line to prevent the brake system from losing all air. A mating male fitting shall be provided with the loose equipment.
- An additional all wheel lock-up system shall be installed which applies air to the front brakes only.

Section 3.4: Secondary Braking System

The engine shall be equipped with an Engine Compression Brake which enables the engine to decelerate the vehicle by turning the energy producing diesel engine into an energy absorbing air compressor slowing the vehicle. An on-off control switch and a high-low selector switch shall be mounted in the cab and clearly labeled.

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.

Section 3.5: Frame

The frame shall consist of double rails running parallel to each other with cross members forming a ladder style frame. The frame rails shall be formed in the shape of a "C" channel. Each rail shall be constructed of not less than 110,000-psi minimum yield high strength low alloy steel and include a full frame liner. The inner frame liner shall be of not less than 110,000 pound minimum yield. The inclusion of the body mounting, or bumper mounting shall not be considered as a cross member. All frame-mounted components shall be secured with grade eight bolts with hardened washers and distorted thread locknuts. The frame, axles, drivelines, air tanks, steering gear, frame mounted brackets, drag link, and fuel tank shall be painted high gloss black. The frame rails, cross members, associated components, as well as the body sub-frame shall be undercoated with a heavy-duty automotive type undercoating.

Section 3.6: Bumpers

The vehicle shall be equipped with a steel front bumper assembly. The sides and bumper front shall be formed from steel plate of not less than .25 inches thick. The bumper shall be a minimum of 10.00" high with a 1.50" top and bottom flange, and shall extend approximately 20.00 inches from the face of the cab. The bumper shall be full width with 45 degree corners and side plates. The front bumper assembly shall be mounted directly to the front frame extensions for maximum strength. The bumper shall incorporate two (2)-stiffening ribs and shall extend not more than 4" forward of the front of the cab to provide additional protection against low-speed frontal impacts. The bumper shall be painted Red to match the lower cab color. The front face and sides of the bumper shall be covered in chevron red/yellow reflective striping.

The extended front bumper shall include a 1/8" (.125") aluminum treadplate top covering. The bumper extension shall include a center mounted hose compartment capable of holding not less than 100 feet of 1.75 inch DJRL fire hose. The front bumper hose tray shall be supplied from the fire pump and controlled by a push/pull valve handle located on the Operators pump panel. The supply for the hose tray shall be located on the Driver's side top of the bumper and include a flex joint with 1 ½ NT fire threads. One (1) pair of hose tray restraint straps shall be installed over the center mounted tray so as to secure the hose in the tray.

A bright aluminum treadplate cover shall be provided over the hose tray. The cover shall be attached with a stainless steel hinge and include a D handle latch. A pneumatic stay arm shall hold the cover in the open position.

The bumper extension shall be bolted to the chassis frame rails through reinforcement plates. Fasteners utilized shall be Grade 8 bolts.

Section 3.7: Air Horns

The front bumper shall include two (2) air horns which shall measure approximately 21.00 inches long with a 6.00 inch round flare. The air horns shall be trumpet style with a chrome finish on the exterior and a painted finish deep inside the trumpet. The air horns shall be recess mounted in the front bumper face, one (1) on the right side of the bumper in the inboard position relative to the right hand frame rail, and one (1) on the left side of the bumper in the inboard position relative to the left hand frame rail. The air horns shall be powered by the vehicle air system and include an in-line pressure protection valve to prevent loss of all air from the apparatus air brake system.

The air horns shall be active in both the "Scene" and "Response Mode".

A driver controlled horn/air horn selector switch shall be installed in the cab and operate either air horn(s) or chassis electric horn through the horn ring button.

One (1) air horn activation button shall be provided on the Operator's Pump panel.

Section 3.8: Sirens

The front bumper shall include an electro mechanical chrome-plated siren that shall produce not less than 123 decibels of sound at 10.00 feet. Actual mounting location to be determined at the pre-construction conference. Siren and siren brake controls shall be provided in the cab in a location convenient to the Driver.

The bumper shall include two (2) 100-watt siren speakers that shall be recess mounted within the bumper fascia. The speaker shall include a stainless steel grill.

Section 3.9: Tow Eyes

The front bumper shall include two (2) chrome plated tow eyes that shall be installed through the gravel shield above the front bumper. The tow eyes shall be fabricated from 0.75-inch thick #1020 ASTM-36 hot-rolled steel. The inside diameter of the tow eye shall be 2.00 inch and have a chamfered edge.

Two (2) painted rear tow eyes shall be installed under the rear bumper, front face, recessed with front even with rear bumper.

Section 3.10: Stability Enhancement System

A roll stability control (RSC) system shall be provided on the apparatus chassis. The RSC shall assist in managing road conditions that may result in an apparatus rollover. The RSC shall intervene to regulate the apparatus' deceleration functions by automatically reducing engine torque, engage the apparatus retarder and apply pressure to the brakes. Electronic Stability Control (ESC) shall be included building upon the established RSC system by sensing the tendency of the vehicle to spin around and automatically applying the brakes to reduce that risk. The system shall conform to NFPA 1901.

Section 3.11: Traction Control

An automatic traction control with deep snow and mud switch shall be at driver's control area. A light shall illuminate on the driver's dash when the drive wheels slip during acceleration. Switch shall include a cutoff.

Section 3.12: Tires, Wheels and Associated Devices

The following wheels, tires and devices shall be provided:

- Front Wheels: The front wheels shall be hub piloted, polished aluminum wheels sized for the application and vehicle load.
- Front tires: The front tires shall be not less than 20 ply tubeless radial with highway tread. The front tire load capacity shall be not less than 22,800 pounds with a speed rating of 68 miles per hour when properly inflated.
- Rear Tires: The rear tires shall be not less than 20 ply tubeless radial with WHA tread. The rear load capacity shall be not less than 36,000 pounds with a speed rating of 68 miles per hour when properly inflated.
- Rear Wheels: All rear wheels shall be aluminum wheels with a polished outer surface.
- All wheels shall include stainless steel lug nut covers.
- Stainless steel hub covers shall be provided on the front axle.
- A pair of stainless steel high hat hub covers shall be provided on rear axle hubs.
- All wheels shall be equipped with valve extensions.
- Each tire installed on the apparatus shall be equipped with a tire pressure monitoring device. The valve stem inflation pressure sensitive monitor shall provide a visual color or LED indication of when the tire pressure is below the manufacturer's recommended level.
- Heavy duty, black rubber type mud flaps shall be provided behind all wheels.

Section 3.13: Apparatus Top Speed

The top speed of the apparatus shall be 60 MPH at the governed engine RPM. Apparatus top speed shall be in compliance with NFPA 1901 Current Edition

Section 4.0: Diesel Engine and Driveline

The chassis shall be powered by an electronically controlled Cummins ISX diesel engine as described below:

The vehicle shall be equipped with a turbocharged diesel engine and include an electronic governor, electronically controlled unit injectors, air cleaner, a 12-volt starter, and an air compressor of not less than 18.7 CFM. The oil filter shall be a full flow and bypass design.

This engine shall conform to the US EPA regulations for heavy-duty diesel engines and include the following:

- Power: 500 hp at 1625 rpm
- Torque: 1850 lb-ft at 1200 rpm
- Governed Speed: 2200 rpm
- Emissions Certification: EPA 2016 (GHG17)
- Fuel: Diesel
- Cylinders: Six (6)
- Starter: Heavy duty
- Fuel Filters: Dual cartridge style with check valve, water separator, and water in fuel sensor
- Coolant Filter: Cartridge style with shut off valves on the supply and return line

The engine shall include on-board diagnostics (OBD), which provides self-diagnostics and reporting. The system shall give the repair technician access to state of health information for various vehicle sub systems. The system shall monitor vehicle systems, engine and after treatment. The system shall illuminate a malfunction light on the dash console if a problem is detected.

Engine High Idle Control: A high idle switch shall be provided, inside the cab, on the instrument panel, that shall automatically maintain a preset engine rpm. The high idle shall be operational only when the parking brake is on and the truck transmission is in neutral. A green indicator light shall be provided, adjacent to the switch. The light shall illuminate when the above conditions are met. The light shall be labeled "OK to Engage High Idle." Automatic activation of the fast idle shall occur when a low voltage condition exists, the apparatus is in neutral and the parking brakes are applied. Cancellation of the fast idle shall be achieved by resetting the manual switch or by depressing the service brake pedal.

Engine Air Intake: The air intake with an ember separator shall be mounted high on the passenger side of the cab, to the front of the crew cab door. The ember separator is designed to prevent road dirt and recirculating hot air from entering the engine.

The ember separator shall be easily accessible through a hinged stainless steel grille, with latch.

Section 4.1: Engine Exhaust System

The exhaust system shall include an Aftertreatment system that continuously monitors the sensors of the exhaust system and calculates the efficiency and effectiveness of the various components of that system. The exhaust system shall include a diesel particulate filter (DPF) and a selective catalytic reduction (SCR) device to meet current EPA standards. An insulation wrap shall be provided on all exhaust pipe between the turbo and SCR to minimize transfer of heat to the cab. The exhaust shall terminate horizontally ahead of the passenger side rear wheels. A tailpipe diffuser shall be provided to reduce the temperature of the exhaust as it exits. Heat deflector shields shall be provided to isolate chassis and body components from the heat of the tailpipe diffuser. The exhaust tubing between the engine turbo and the diesel particulate filter (DPF) shall be wrapped with a thermal cover in order to retain the necessary heat for DPF regeneration. The exhaust wrap shall also help protect surrounding components from radiant heat, which can be transferred from the exhaust.

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

An indicator light panel for this system shall be located in the cab informing the driver of the systems status. At times a forced regeneration may be required, which would be indicated by a combination of illuminating and/or flashing lights.

A diesel exhaust fluid (DEF) tank of not less than 4.5 gallon shall be provided and mounted in the driver's side body forward of the rear axle.

A 0.50" drain plug shall be provided in a low point of the tank for drainage.

A fill inlet shall be located on the driver's side of the body and be covered with a hinged, spring loaded, polished stainless steel door that is marked "Diesel Exhaust Fluid Only".

The tank shall meet the engine manufacturer's requirement for 10 percent expansion space in the event of tank freezing.

The tank shall include an integrated heater unit that utilizes engine coolant to thaw the DEF in the event of freezing.

The exhaust system shall terminate in a tailpipe that is configured for the Clean Air Concept Station Exhaust Removal System, MagneGrip nozzle fitting system.

Section 4.2: Fuel System

The fuel system shall include the following components:

- The fuel system shall include a fuel filter/water separator as a primary filter. The fuel filter shall have a drain valve. A water-in-fuel sensor shall be provided and wired to an instrument panel lamp and audible alarm to indicate when water is present in the fuel/water separator. A secondary fuel filter shall be included as approved by the engine manufacturer.
- The fuel system supply and return lines installed from the fuel tank to the engine shall be reinforced nylon tubing rated for diesel fuel. The fuel lines shall be color coded and connected with brass fittings.
- A fuel tank with a minimum capacity of 65-gallon shall be provided and mounted on the chassis. The tanks shall be constructed of heavy duty steel or aluminum. It shall be equipped with swash partitions. The tank shall meet all FHWA 393.67 requirements including a fill capacity of 95 percent of tank volume
- The chassis fuel lines shall have additional length provided so the tank can be easily lowered and removed for service purposes. The additional 8 ft. of length shall be located above the fuel tank and shall be coiled and secured. The fuel line fittings shall be pointed towards the right side (curbside) of the chassis.
- An adequately sized drain plug shall be provided in a low point of the tank for drainage.
- An adequately sized fill inlet shall be located on the left hand side of the body and be covered with a hinged, spring loaded, stainless steel door that is marked "Ultra Low Sulfur – Diesel Fuel Only."
- An adequately sized vent shall be provided running from the top of the tank to just below the fuel fill inlet.
- An air to fuel cooler shall be installed in the engine fuel return line.

Section 4.3: Alternator

The alternator shall be not less than 320 amp. The alternator shall be engine driven via a power belt with an automatic tensioner. The alternator shall meet all current applicable NFPA 1901 requirements for performance.

Section 4.4 Steering System

Heavy duty power steering shall be provided that shall include a hydraulic pump with oil cooler. All power steering lines shall be wire braded and include crimped fittings.

These steering system shall include a steering wheel that shall have tilting and telescoping capabilities.

Section 4.5: Engine Coolant Radiator

The radiator and the complete cooling system shall meet or exceed NFPA 1901 and engine manufacturer cooling system standards.

For maximum cooling performance, the radiator core shall be made of copper fins having a serpentine design, soldered to brass tubes. The tubes shall be welded to brass headers for increased strength, longer road life and solder-bloom corrosion protection. Steel supply and return tanks shall be bolted to the core headers and steel side channels to complete the radiator assembly. The radiator shall be compatible with commercial antifreeze solutions.

The radiator shall be mounted in such a manner as to prevent the development of leaks caused by twisting or straining when the apparatus operates over uneven ground. The radiator assembly shall be isolated from the chassis frame rails with rubber isolators.

The radiator shall include an integral de-aeration tank, with a remote-mounted overflow tank. For visual coolant level inspection, the radiator shall have a built-in sight glass. The radiator shall be equipped with a pressure relief cap.

A drain port shall be located at the lowest point of the cooling system and/or the bottom of the radiator to permit complete flushing of the coolant from the system.

A heavy-duty fan shall draw in fresh, cool air through the radiator. Shields or baffles shall be provided to prevent recirculation of hot air to the inlet side of the radiator. The engine shall be equipped with a clutch fan system. The fan shall be automatic when the pump transmission is in "Road" position, and fully engaged in "Pump" position.

Silicone hose shall be used for all engine coolant lines to be installed by the chassis manufacturer.

Hose clamps shall be stainless steel constant torque type to prevent coolant leakage. They shall react to temperature changes in the cooling system and expand or contract accordingly while maintaining a constant clamping pressure on the hose.

Section 4.6: Transmission

One (1) Allison 4000 EVS, electronically controlled, 5 speed automatic transmission with integral fluid filter shall be provided. The transmission shall have 4th gear operating controls and programmed for Fire Apparatus vocation. An electronic oil level indicator shall be provided as well as a diagnostic reader port connection. The transmission shall be geared to provide one-to-one ratio in fourth gear for fire

pump applications. This dedicated "lockup" circuit shall be provided for pump operation. The transmission fifth gear shall be an overdrive ratio, permitting the vehicle to reach its top speed at the governed engine speed.

The transmission shall be equipped with an automatic neutral feature. Applying the parking brake shall command the transmission to neutral, regardless of drive range requested on the shift selector which shall require re-selecting the drive range to shift out of neutral.

The transmission shall be equipped with dual PTO ports with engine speed capabilities. The transmission shall be cooled by a radiator-mounted heat exchanger. The transmission fluid shall meet Allison specification TES-295. Touch pad control shift module shall be mounted to the right of the driver on the console and be indirectly illuminated for night operations. The transmission shall be equipped with diagnostics to monitor oil life, filter life, and transmission health. A warning light and buzzer shall be provided on the cab dash to alert the driver should the transmission overheat.

Section 4.7: Drivelines

All drivelines shall be heavy-duty metal tube and equipped with heavy duty universal joints. The shafts shall be dynamically balanced prior to installation to alleviate future vibration. Driveshaft drop guard shall be provided on the rear driveshaft to prevent damage to the vehicle should the driveshaft fail.

Section 5.0: Cab

The vehicle shall include an all-welded aluminum and fully enclosed four (4) door 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 that creates an occupant compartment that provided protection for the vehicle occupants.

The cab shall include a raised roof of not less than 10 inches nor more than 12 inches and a rear cab extension of not less than 10 inches. The raised roof section shall start at approximately the center of the front axle and continue rearward over the rear section of the cab to the back wall of the cab. This section shall be notched to provide a cradle area for the aerial ladder.

The cab shall be not less than 94" wide (outside door skin to outside door skin). The front cab area shall measure approximately 72 inches from the center of the front axle forward to the outer edge of the cab front. The rear cab area shall measure approximately 67 inches from the center of the front axle rearward to the back wall of the cab.

The floor of the cab shall be covered with a multi-layer mat consisting of sound absorbing closed cell foam with non-slip vinyl surface with a pebble grain finish.

A fully insulated engine cover shall be provided between the driver and officer. An engine tunnel equipment mounting plate shall be installed. The location is to be determined at the preconstruction conference. The engine cover shall be coated or painted with slip resistant surface material that is grey in color. This material shall act as a sound deadening and heat reducing covering. Vinyl coverings shall not be accepted.

Aluminum plate or Tread plate shall be installed in the floor below each seating position.

The cab and chassis shall have passed all load and impact tests required for compliance certification with United Nations Agreement, Standard for Protection of Cab Occupants, Regulation #29.

The exterior of the rear cab wall shall be covered with bright aluminum tread plate.

The cab front corners shall be contoured.

Full fender well liners shall be provided. Both of the liners shall extend out past the cab side sheet work and terminate in a highly polished stainless steel fender crown.

Section 5.1: Cab Interior

The interior of the cab shall be of the open design and insulated against heat and sound intrusion.

A full width and length headliner shall be installed in both forward and rear cab sections. The headliner shall include a sound barrier. The headliner shall be securely fastened to interior cab ceiling.

The cab ceiling and walls shall include insulation that is not less than 1 inch thick. The insulation shall act as a barrier absorbing noise as well as assisting in sustaining the desired climate within the cab interior.

Section 5.2: Occupant Safety System

The vehicle shall include an occupant protection system, which shall secure belted occupants and increase the survivable space within the cab. The occupant protection system shall selectively deploy integrated systems to protect against injuries in qualifying frontal impact, side impact, and rollover events. The occupant protection system side impact system shall be independently tested to ensure occupant injury criteria does not exceed injury criteria defined in Federal Motor Vehicle Safety Standard (FMVSS) 214.

The cab safety system shall be designed to protect occupants in the event of a side roll or frontal impact.

The SRS system shall deploy the following components in the event of a frontal or oblique impact event:

- Driver side front air bag
- Passenger side knee bolster air bag
- Air curtains mounted in the outboard bolster of outboard seat backs
- Suspension seats shall be retracted to the lowest travel position
- Seat belts shall be pre-tensioned to firmly hold the occupant in place

The SRS system shall provide protection during a fast or slow 90 degree roll to the side, in which the vehicle comes to rest on its side. The system shall analyze the vehicle's angle and rate of roll to determine the optimal activation of the advanced occupant restraints.

The SRS system shall deploy the following components in the event of a side roll:

- Air curtains mounted in the outboard bolster of outboard seat backs
- Suspension seats shall be retracted to the lowest travel position
- Seat belts shall be pre-tensioned to firmly hold the occupant in place

Section 5.3: Cab Seating

Seating for six (6) shall be provided in the cab. All cab seating shall be in accordance with FMVSS. Each seat belt anchor shall be in accordance with FMVSS 210. All seats are to be equipped with 3 point high

visibility red or orange seat belts with retractors and NFPA compliant sensor and dash harness. The cab shall be equipped with the following seating:

- **Driver's Seat:** The seat design shall be a cam action type, with air suspension. For increased convenience, the seat shall include a manual control to adjust the horizontal position (6.00" travel). The manual horizontal control shall be a towel-bar style located below the forward part of the seat cushion. To provide flexibility for multiple driver configurations, the seat shall have an adjustable reclining back. The seat back shall be a high back style with side bolster pads for maximum support. For optimal comfort, the seat shall be provided with 17.00" deep foam cushions designed with EVC (elastomeric vibration control). The seat shall include the following features incorporated into the side roll protection system:
 - Side air curtain shall be mounted integral to the outboard bolster of the seat back. The air curtain shall be covered by a decorative panel when in the stowed position.
 - A suspension seat safety system shall be included. When activated in the event of a side roll, this system shall pretension the seat belt and retract the seat to its lowest travel position.
 - The seat shall be furnished with a 3-point, shoulder type seat belt. The seat belt tongue shall be stored at waist position for quick application by the seat occupant. The seat belt receptacle shall be provided on a cable conveniently nested next to the seat cushion, providing easy accessibility. The seat belt shall be furnished with dual automatic retractors that shall provide ease of operation in the normal seating position. Female connector of the belt shall be extended for easy latching with bunker gear on.
- **Officer's Seat:** A seat shall be provided in the front right of the cab for the Officer. The seat shall be a fixed type, with no suspension. For optimal comfort, the seat shall be provided with 17.00" deep foam cushions designed with EVC (elastomeric vibration control). To ensure safe operation, the seat shall be equipped with seat belt sensors in the seat cushion and belt receptacle that shall activate an alarm indicating a seat is occupied but not buckled. The seat back shall be an SCBA back style with 5 degree fixed recline angle. The SCBA cavity shall be adjustable from front to rear in 1.00" increments, to accommodate different sized SCBA cylinders. Relocating the SCBA cavity shall be accomplished by unbolting, relocating, and re-bolting it in the desired location. The seat shall include a side roll protection system including a side air curtain mounted integral to the outboard bolster of the seat back. The air curtain shall be covered by a decorative panel when in the stowed position. A seat safety system shall be included. When activated, this system shall pretension the seat belt. The seat shall be furnished with a 3-point, shoulder type seat belt. The seat belt tongue shall be stored at waist position for quick application by the seat occupant. The seat belt receptacle shall be provided on a cable conveniently nested next to the seat cushion, providing easy accessibility. The seat belt shall be furnished with dual automatic retractors that shall provide ease of operation in the normal seating position.
- **Rear Facing Crew Seats:** The crew area shall include two (2) rear facing crew seats, which include one (1) located directly behind the driver seat and one (1) located directly behind the officer seat. For optimal comfort, these seat shall be provided with 15.00" deep foam cushions designed with EVC (elastomeric vibration control). To ensure safe operation, the seats shall be equipped with seat belt sensors in the seat cushion and belt receptacle that shall activate an alarm indicating a seat is occupied but not buckled. The seat back shall be an SCBA back style

with 5 degree fixed recline angle. The SCBA cavity shall be adjustable from front to rear in 1.00" increments, to accommodate different sized SCBA cylinders. Side air curtain shall be mounted integral to the outboard bolster of the seat back. The air curtain shall be covered by a decorative panel when in the stowed position. A seat safety system shall be included. When activated this system shall pretension the seat belt around the occupant to firmly hold them in place in the event of a side roll. The seat shall be furnished with a 3-point, shoulder type seat belt. The seat belt tongue shall be stored at waist position for quick application by the seat occupant. The seat belt receptacle shall be provided on a cable conveniently nested next to the seat cushion, providing easy accessibility. The seat belt shall be furnished with dual automatic retractors that shall provide ease of operation in the normal seating position.

- **Forward Facing Rear Center Crew Seats:** Two (2) forward facing SCBA seats provided at the center position on the back wall of the crew cab. The seats shall be spaced 8.00" apart to provide additional room for each occupant. For optimal comfort, the seats shall be provided with 15.00" deep cushions. To ensure safe operation, the seats shall be equipped with a sensor in the seat cushion and belt receptacle that shall activate an alarm indicating the seat is occupied but not buckled. The seat backs shall be an SCBA back style with a zero (0) degree fixed recline angle. The SCBA cavity shall be adjustable from front to rear in 1.50" increments, to accommodate different sized SCBA cylinders. Moving the SCBA cavity shall be accomplished by unbolting, relocating, and re-bolting it in the desired location. A seat safety system shall be included. When activated, this system shall pretension the seat belts.
The seats shall be furnished with a three (3)-point, shoulder type seat belts. To provide quick, easy use for occupants wearing bunker gear, the seat belts shall have a minimum 130.00" shoulder length and 55.00" lap length. The seat belt tongues shall be stored at waist position for quick application by the seat occupant. The seat belt receptacles shall be provided on a cable conveniently nested next to the seat cushion, providing easy accessibility. The seat belts shall be furnished with dual automatic retractors that shall provide ease of operation in the normal seating position.
- All seats shall be upholstered in black, ballistic, waterproof cloth fabric
- A seat belt warning system shall be installed in the cab as part of the multiplex electrical system. The system shall meet NFPA 1901 and include an alarm system that shall activate anytime the parking brake is released or the automatic transmission is not in park and a seatbelt is not fastened. The system shall consist of an audible alarm that can be heard at all positions designated to be occupied while the apparatus is in motion and a visual display to the driver or officer showing the condition at each seating position.
- All SCBA seats (5) shall be equipped with EZ-Loc SCBA brackets that feature:
 - Easy grip and effortless bottle release
 - An integrated SCBA bracket built into the seat.
 - Bracket that allows on-the-fly adjusts to fit most brands and sizes of SCBA without needing extra parts
 - Must not interfere with the Heads-Up display modules
 - Must require minimal downward pressure to insure the SCBA is locked. Slamming the cylinder to lock the SCBA in place shall not be accepted.

Section 5.4 Cab Tilt System:

The entire cab shall be capable of tilting approximately 45-degrees to allow for easy maintenance of the engine and transmission. The hydraulic cab tilt system shall include an electric powered hydraulic pump, dual lift cylinders, and all associated hoses and valves. The cab shall be locked down by a two (2)-point automatic spring-loaded hook mechanism that actuates after the cab has been lowered.

The hydraulic cylinders shall be equipped with a velocity fuse that protects the cab from accidentally descending when the control is located in the tilt position.

For increased safety, a redundant mechanical stay arm shall be provided that shall be manually placed on the driver side between the chassis and cab frame when the cab is in the raised position. This device shall be stowed to its original position before the cab can be lowered.

The cab lift system shall be interlocked to the parking brake. The cab tilt mechanism shall be active only when the parking brake is set. If the parking brake is released, the cab tilt mechanism shall be disabled.

Section 5.5: Cab Entry Doors

The cab shall include four (4) entry doors, two (2) front doors and two (2) crew doors designed for ease of entering and egress when outfitted with an SCBA. The doors shall be constructed of aluminum with a nominal thickness of not less than 0.13 inch. The doors shall include a double rolled style automotive rubber seal around the perimeter of each doorframe and door edge, which ensures a weather tight fit. All door hinges shall be hidden within flush mounted cab doors for a pleasing smooth appearance and perfect fit along each side of the cab. Each door hinge shall be a stainless steel piano style. Exterior door handles shall be paddle style. The interior door shall have a reinforced entry handle.

- All cab doors shall include roll down windows. These windows shall be tinted with 44 percent light transmission tint.
- Full height brushed stainless steel door panels shall be installed on the inside of all cab doors. The cab door panels shall be removable.
- On the interior lower section of each cab door, reflective chevrons full door width, shall be installed. They shall be alternating yellow and red.
- All cab doors shall be key lockable.
- One (1) red, 4" LED warning light shall be installed on the interior lower section of each cab door. The light shall activate when the door is opened.
- One (1) adjustable West Coast style mirror shall be installed on each side of the front cab doors. A convex mirror shall be installed directly below the main mirror and shall be adjustable. Mirrors shall include the following features:
 - chrome-plated or stainless steel smooth exterior
 - head-adjustable, 4-way remote control
 - flat glass
 - matching spot mirror
 - shatter proof glass
 - LED marker light
 - stainless steel bracket
 - Replaceable mirror heads and glass
 - break-away bracket

- NFPA compliant cab entry steps, grab handles, and LED illumination shall be provided on all cab entry doors. All lighting fixtures shall be recess mounted so as to not interfere with cab access or be damaged by contact with personnel or equipment and shall activate when the corresponding door is opened.
- All cab door jambs shall include polished stainless steel scuff plates, mounted on the striker side of the jamb as well as the lower cab entry area frame.

Section 5.6: Cab Climate Control

A high-performance customized air conditioning system shall be furnished inside the cab and crew cab. The system shall be of a heavy duty design and the air conditioning system shall be capable of cooling the average cab temperature from 100 degrees Fahrenheit to 72 degrees Fahrenheit at 50 percent relative humidity within 30 minutes. The cooling performance test shall be run only after the cab has been heat soaked at 100 degrees Fahrenheit for a minimum of 4 hours.

The cab shall a/c system shall produce a minimum of 55,000 BTU and not less than 900 CFM. Each bidder shall include, with their bid, verification of air conditioner performance, testing and capability.

One (1) air conditioning compressor shall be installed on the engine with a capacity of not less than 18.0 cubic inch.

A roof-mounted air conditioning condenser shall be installed on the cab roof. A formed cover shall be provided over all air conditioning lines and connections below the condenser. The cover shall be constructed of smooth aluminum. The cover shall be painted the same color as the air conditioning cover.

An evaporator unit shall be installed in the cab. The evaporator shall include two (2) high performance cores and plenums with multiple outlets, one (1) plenum directed to the front and one (1) plenum directed to the rear of the cab. The evaporator unit shall be provided with adjustable air outlets strategically located to direct air flow to the driver, officer and crew cab area. Two (2) condensate drain tubes shall be provided for the air conditioning evaporator. The drip pan shall have two (2) drain tubes plumbed separately to allow for the condensate to exit the drip pan.

All hose used shall be class 1 type to reduce moisture ingress into the air conditioning system.

The air conditioner refrigerant shall be R-134A and shall be installed by a certified technician.

All air conditioning controls shall be in the multiplex display and shall include variable adjustments for temperature and fan control.

The air conditioning evaporator filters shall be located on the exterior of the evaporator cover. The filters shall be held in place with easily removable brackets for ease of maintenance.

Section 5.7: Cab Mounted Devices and Accessories

The following shall be provided and installed on the vehicle:

- DOT approved LED cab marker lights shall be mounted on the top front edge of the cab roof. Marker lights on side on the cab shall be provided. D.O.T. reflectors shall be placed on the cab and body as required by Federal standards
- Cab Grille shall be polished stainless steel

- One (1) defroster shall be installed in the cab located under the engine tunnel and with a rated capacity of not less than 41,000 BTU. Defroster ventilation shall be built into the design of the cab dash instrument panel and shall be easily removable for maintenance. The defroster shall have a 3-speed blower and temperature controls accessible to the driver and officer. The defroster ducts shall be designed to provide maximum defrosting capabilities for the front cab windows.
- Two (2) auxiliary heaters of not less than 32,000 BTU each shall be provided in the cab. The heaters shall have a 3-speed blower and temperature controls accessible to the driver and officer.
- Dual, 12 volt electrically operated, windshield wipers shall be provided. Wipers shall have, “HI / LO” and “Intermittent” operating speeds. The wipers shall be self-parking type.
- Two (2) sun visors shall be mounted in the cab overhead for the driver and officer.
- Six (6) led red/white LED lights with push button shall be installed in the cab ceiling, two (2) in the front (driver and officer) and four (4) in the rear crew area, near each seat. Lights shall activate from their switch and when any cab door is opened.
- Stainless steel or aluminum fender crowns shall be installed at the cab wheel openings. The fender crowns shall have a radius outside corner that allows the fender crown to extend beyond the side wall of the front tires and also allow the crew cab doors to open fully.
- A grab handle shall be mounted on the lower portion of the driver's side cab entrance to assist in entering the cab. The grab handle shall be securely mounted to the post area between the door and steering wheel column.
- A long rubber grab handle shall be mounted on the dash board in front of the officer.
- For access to the engine oil and transmission fluid dipsticks, there shall be a door on the engine tunnel, inside the crew cab. The door shall be on the rear wall of the engine tunnel, on the vertical surface. An additional port shall be provided for filling the engine oil. The door shall have a rubber seal for thermal and acoustic insulation. One (1) flush latch shall be provided on the access door.

Section 5.8: Cab Controls, Gauges and Devices

The Drivers’ instrument panel shall be centered in front of the driver and shall contain all devices and switches related to the operation of the vehicle. LED backlighting shall be provided for illuminating all instruments and switches on the dash. The following gauges and devices, at a minimum, shall be installed within the cab dash on the driver’s side.

- a) Speedometer
- b) Tachometer
- c) Fuel Level
- d) Voltmeter
- e) Engine Coolant Temperature
- f) Engine Oil Pressure
- g) Transmission Oil Temperature
- h) Air Pressure Gauges
- i) Diesel Exhaust Fluid Level
- j) Driver’s Indicator Light Cluster
- k) Driver Control Switches

- l) "LOW AIR", "STOP ENGINE", "CHECK ENGINE" and "CHECK TRANSMISSION" visual indicators shall be located in the dash gauge panel in front of the driver.
- m) Vehicle hour meter
- n) Aerial hour meter

The following telltale indicator lamps shall be integral to the gauge assembly and are located above and below the center gauges. The indicator lamps shall be "dead-front" design that is only visible when active. The colored indicator lights shall have descriptive text or symbols.

The following amber telltale lamps shall be present:

- Low coolant
- Traction control
- Check engine
- Check trans (check transmission)
- Aux brake overheat (Auxiliary brake overheat)
- Air rest (air restriction)
- Caution (triangle symbol)
- Water in fuel
- DPF (engine diesel particulate filter regeneration)
- HET (engine high exhaust temperature) (where applicable)
- ABS (antilock brake system)
- MIL (engine emissions system malfunction indicator lamp) (where applicable)
- SRS (supplemental restraint system) fault (where applicable)
- DEF (low diesel exhaust fluid level)

The following control switches shall be identified and accessible to the driver while seated. Switches shall include integral indicator lights (where applicable) to advise that the switch has been energized and identification labels shall be illuminated for night driving.

- a) Ignition switch
- b) Engine start switch
- c) Headlight / Tail-Marker-ID light switch
- d) Aerial Master
- e) Aerial PTO

The following controls shall be provided and accessible to the driver while seated:

- a) Parking (Spring) Brake Control
- b) Windshield wiper control switch
Windshield washer control switch
- c) High Idle control switch
- d) PTO control switch
- e) Traction control switch
- f) Pump Shift
- g) Horn
- h) High-beam headlight switch
- i) Turn Signal Control

- j) 4-Way Hazard Warning switch

The following controls shall be provided and accessible to driver and officer while seated:

- a) Mechanical siren control switch
- b) Mechanical siren brake switch
- c) 100 watt electron siren
- d) One (1) 12-volt power point shall be provided on the dash between driver and officer.

All switches and controls shall be labeled and illuminated.

Section 5.9: Emergency & Work Light Panel

All emergency light and work area lighting control switches shall be in the cab mounted multiplex display. All switching functions shall be properly identified and illuminated for night driving.

- a) Master warning light switch
- b) Roof mounted light bars switch
- c) Rear body upper warning lights switch
- d) Cab and body LED warning lights switch
- e) Ground lights switch
- f) Rear Deck lights switch
- g) Scene light switch/s

Section 5.10: Audible Cab Alarms

The following conditions shall cause the audible alarm to sound “Steady” (not an intermittent beep); signifying a “mission critical” condition exists that requires immediate attention.

- a) Stop Engine
- b) Cab Not Latched
- c) Low Air Pressure
- d) Ladder Not Stowed
- e) Stabilizers Not Stowed

The following conditions shall cause the audible alarm to sound “intermittently” (i.e. beep), signifying a condition exists that may become “mission critical” if not quickly addressed. A cutoff switch for audible alarm shall be installed.

- a) Low Voltage, Check Engine
- b) Check transmission
- c) Door Ajar Indicator Light (Do Not Move Apparatus)

In accordance with NFPA 1901, any device that is opened, extended, or deployed that creates a hazard or is likely to cause major damage to the apparatus if the apparatus is moved shall be displayed as a “Do Not Move” caution message when the parking brake is disengaged.

Section 5.11: Compartment Door Open Warning System

One (1) 2” round red flashing LED light shall illuminate automatically whenever the apparatus parking brake is not fully engaged and any passenger or equipment compartment door is open. The light shall be

located on the ceiling, toward the windshield in between the driver and officer. The hazard warning light shall be identified with a label that reads: "Do Not Move Apparatus When Light Is On".

Section 5.12: Cab Map Light

One (1) cab mounted LED map light shall be mounted overhead for the officer. (Right front seating position)

Section 5.13 Back-up Camera System

A back-up camera system shall be provided and installed. The rear facing color camera shall be mounted on the rear of the vehicle and shall activate when the vehicle is placed in reverse. The system shall display the camera on the cab mounted multiplex display.

Section 5.14: Load Manager and Sequencing

As part of the multiplex electrical system, the apparatus shall be equipped with a Load Manager System for performing electrical load management. The Load Manager shall have two-(2) modes of operation, a "Calling Right of Way" mode, and a "Blocking Right of Way" mode. The "Blocking Right of Way" mode shall be activated only when the park brake is set. Load shedding may occur "only" in the "Blocking Right of Way" mode also when the battery voltage level reaches the programmed shed level.

This system shall be designed to activate a fast idle system with low voltage alarm that activates at the NFPA required 11.8 volts.

The multiplex electrical system shall also provide electrical system sequencing that switches electrical loads on and off one at a time to reduce alternator load.

Section 5.15: Back-up Alarm

There shall be one-(1) electronic back-up alarm installed at the rear of the apparatus. The alarm shall be wired to the transmissions and shall activate automatically when the transmission is shifted into reverse.

Section 5.16: Engine Data Recorder

The Apparatus shall be equipped with a "Vehicle Data Recorder and Seat Belt Warning System" that shall be displayed on the cab mounted multiplex display. The system shall monitor and record:

- Vehicle Speed, Acceleration
- Deceleration
- Engine Speed
- Engine Throttle Position
- ABS Event
- Seat Occupied Status
- Seat Belt Status
- Master Optical Warning Switch
- Park Brake
- Service Brake
- Time, Date and Engine Hours.
- Shall be Password Protected by the customer
- Six (6) seat position inputs for occupied and belts buckled

- Shall easily interface with traditional wiring or other multiplexing systems
- Data to be extracted by a standard, mini USB cable

Each portion of the data shall be recorded at the specified intervals and stored for the specified length of time to meet NFPA 1901 guidelines and shall be retrievable by connecting a laptop computer to the VDR system.

Section 5.17: Radio Compartment and Antenna

A suitable location shall be provided in dash, on dash, or on the engine cover between the driver and officer for the installation of a 2-way radio. This area shall include a 12v power point and antenna wired for the installation of 2-way radio. The radio and antenna shall be provided to the manufacturer who shall install the radio and antenna during the manufacturing process. Location of the radio and antenna shall be determined at pre-construction conference.

Section 5.18: Portable Hand Lights

As per NFPA 1901, six (6) portable hand lights shall be provided and mounted in brackets in convenient locations within the cab with chargers wired to the vehicle electrical system. Actual mounting locations to be determined at the pre-construction conference. These lights shall be LED and shall be mounted in vehicle charging racks and include the following features:

- a) Six (6) C4® LEDs, impervious to shock with a 50,000 hour lifetime
- b) Toggle switch and two (2) user programmable ultra bright blue tail-light LEDs
- c) 6 wide pattern parabolic reflectors that produce a smooth flood pattern
- d) Each light shall have 2 levels of lighting:
 - High:** 4,000 candela (Peak Beam Intensity), 615 lumens, up to 8 hrs.
 - Low:** 2,150 candela (Peak Beam Intensity), 330 lumens, up to 18 hrs.
- e) Each light shall include shoulder strap, AC and DC charge cords and charge rack

Section 5.19: Cab Intercom System

A Firecom 5000D Series Digital Intercom system shall be provided which allow users to connect up to four radios for simulcast interoperability with mutual aid or other agencies to improve operational efficiencies and responder safety. The intercom system shall be provided in the cab with one headset at each seating position. (Total 4). The intercom base station shall be provided that utilizes a 12 volt nominal power supply. The unit shall have a touch pad adjustable volume control and have advanced noise reducing circuitry.

Firecom FHW-57 wireless headsets with all-in-one design providing complete freedom of movement while maintaining hands-free, full-duplex communication shall be provided for each seating position. (Total 4) The headsets shall include noise attenuating features that provide protection from hearing loss that can occur from exposure to high noise levels, while also providing each firefighter clear communication with the other crew members. The Intercom system shall include advanced circuitry that effectively suppresses distracting background noise and eliminates clipping without affecting communication.

Section 6.0: Vehicle Batteries and Electrical System

The vehicle shall include not less than (5) 12V Group 31 950 CCA batteries with heavy-duty battery cables to maximize power available to the electrical system.

Batteries shall be stored in well-ventilated compartments that are located under the cab and bolted directly to the chassis frame. The battery compartments shall be constructed of steel plate or heavy duty aluminum and be designed to accommodate the specified batteries. The battery hold-downs shall be of a non-corrosive material. All bolts and nuts shall be stainless steel.

The compartments shall include formed fit heavy duty battery trays with drain tubes for the batteries to sit in.

Heavy-duty battery cables shall be used to provide maximum power to the electrical system. Cables shall be color-coded.

Battery terminal connections shall be coated with anti-corrosion compound. Battery solenoid terminal connections shall be encapsulated with semi-permanent rubberized compound.

A master battery switch shall be provided within the cab within easy reach of the driver to activate the battery system.

An indicator light shall be provided on the instrument panel to notify the driver of the status of the battery system.

Section 6.1: Jumper Cable Studs

A pair of jumper cable studs with color coded covers shall be provided and installed in a convenient location. One (1) pair of heavy duty jumper cables shall be provided and stored within a compartment in the vicinity of the jumper cable studs.

Section 6.2: Battery Charger Air Pump System

One (1) Kussmaul "Auto Charge Pump" high output battery charger and air compressor system shall be installed in the apparatus and shall charge the batteries and maintain air pressures in the air brake system when plugged into a 120 volt shoreline.

The Auto Charge Pump system shall include a Charger, a Display, an Auto Pump and a WP Auto Eject with Weatherproof Cover and Mating Connector.

The battery charger shall be fully automatic and shall maintain the apparatus' batteries at a full charge level when connected to a 120 VAC source. The unit shall include front panel connections for a remote display and Auto Charge Deluxe Watertight Status Center which shall be mounted in a location to be determined at the pre-construction conference. The system shall have a built-in sense circuit to check battery voltage and shall compensate for voltage drop in charging wires and provide quick recharging with no overcharging. The charger shall include an exterior bar graph display and shall have the following operational specifications:

120 volts AC input at 10 amps

12 volts DC output at 40 amps

The Auto Air Pump shall maintain air pressure in the vehicle's air system while it is plugged into the shoreline system and include the following:

- 100 PSI Max Rating, 120V, 4A
- Vehicle mount compressor shall insure air brake system is properly pressurized
- Pressure switch regulated operation shall automatically sense low pressure in air system and restore proper pressure, preventing brake lock-up
- Shall not interference with engine mounted air compressor
- Shall include factory set PSI actuation points: 75 "On", 95 "Off"
- Shall include sealed ball bearings for long service life
- Shall include auto drain feature
- Shall include system pressure gauge.

Section 6.3: Electrical Components and Wiring

All electrical equipment installed by the apparatus builder shall conform to current automotive electrical system standards and the latest standards as outlined in NFPA #1901. All electrical wire installed by the apparatus builder shall be rated to carry 125 percent of the maximum current for which the circuit is protected. A high-temp automotive primary wire that is insulated with chemically cross-linked Polyethylene and withstands prolonged temperatures of up to 350 degrees F without melting or fusing shall be used. Wire shall be highly resistant to grease, oil, acids, brake fluid, and abrasion. Wire shall meet or exceed S.A.E. specifications J1127. All exterior wiring shall have wire protection guards installed. Electrical connections in exposed areas outside of the cab shall be made using heat shrink, or weatherproof connections. All connections shall have a corrosion preventative compound applied to them. All weather-exposed lights shall have the sockets coated with this same compound. Wiring installed by body builder shall be run in a heat protective loom that is held in place with a rubber-coated bracket that is fastened in place with stainless steel screws..

There shall be no exposed electrical cabling, harnesses, or terminal connections located in compartments, unless they are enclosed in an electrical junction box or covered with a removable electrical panel. The wiring shall be secured in place and protected against heat, liquid contaminants and damage. Wiring shall be uniquely identified at least every two feet (2') by color coding or permanent marking with a circuit function code and identified on a reference chart or electrical wiring schematic per requirements of applicable NFPA #1901 standards.

Any electrical junction or terminal boxes shall be weather resistant and located away from water spray conditions. In addition, the main body junction panel shall house the automatic reset breakers and relays where required.

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.

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.

Section 6.4: Multiplex Electrical System

The cab and chassis shall be equipped with a multiplexed electrical system. The multiplex system shall consist of all solid-state components contained inside sealed aluminum extrusions and/or weatherproof Deutsch nodes. The system, at a minimum, shall be capable of performing the following functions:

The multiplex system shall be field reprogrammed and re-configurable by an authorized service center and shall include the following system capabilities:

- a) Total Load Management
- b) Load Shedding Capabilities
- c) Load Sequencing Capabilities
- d) On- Board Diagnostics Readout
- e) Very reliable, solid- state hardware
- f) Error Reporting
- g) Continuous system monitoring and reporting
- h) Emergency warning lamp flasher
- i) Field Configurable
- j) Expandability Capabilities
- k) Rear camera display with sound
- l) Cab mounted display
- m) Advanced PC Diagnostics

As programmed electrical system reports shall be generated by the multiplex system designer software and furnished in the apparatus manuals. A master circuit list of electrical circuits that the apparatus builder installs shall be furnished in the delivery manuals.

A cab mounted multiplex control display with multiple screens shall be provided in the cab dash in close proximity to the Driver.

The multiplex electrical system shall include a modem or wireless network that is capable of being used for upgrading and troubleshooting electrical components or issues.

Section 6.5: EMI/RFI Protection

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

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

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

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

Section 6.6: Vehicle and Emergency Lighting

The following lighting shall be installed. All lighting shall meet NFPA 1901 latest edition as configured. All lighting shall be Super LED and of the same manufacturer where possible. All emergency lighting shall utilize wide angle LEDs with spreader optic lenses series unless otherwise specified. All lens shall be clear, all LEDs shall be red. All lighting shall be surface mounted unless otherwise specified. Where a series is mentioned, the series reference is for size purposes only. All lights shall include chrome flange. All emergency and scene lights shall be activated by switches located in the multiplex display.

Cab Front Lighting

There shall be four (4) rectangular LED lights mounted in the front quad style, chrome housing on each side of the cab grille:

- a) The outside light on each side shall contain an LED low beam module.
- b) The inside light on each side shall contain an LED high beam module.

Turn Signals

600 Series amber LED turn signal lamps shall be installed directly above the low beam headlights in the warning light modules.

LED Cornering Lights

400 Series flashing LED-cornering lamps shall be mounted below the marker light in the warning light module. The lamps are mounted at a 45-degree angle off the front of the cab and are visible from the side and front of the vehicle.

DOT MARKER LIGHTS

LED marker lights shall be installed per DOT guidelines.

Lightbars, Cab Mounted 24 inch LED Front Facing

A pair of Mini LED 24" light bars shall be mounted on the cabs roof, one-(1) each side outboard forward facing. Each light bar shall have clear lens with full length red linear LEDs. So as to not affect the aerial operators' vision during night operations, lightbars shall have forward and side facing LEDs only.

Cab Face Warning Lights

There shall be four (4) 600 series LED flashing warning lights installed on the cab face, above the headlights, two (2) on each side mounted in a common bezel. These lights shall have red LEDs and clear lens.

Side Zone Upper Lights

There shall be two (2) 600 series LED flashing lights provided, one (1) each side of the crew cab. The lights shall be located in the raised roof section, at the top of the cab rear of the crew cab doors. Each light shall be mounted with a chrome flange. The color of the lights shall be red LED/clear lens.

Side Zone Lower Lighting

There shall be six (6) 600 series LED flashing warning lights with chrome flanges installed in the following locations:

- One (1) light on each side of the bumper extension lights. Total 2
- One (1) light on each side of the cab directly above the front wheel well. Total 2
- One (1) light in the rear stabilizer. Total 2

These lights shall have red LEDs and clear lens.

Rear Zone Lower Lighting

Two (2) 600 series LED flashing warning lights with chrome flanges shall be located on the rear of the apparatus. One left rear and one right rear mounted directly above the tailboard.

These lights shall have red LEDs and clear lens.

Rear Warning Lights

Two (2) 600 series LED flashing warning lights with chrome bezel shall be installed above the taillights.

These lights shall have red LEDs and clear lens.

Rear/Side Zone Upper Warning Lights

Two (2) 600 series LED warning beacons provided at the rear of the truck, located one (1) each side near the rear compartment tops.

These lights shall have red LEDs and clear lens. These lights shall be switched from the cab mounted switch control panel to for emergency lights.

Traffic Advisor Light Bar

One (1) 36.01" long x 2.84" high x 2.24" deep, amber LED traffic directing light installed at the rear of the apparatus. The light bar shall alert approaching traffic to hazardous vehicle situations and indicate the correct direction with bright signal sequencing. The light bar shall have four operating modes, left, right, split, and flash that can be selected from a compact remote control console. The control console shall be located in the cab, in a convenient location to the Driver.

This traffic directing light shall be mounted on top of the body below the turntable at the rear of the apparatus.

Ground Lights

Perimeter lighting shall be installed as follows and shall be switched from the cab switch console and the parking brake circuit. These lights shall illuminate when the parking brake is set and the battery switch is in the "on" position.

Four (4) LED strip weatherproof ground lights shall be installed, one (1) under each cab door entrance step. The ground lights shall turn on automatically with each respective door jamb switch and also by a master ground light switch in the warning light switch console.

One (1) LED strip weatherproof ground light shall be installed under each pump panel running. Total 2

One (1) LED strip weatherproof ground light shall be installed under compartments L1, R1, L3 and R3. Total 4.

Two (2) LED strip weatherproof ground lights shall be installed in the rear step area of the vehicle.

Rear Stop, Brake, and Turn Lighting

Stop, turn and backup lights shall be installed in the rear of the vehicle and shall utilize 600 series LED lights mounted in 3 lamp polished aluminum housings for Vertical Mounting. Fixtures shall be surface mounted on each rear face of the body and include LED light heads for the red stop light, the turn light amber with directional arrow, and a clear LED backup light.

Rear mounted LED marker lights shall be provided as per DOT requirements.

LED Scene Lighting

LED scene lighting shall be provided and installed as follows. All LED scene lights shall be switched from the cab and pump panel and shall meet the following requirements:

- White rugged die cast aluminum, powder coated housing
- Instant On/Off
- Recessed housing mounts at 15° fixed downward angle to maximize light effectiveness
- LED lights shall be dual panel with all flood pattern
- LED lights shall include chrome flange where recess mounted

One (1) 12 volt LED floodlight shall be installed on each side of the cab in a semi-recessed housing as high as possible directly over the front axle. Total 2

One (1) 12 volt LED floodlight shall be installed on each side of the vehicle cab above the windshield line in the visor position facing to the forward. (Brow Mounted) Total 2

One (1) 12 volt LED floodlight shall be installed on each side of the vehicle on top of the L1 and R1 compartments. These lights shall include Low Profile Pedestal/Swivel Mounts. Total 2

Two-(2) LED deck lights with low profile Pedestal/Swivel Mount shall be installed one-(1) each side at the rear of the apparatus. The deck lights shall also serve as rear work lights to illuminate the rear of the apparatus to meet NFPA-1901 requirements. Each light shall be manually operated and switched on and off at the light.

Section 7.0: Fire Pump and Associated Components

The fire pump shall be a Waterous CSU series single (1) stage midship mounted centrifugal type with a capacity of not less than 1500 gpm at 150 psi. So as to assure that parts and service are readily available, the pump must be manufactured in the United States.

Pump shall be the class "A" type.

Pump shall deliver the percentage of rated discharge at pressures indicated below:

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

Pump body shall be close-grained gray iron, bronze fitted, and horizontally split in two (2) sections for easy removal of the entire impeller shaft assembly (including wear rings).

Pump shall be designed for complete servicing from the bottom of the truck, without disturbing the pump setting or apparatus piping.

Pump case halves shall be bolted together on a single horizontal face to minimize a chance of leakage and facilitate ease of reassembly. No end flanges shall be used.

Discharge manifold of the pump shall be cast as an integral part of the pump body assembly and shall provide a minimum of three (3) 3.50" openings for flexibility in providing various discharge outlets for maximum efficiency.

The three (3) 3.50" openings shall be located as follows: one (1) outlet to the right of the pump, one (1) outlet to the left of the pump, and one (1) outlet directly on top of the discharge manifold.

Impeller shaft shall be stainless steel, accurately ground to size. It shall be supported at each end by sealed, anti-friction ball bearings for rigid precise support. Impeller shall have flame plated hubs assuring maximum pump life and efficiency despite any presence of abrasive matter in the water supply.

Bearings shall be protected from water and sediment by suitable stuffing boxes, flinger rings, and oil seals. No special or sleeve type bearings shall be used.

Stuffing boxes shall be of the conventional two (2) piece, split-gland type, to permit adjustment or replacement of packing without disturbing the pump. Water shall be fed into stuffing box lantern rings for proper lubrication and cooling when the pump is operating.

Lantern rings shall be located at the inner ends of the stuffing boxes, to avoid having to remove them when replacing pump packing.

Wear rings shall be bronze and easily replaceable to restore original pump efficiency and eliminate the need to replace the entire pump casing due to wear.

Section 7.1: Pump Transmission

Pump transmission shall be made of aluminum with a horizontally split casing. Drive shafts shall be a minimum of 2.35" diameter hardened and ground alloy steel. All shafts shall be ball bearing supported. The case is to be designed as to eliminate the need for water cooling.

Section 7.2: Pump Air Shift

Pump shift engagement shall be made by a two (2) position sliding collar, actuated pneumatically (by air pressure), with a three (3) position air control switch located in the cab. A manual back-up shift control shall also be located on the pump operator's pump panel.

Two (2) indicator lights shall be provided adjacent to the pump shift inside the cab. One (1) green light shall indicate the pump shift has been completed and be labeled "pump engaged". The second green light shall indicate when the pump has been engaged, and that the chassis transmission is in pump gear. This indicator light shall be labeled "OK to pump".

Another green indicator light shall be installed adjacent to the hand throttle on the pump panel and indicate either the pump is engaged and the road transmission is in pump gear, or the road transmission is in neutral and the pump is not engaged. This indicator light shall be labeled "Warning: Do not open throttle unless light is on".

The pump shift control in the cab shall be illuminated to meet NFPA requirements.

Section 7.3: Transmission Lock-Up

The direct gear transmission lock-up for the fire pump operation shall engage automatically when the pump shift control in the cab is activated.

Section 7.4: Auxiliary Cooling System

A supplementary heat exchange cooling system shall be provided to allow the use of water from the discharge side of the pump for cooling the engine water. Heat exchanger shall be cylindrical type and shall be a separate unit. It shall be installed in the pump or engine compartment with the control located on the pump operator's control panel. Exchanger shall be plumbed to the master drain valve.

Section 7.5: Intake Relief Valve

One (1) Intake Relief Valve system shall be provided that is designed to act as a safety valve by "dumping" excess pressure from the inlet side of the pump. The relief valve system shall be of the same manufacturer as the pump. The relief valve shall be installed on the suction side of the pump preset at 125 psig.

The relief valve shall have a working range of 75 psig to 250 psig.

The outlet shall terminate below the frame rails with a 2.50" National Standard hose thread adapter and shall have a "do not cap" warning tag.

The intake relief valve control shall be located behind an access door at a side pump panel.

Section 7.6: Pump Primer System

One (1) automatic air operated priming system shall be provided and installed. The unit shall be of all brass and stainless steel construction and designed for fire pumps of 1,250 GPM (4,690 LPM) or more.

Due to corrosion exposure no aluminum or vanes shall be used in the primer design. The primer shall be three-barrel design with ¾" NPT connection to the fire pump.

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

The priming system shall be capable of a vertical lift to 22 inches of mercury and shall be fully compliant to applicable NFPA standards for vertical lift. The system shall create vacuum by using air from the chassis air brake system through a three-barrel multi-stage internal "venturi nozzles" within the primer body. The noise level during operation of the primer shall not exceed 75 Db.

The primer shall require a minimum of 15.6 cubic foot per minute air compressor and shall be capable of meeting drafting requirements at high idle engine speed. The air supply shall be from a chassis supplied 'protected' air storage tank with a pressure protection valve. The air supply line shall have a pressure protection valve set between 70 to 80 PSIG.

The 12 volt primer control shall be an "automatic" type, with a pump panel three-way switch to operate an air solenoid valve. The air valve shall direct air pressure from the air brake system to the primer. To prevent freezing, no water shall enter the primer valve control.

A vacuum gauge 2" in diameter, with graduations from zero to 30 feet, shall be installed in the primer control panel. The gauge shall be physically connected to the vacuum side of the primer and read only when the primer is running so it shall never see or be subject to damage from high pump intake pressures

The automatic priming switch shall have three positions as follows:

- "Prime" – the lower position shall be a momentary "push to prime". The "Prime" position shall allow the operator to "ramp" test the primer without the fire pump being engaged.
- "Off" -- center position
- "Auto-Prime" – in the upper position, a "green" LED pilot light shall be illuminated when the switch is in the auto-prime position. The "Auto-Prime" operates automatically when the pump pressure drops below 20 PSIG. The primer shuts "off" automatically when the pump pressure is re-established and exceeds 20 PSIG. The "Auto" mode shall only operate when the fire pump is engaged.

Section 7.7: Pump Plumbing System

All inlet and outlet plumbing, 3.00" and smaller, shall be plumbed with either stainless steel pipe or synthetic rubber hose reinforced with high-tensile polyester braid. Small diameter secondary plumbing such as drain lines shall be stainless steel, brass or hose.

Where vibration or chassis flexing may damage or loosen piping or where a coupling is required for servicing, the piping shall be equipped with victaulic or rubber couplings.

Plumbing manifold bodies shall be ductile cast iron or stainless steel.

All lines shall drain through a master drain valve or shall be equipped with individual drain valves. All individual drain lines for discharges shall be extended with a hose to drain below the chassis frame.

All water carrying gauge lines shall be of flexible polypropylene tubing.

Section 7.8: Pump Inlets

One (1) 6.00" pump inlet shall be provided on each side of the vehicle. The suction inlets shall include screens that are designed to provide cathodic protection for the pump, thus reducing corrosion in the pump.

The main pump inlets shall have National Standard Threads with a long handle chrome cap.

Section 7.9: Inlet Butterfly Valve

One (1) butterfly valve shall be provided on the passenger's side main pump inlet.

The 6.00" inlet valve shall be partially recessed behind the pump panel with a "key hole" shaped stainless steel trim ring around the opening.

A built-in, adjustable pressure relief valve and a 3/4" bleeder valve shall be provided on the inlet side of the valve. The bleeder valve controls shall be located at the threaded connection and at the pump operator's panel.

Valve shall be electrically operated. An electric actuator, with seven (7) valve position LED indicator lights shall be provided at the pump operator's panel.

The electric actuator shall be furnished with a manual over ride, extended to the pump panel

Section 7.10: 2.5 inch Suction Inlets

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

One-(1) 2-1/2" swing operated ball valve shall be installed at the pump panel, right rear plumbed to the suction side of the pump with 2-1/2" piping, and include a 2-1/2" FNST chrome inlet swivel, brass inlet strainer, chrome plug with chain, and 3/4" drain valve.

All intakes shall have bleeder valves.

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

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

As per NFPA, two (2) 15 foot sections of 3 inch supply hose shall be provided with the vehicle and shipped loose. The supply hoses shall have 2 ½ inch male and female couplings.

Section 7.11: Valves and Valve Controls

All discharge valves shall be heavy-duty swing-out with stainless steel ball and shall be controlled from the pump operator's panel unless otherwise specified.

The heavy-duty valves shall be designed for operating pressures to 250 psi (17 bars) and include the following:

- 10-year warranty against manufacturer's defects
- Available in 1" to 4" sizes
- 90° handle travel 316 stainless steel ball
- Improved sealing & increased gating ability
- Flow optimization to reduce turbulence while in the gated position and require lower operating forces
- No lubrication or regular maintenance required
- Simple two seated design (no O-Rings to cut or lose during assembly or maintenance)
- Designed and tested to exceed NFPA requirements
- Cast, machined and assembled in the US

All valves shall meet current NFPA 1901 Standards for valve operating speeds when controlled by gear, electric actuator, or slow close device.

Section 7.12: Gauges

All discharges shall be provided with combination pressure gauges and flow meters that meet the following requirements:

- Displays GPM and PSI Directly
- All Aluminum Housing
- Display Module Identification and Program Access Modes
- Datalink Interface - allows for remote displays and summing or accumulating of flow from all discharges
- Linearizer Feature - Multiple Flow Rate Calibration Points
- Pressure Scale Expands Between 100 and 250 PSI
- Safeflow Feature - High and Low Flow Warnings
- NFPA Color Coded Bezel
- External Totalizing Button
- Backlighting
- Paddlewheel Style Flow Sensor

Section 7.13: Tank Fill Valve

There shall be a 1-1/2" pump to tank fill line installed, with a 1-1/2" inline bronze valve and high-pressure flexible hose tested to 1200 PSI. The valve shall be push-pull (locking "T" handle) controlled from the pump operator's panel.

Section 7.14: Engine Cooler

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

Section 7.15: Pump Cooler

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

Section 7.16: Aerial Waterway

An aerial waterway system shall be provided. The telescopic water system shall consist of a base section, mid-section and the fly section. The telescopic waterway shall be constructed of anodized aluminum pipe. The aerial waterway shall include:

- A pipe of not less than 4 inches shall be connected to the pump on one end and to a 4.00" internal diameter water swivel at the rotation point of the turntable. The water swivel shall permit 360 degree continuous rotation of the aerial device.
- The 4.00" waterway swivel is to be routed through the rotation point swivel up to the heel pin swivel. The heel pin swivel shall allow the water to flow to the ladder pipe while elevating the aerial ladder from -5 degrees to 75 degrees. The heel pivot pin is not integral with the waterway swivel at any point. The design of the waterway shall allow complete servicing of the waterway swivel without disturbing the heel pivot pin.
- The rotational torque shall have adequate power to rotate the ladder into a full 1500 gallon per minute water stream directed at 90 degrees to the side while maintaining the 500 pound tip load.
- An adjustable pressure relief valve shall be furnished to protect the aerial waterway from a pressure surge.
- A 1.50" drain valve shall be located at the lowest point of the waterway system.

The aerial shall be capable of discharging up to 1500 gallons per minute at 100 pounds per square inch parallel to the ladder and 90 degrees to each side of center while maintaining the 500 pound tip load.

The safety factor shall be 2.5:1 while flowing up to 1000 gallons per minute at 100 pounds per square inch and 2:1 while flowing between 1000 and 1500 gallons per minute at 100 pounds per square inch.

The waterway seals shall be of type-B PolyPak design, composed of nitroxile seal and a nitrile wiper, which together offer maximum stability and extrusion resistance on the waterway. The seal shall be capable of withstanding pressures up to 2000 psi, temperatures in excess of 250 degrees Fahrenheit and have resistance to all foam generating solutions. The seals shall be internally lubricated.

The waterway seals shall have automatic centering guides constructed of synthetic thermalpolymer. The guides shall provide positive centering of the extendible sections within each other and the base section to insure longer service life and smoother operation.

A slow open/ slow close valve shall be provided at the top of the waterway that feeds the monitor and a 2 ½ inch discharge valve with 1 ½ inch reducer shall be provided at the ladder tip for use as an elevated standpipe.

A monitor shall be provided at the tip with a 2000 gpm electric nozzle. The electric master stream nozzle shall be designed for flows from 500 to 2000 gpm at an operating pressure of 80 psi . The nozzle shall have a manual override and built-in stream shaper. The nozzle shall include Electric pattern control and be constructed of Pyrolite. The monitor's functions shall be controlled electrically from two (2) locations. One (1) control shall be located at the turntable control console and the other at the ladder tip. LED lighting shall be provided to fully illuminate both controls. Digital flowmeters shall be installed, per NFPA 1901 to monitor the flow of the aerial waterway. The flow meter's display shall be located on the pump operator's panel left side and the turntable control station. Flowmeters shall include a display module, paddle wheel flow sensor, sensor housing with a mount and a 10' sensor cable. The flowmeter case shall be waterproof, manufactured of anodized machined aluminum, and have dimensions not to exceed 3 1/4" high by 3 1/4" wide by 2 1/2" deep. It shall have an LED display with super bright digits more than 1/2" high. Flow rate shall be displayed in GPM (Gallons per Minute).

Section 7.17: Front Discharge

One (1) 1.50" discharge outlet shall be piped to the front of the apparatus and located on the top of the left side of the front bumper.

Plumbing shall consist of 2.00" piping and flexible hose with a 2.00" ball valve with control at the pump operator's panel. A fabricated weldment made of stainless steel pipe shall be used in the plumbing where appropriate. The piping shall terminate with a 1.50" NST with 90 degree stainless steel swivel.

Automatic drains shall be provided at all low points of the piping.

Section 7.18: Pump Module

The pump module shall be a self-supported structure mounted independently from the body and chassis cab. The pump module shall be constructed entirely of extrusions and aluminum plate and shall be bolted to the chassis frame rails. The framework shall be formed from beveled aluminum alloy extrusions and electrically seam welded both internally and externally at each joint using aluminum alloy welding wire. The main framework shall be aluminum. Aluminum angle shall be welded such that a recessed pump panel can be mounted inside the extrusion perimeter. The module shall be mounted to the chassis frame rails utilizing a "U" bolt spring mounting system. The pump module design must allow normal frame deflection without imposing stress on the pump module structure or side running boards.

The pump enclosure superstructure shall be constructed of aluminum tubing, channel, angle, and break-formed components. The framework shall welded both internally and externally at each joint using aluminum alloy welding wire. The main, frame work shall be constructed of aluminum box and/or extrusions. The break-formed components shall be constructed from minimum 3/16" (1.875) aluminum.

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

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

The pump enclosure shall include an area above the pump for the installation of crosslays and/or dunnage area.

Section 7.19: Pump Panels

There shall be two side mounted pump panels, one of each side of the pump enclosure.

- a) The operator's controls and gauges shall be mounted on pump panels constructed of 1/8" (.125) black anodized, non-glare aluminum or stainless steel. No vinyl coverings shall be
- b) The operator's master gauge panel shall be vertically hinged with push style latch for access to gauges and auxiliary controls.
- c) The operator's control panel shall be located below the master gauge panel and constructed of 1/8" (.125) black anodized, non-glare aluminum or stainless steel.
- d) All gauges and controls shall be properly identified with color-coded metal tags. The tags shall be affixed with 3M brand industrial adhesive. The gauges shall be functionally grouped above each control.
- e) All gauge bezels, controls, trim rings, pump panel labels, and drains shall be color coded.
- f) Vertically hinged pump panel/s with latches shall be installed on the curb side of the pump module and provide access to the pump compartment during routine maintenance.
- g) All instruments and controls shall be provided and installed as a group at the pump panel. The central midpoint or centerline of any valve control shall be no more than 72" vertically above the ground or platform that is designed to serve as the operator's standing position. The instruments shall be placed to keep the pump operator as far as practical from all discharge and intake connections and in a location where they are readily visible and operationally functional while the operator remains stationary.
- h) One-(1) individual LED pump panel light with on/off switch shall be mounted under the light shield operator's side. For optimum visibility during nighttime operations, the light shall be mounted as high as possible.
- i) One-(1) individual LED pump panel light with on/off switch shall be mounted under the light shield curb side. For optimum visibility during nighttime operations, the light shall be mounted as high as possible.
- j) Two (2) LED lights shall be installed in the pump compartment for inspection or routine maintenance and shall be wired to the pump panel light switch

Section 7.20: Pump Operator's Platform

One (1) slide-out platform shall be installed under the operator's panel constructed from minimum 3/16" aluminum tread plate. Two-(2) sealed roller bearing slides, with a total capacity of not less than 500lbs shall be installed one-(1) each side of the platform. Devices shall be provided that mechanically hold the platform in both the retracted and extended positions. The slide-out platform shall be wired to the open door indicator system activating the light in the cab when the step is in the extended position.

Section 7.21: Running Boards

Slip resistant running boards shall be provided on each side of the pump module. The running board stepping surface shall comply with the latest edition of NFPA 1901. The running boards shall be bolted to the modules substructure so as to facilitate removal.

Section 7.22: Pressure Governor System

An electronic Pressure Governor system shall be installed in the vehicle and mounted on the Operator's Pump Panel. The governor shall monitor engine RPM and other pertinent data directly from the engine ECU. Engine information required by NFPA shall be delivered through a single unit resulting in saving panel space and delivering engine specific warnings. The system shall include water supply and cavitation routines. The system shall include:

- a) Throttle control
- b) Display that is easily read in direct sunlight
- c) Shall be sealed to IP67 both front and rear
- d) May be used in vertical or horizontal positions
- e) Intake and discharge displays
- f) Dedicated RPM display
- g) Target pressure indication
- h) Interlock and mode status
- i) System voltage indicator with warning
- j) Engine coolant temperature
- k) Engine oil pressure
- l) Transmission temperature
- m) Advanced service diagnostics
- n) Preset pressure capability

Section 7.23: Operator's Pump Panel

The primary pump panel shall be located on the street side of the apparatus and shall be known as the Operator's Pump Panel. The following devices and components shall be mounted on the Operator's Pump Panel:

Two compound 4-1/2" master gauges shall be provided and installed on the pump operator's panel. The intake and discharge gauges shall be liquid filled with a solution to assure visual readings and reduce inner lens condensation. The body of the gauges shall be constructed with chrome-plated bezels. The gauges shall be internally illuminated with easily replicable LED. The face of the gauges shall have a white background and black markings accurate within 1%. The pressure gauges shall maintain performance of all features and be free from defects in material and workmanship which includes fluid fill leakage and discoloration for seven years.

Section 7.24: Tank to Pump Valve

One (1) 3" ball valve shall be installed between the pump and the water tank. The tank to pump valve shall be a quarter turn fixed pivot design constructed from bronze. The valve shall be controlled by a chrome push/pull locking "T" handle installed at the left pump panel.

Section 7.25: Discharge Valves, Operator's Pump Panel

Two (2) 2-1/2" Heavy-Duty ball valves with 3/4" drain shall be installed on the Operator's pump panel and shall be plumbed to the discharge side of the pump with push/pull controlled from the pump operator's panel.

Section 7.26: Discharge Valves, Curb side Pump Panel

Two (2) 2-1/2" Heavy-Duty ball valves with 3/4" drain shall be installed on the Operator's pump panel and shall be plumbed to the discharge side of the pump with push/pull controlled from the pump operator's panel.

One-(1) 3" Heavy-Duty (Slo-Close) ball valve with 3/4" drain shall be installed on the right pump panel, right and shall be plumbed to the discharge side of the pump and equipped with 3" NST threads chrome cap and chain and controlled at the pump operator's panel. One (1) 3" FNST rocker lug x 5" Storz, adapter with 30 degree turn down shall be supplied with the apparatus and connected to the right side 3" discharge and include one (1) 5" Storz cap with chain.

Section 7.27: Aerial Waterway Discharge

An aerial waterway discharge shall be provided with a 4" full-flow brass valve with Teflon ball. The waterway discharge shall be connected from the pump to the aerial waterway with the use of heavy steel pipe. The discharge valve shall be hand wheel controlled. The control shall be located at the Operator's pump panel and shall have a liquid filled 2.5" pressure gauge.

An inlet to the aerial waterway of not less 4" NST shall be provided at the rear of the apparatus. The inlet shall have 4.00" aluminum plumbing. It shall include (1) 4" FNST rocker lug x 5" Storz, adapter with 30 degree turn down, 4.00" chrome plated adapter and a 4.00" chrome plated, long handle cap.

Section 7.28: Pre-connected Crosslay Control Valves

One-(1) 2" ball valve with mechanical swivel shall be installed. The valve shall be plumbed to the front crosslay with 2" high-pressure flexible hose and stainless steel couplings. The high pressure hose shall be tested to 1200 PSI. The crosslay valve shall be push-pull controlled at the pump operator's panel and include a 3/4 quarter-turn drain valve.

One-(1) 2" ball valve with mechanical swivel shall be installed. The valve shall be plumbed to the rear crosslay with 2" high-pressure flexible hose and stainless steel couplings. The high pressure hose shall be tested to 1200 PSI. The crosslay valve shall be push-pull controlled at the pump operator's panel and include a 3/4 quarter-turn drain valve.

Section 7.29: Master Drain Valve

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

Section 7.30: Thermal Relief Valve

A thermal protection device shall be included on the pump that monitors pump water temperature and opens to relieve water to cool the pump. The thermal protection device shall be set to relieve water when the temperature of the pump water exceeds 120o F (49 C). The components of the thermal protection device shall be manufactured of brass and stainless steel and be compatible with most foam concentrates. The thermal protection device shall have 1-1/4 inch NPT threads for easy adaptability to existing pump discharge openings. The discharge line shall be 3/8 inch diameter tubing vented to

atmosphere or back to the booster tank. The thermal protection device shall have a hydrostatic test rating of 600 PSIG.

The thermal protection device shall include a chrome panel placard with warning lamp and lamp test button and a pump panel mounted buzzer that provides audible warning of an overheat occurrence of the pump.

Section 7.31: Pump Anode System

The Fire Pump shall be equipped with replaceable anodes. The pump shall have one anode on each intake section and one anode on the discharge section of the Fire Pump.

Section 7.32: U.L. Test Points

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

Section 7.33: Pump Test Certification Plate

A permanently affixed plate shall be installed at the pump operator's panel. It shall provide the rated discharge and pressures together with the speed of the engine as determined by the certification test for each unit. It shall also provide the position of the parallel/series pump used and the no load governed speed of the engine as stated by the engine manufacturer on a certified brake horsepower curve.

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

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

Section 8.0: Water Tank

The tank shall have a capacity of 500 U.S. gallons and shall be constructed of polypropylene material. This material shall be a non-corrosive stress relieved thermoplastic and UV stabilized for maximum protection. Tank shell thickness may vary depending on the application and may range from ½ to 1" as required. Internal baffles are generally 3/8" in thickness.

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

All swash partitions interlock with one another and shall be 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.

Section 8.1: Water Fill Tower and Cover

The tank shall have a combination vent and manual fill tower. The fill tower shall be constructed of 1/2" polypropylene and shall be a minimum dimension of 8" x 8" outer perimeter. 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. Inside the fill tower there shall be a combination vent/overflow pipe. The vent overflow shall be a minimum of schedule 40 polypropylene pipe with a minimum I.D. of 4" that is designed to run through the tank, and shall be piped to discharge water behind the rear wheels as required in NFPA 1901 so as to not interfere with rear tire traction.

The tank cover shall be constructed of 1/2" thick 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 shall assist in keeping the covers rigid under fast filling conditions. A minimum of two lifting dowels shall accommodate the necessary lifting hardware.

Section 8.2: Sump

One (1) sump shall be provided in the bottom of the water tank. The sump shall be constructed of a minimum of 1/2" polypropylene and be located in the left front quarter of the tank. The sump shall have a minimum 3" NPT threaded outlet on the bottom for a drain plug per NFPA 1901 that shall be used as a combination clean-out and drain. Tank shall have an anti-swirl plate located approximately 3" above the inside floor.

Section 8.3: Tank Outlets

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

Section 8.4: Tank Mounting

The tank shall rest on the body cross members in conjunction with such additional cross members, spaced at a distance that would not allow for more than 530 square inches of unsupported area under the tank floor. In cases where overall height of the tank exceeds 40 inches, cross member spacing must be decreased to allow for not more than 400 square inches of unsupported area. The tank must be isolated from the cross members through the use of hard rubber strips with a minimum thickness and width dimension of 1/4" x 1". The rubber must be installed so it shall not become dislodged during normal operation of the vehicle. Additionally, the tank must be supported around the entire bottom outside perimeter and captured both in the front and rear as well as side to side to prevent tank from shifting during vehicle operation. A picture frame type cradle mount with a minimum of 2" x 2" x 1/4" mild steel, stainless steel, or aluminum angle shall be provided or the use of corner angles having a minimum dimension of 4" x 4" x 1/4" by 6" high are permitted for the purpose of capturing the tank. The tanks shall include adequate vertical hold down restraints to minimize movement during vehicle

operation. Equipment shall not be mounted directly to the tank top unless provisions have been designed into the tank for that purpose. The tank shall be completely removable without disturbing or dismantling the apparatus structure.

Section 8.5: Capacity Certification

The water tank shall be tested and certified as to capacity. Each tank shall be weighed empty and full to provide precise fluid capacity. The tank shall include a Certificate of Capacity delineating the weight empty and full and the resultant capacity based on weight. The manufacturer shall certify the capacity of the water tank prior to the delivery of the apparatus. This capacity shall be recorded on the manufacturer's record of construction and the certification shall be provided when the apparatus is delivered.

Section 8.6: Tank Water Level Gauges

Water tank level gauges shall be installed on each pump panel. Total two (2) and shall include an electronic indicator module, a pressure sensor, chrome bezel, and a 10' sensor cable. The indicator shall show the volume of water in the tank on nine (9) super bright LED's. A wide view lens over the LED's shall provide for a viewing angle of 180 degrees. The indicator case shall be waterproof, manufactured of aluminum, and have a distinctive blue label.

Program features shall be accessed from the front of the indicator module. The program shall support self-diagnostics capabilities, self-calibration, and a data link to connect remote indicators. Low water warnings shall include flashing LED's at 1/4 tank, down chasing LED's when the tank is almost empty, and an output for an audio alarm.

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

Section 9.0: Compartmentation

The body and compartments shall be constructed of heavy duty aluminum plate, extrusions, and /or channel. The body shall be welded on external or hidden surfaces wherever possible to insure a clean compartment interior look. The compartments shall be a "sweep out" design with the floor higher than the door sill. All compartment seams shall be caulked. Compartments shall have weather stripping to enclose compartment from the elements. Compartments shall be painted with a scuff resistant paint.

Drip protection shall be provided above the compartment doors by means of bright aluminum extrusion, formed bright aluminum treadplate or polished stainless steel.

The top of the compartments shall be covered with bright aluminum treadplate rolled over the edges on the front, rear and outward side. These covers shall have the corners welded.

Side compartment covers shall be separate from the compartment tops.

All screws and bolts, utilized in the compartments shall be stainless steel and where they protrude into a compartment shall have acorn nuts on the ends to prevent injury.

All body compartments shall be vented to provide one (1) way airflow out of the compartment that prevents water and dirt from gaining access to the compartment. Compartments vents shall meet the requirements of NFPA 1901, current edition.

Compartmentation on each side of the vehicle shall be high side rescue style compartments and the same quantity, size and configuration on the curb and street sides of the apparatus.

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

Polished stainless steel or aluminum fender crowns shall be provided around the rear wheel openings.

Section 9.1: Compartment Lighting

All compartments with roll-up doors shall be equipped with white 12 volt DC LED compartment light strips mounted in the roll-up door track. All compartments with non-roll-up doors shall include round or strip LED lighting. Compartments must be fully illuminated and the lighting shall not be blocked due to shelving or equipment stored within the compartment. Compartment lights must be easy to install and repair without having to remove track or other system components.

The compartment lights shall illuminate when the battery switch is on and the respective compartment door is opened.

Section 9.2: Wheel Well Compartments

The body shall include compartments in the wheel well area capable of storing SCBA cylinders and wheel chocs as follows:

SCBA cylinder compartments shall be located in front of the rear axle and wheel chock storage shall be provided behind the rear axle in the wheel wells.

Street side:

One (1) SCBA cylinder compartment capable of holding one (1) SCBA cylinder

One (1) Wheel choc compartment capable of holding one (1) wheel choc.

Curb Side:

One (1) SCBA cylinder compartment capable of holding two (2) SCBA cylinders

One (1) Wheel choc compartment capable of holding one (1) wheel choc.

The SCBA cylinders and wheel chocs shall be externally secured in each storage area by a hinged door which shall be secured in the closed position by a push button latch. The doors shall have a brushed stainless steel finish. A dielectric barrier shall be provided between the door hinge, hinge fasteners and the aluminum apparatus body.

Each storage area shall provide individual storage and shall not allow forward or rearward movement of the equipment within the compartment. The SCBA cylinders and wheel chocs shall be removable from the storage area without coming into contact with any surface area of the wheel well.

So as to prevent cylinder damage, the bottom of each SCBA cylinder wheel well compartment shall be lined with a ribbed rubber matt.

Wheel choc compartments shall include NFPA compliant wheel chocs. The vehicle may either roll over or crush an undersized choc, possibly resulting in bodily injury or property damage, therefore Zico aluminum chocs or equal meeting the following salient characteristics shall be provided and stored within the specified compartments:

- a) High-tensile strength aluminum construction
- b) Large rear-opening hand grip
- c) Double row of rugged teeth to grip virtually any firm surface.
- d) Recommended for tires up to 32" in diameter.
- e) NFPA compliant
- f) SAEJ348 compliant
- g) Third-party tested
- h) Must fit within the specified compartments.

Section 9.3: Compartments L1 and R1

There shall be a full height compartment ahead of the rear wheels on both sides of the vehicle which shall be not less than 60 wide and not less than 64 inches high. These compartments shall be not less than 26.00" deep inside the lower section and 12.00" deep inside the upper portion. The clear door opening shall be not less than 58.75" wide x 57.00" high. These compartments shall be equipped with rollup doors. These compartment shall be known as Compartments L1 and R1 respectively.

Section 9.4: Over Wheelwell Compartments

There shall be two (2) compartments on each side of the vehicle directly behind the L1 and R1 compartments. These compartments shall be located above the wheelwell and stabilizer. Each compartment shall be not less than 40." wide x not less than 25" high and not less than 12.00" deep. The clear door opening shall be not less than 37.75" wide x 19 inches high. These compartments shall be equipped with rollup doors. There shall be no patrician between these compartments.

Section 9.5: Compartments L4 and R4

There shall be a full height compartment behind the rear wheels and stabilizer on both sides of the vehicle which shall be not less than wide and not less than 57 inches high and 47 inches wide. These compartments shall be not less than 26.00" deep inside the lower section and 12.00" deep inside the upper portion. The clear door opening shall be not less than 44" wide x 52.00" high. These compartments shall be equipped with rollup doors.

These compartment shall include a drip pan below the roll of the door.

Section 9.6: Roll-up Compartment Doors

Roll-up compartment door shall be constructed using 1.00" extruded double wall aluminum slats which shall include a flat smooth interior surface to provide maximum protection against equipment hang-up. The slats shall be connected with a structural driven ball and socket hinge designed to provide maximum curtain diaphragm strength. Mounting and adjusting the curtain shall be done with a clip system that connects the curtain to the balancer drum allowing for easy tension adjustment without tools. The slats shall be mounted in reusable slat shoes with positive snap-lock securement.

Each slat shall incorporate weather tight recessed dual durometer seals. One (1) fin shall be designed to locate the seal within the extrusion. The second shall serve as a wiping seal which shall also allow for compression to prevent water ingress.

The doors shall be mounted in a one (1)-piece aluminum side frame with recessed side seals to minimize seal damage during equipment deployment. All seals including side frames, top gutters and bottom panel are to be manufactured utilizing non-marring materials.

Bottom panel flange of roll-up door shall be equipped with two (2) cut-outs to allow for easier access with gloved hands.

A stainless steel lift bar to be provided for opening the door and located at the bottom of each door with latches on the outer extrusion of the door frame. A ledge to be supplied over lift bar for additional area to aid in closing the door. The lift bar shall be located at the bottom of door with striker latches installed at the base of the side frames. Side frame mounted door strikers shall include support beneath the stainless steel lift bar to prevent door curtain bounce, improve bottom seal life expectancy and to avoid false door ajar signals.

All injection molded roll-up door wear components shall be constructed of Type 6 nylon.

The header for the roll-up door assembly shall not exceed 4.00".

A heavy-duty magnetic switch shall be used for control of open compartment door warning lights.

All roll-up doors shall be key lockable and include track mounted LED lighting.

Section 9.7: Ground Ladder Compartments

Two (2) Ladder tunnels shall be provided at the rear of the apparatus on either side of the turntable.

The ladder tunnel/s shall be capable of holding the specified ladders and designed in such a fashion that allows all ladders to be removable individually without having to remove any other ladder.

The ladders shall be held in place by top and bottom by stainless steel or heavy duty aluminum tracks. A polyethylene wear plate shall be provided to prevent ladders from being scuffed by contacting metal parts. The plate shall be mounted to the bottom of the entrance area of the ladder tunnels.

All ladders shall be secured in place by a heavy duty strap or other method so as to provide additional security for the ladders when the vehicle is in motion. A smooth aluminum door shall be provided on each ladder tunnel.

The following ladders shall be provided and stored within the ladder compartments:

Street Side Ladder Compartment:

- 1- 24 foot aluminum extension ladder
- 2- 16 foot roof ladders with folding hooks
- 2- I-Beam Pike Poles

Curb side Ladder Compartment:

- 1- 35 foot aluminum extension ladder
- 1-10 foot folding ladder
- 4- I- Beam Pike Poles

Extension and roof ladders must have field repairable factory parts and be equipped with high strength steel butt spurs and rounded aluminum top caps for increased durability.

All ladders must meet NFPA 1931.

The following pike poles shall be provided with the apparatus and stored within tubes inside the ground ladder compartment/s:

- Two (2) 12' pike pole(s) with fiberglass I-beam handles
- Two (2) 8' pike pole(s) with fiberglass I beam handles
- Two (2) 6' pike pole(s) with fiberglass I beam handles

All ladder shall be Duo Safety brand and all pike poles shall be Zico I Beam

Section 9.8: Compartment Shelves

Adjustable shelves shall be constructed from 3/16" (.1875) smooth aluminum. The adjustable track shall be made from aluminum extrusions. The shelf shall have a 2" lip on all sides, vertically welded in the corners, for additional strength.

Fully adjustable shelves shall be provided as follows:

- There shall be two (2) adjustable shelves provided in the L1 and R1 compartments
- There shall be two (2) adjustable shelves provided in the L3 and R3 compartments

Section 10.0: Crosslay Hosebeds

Crosslay hose beds shall be provided directly above the pump panel and shall be accessible from either side of the apparatus. Crosslays shall consist of:

Two (2) crosslays with 1.50" discharges. Each bed to be capable of carrying 200' of 1.75" double jacketed hose and shall be plumbed with 2.00" i.d. pipe or high pressure hose and gated with a 2.00" quarter turn ball valve. Outlets to be equipped with a 1.50" National Standard hose thread 90 degree swivel located in the hose bed so that hose may be removed from either side of apparatus. A center crosslay divider shall be provided and fabricated from 0.25" aluminum and shall be adjustable from side to side. The divider shall be unpainted with a brushed finish. Vertical scuff plates constructed of stainless steel shall

be provided at the front and rear ends of the bed on each side of vehicle. Crosslay bed flooring shall consist of removable perforated brushed aluminum.

One (1) crosslay with 2.50" discharge. This hosebed shall be capable of carrying 200' of 2.50" double jacketed hose and shall be plumbed with 2.50" i.d. pipe or high pressure hose and gated with a 2.50" quarter turn ball valve. Discharge to be equipped with a 2.50" National Standard hose thread 90 degree swivel located in the hose bed so that hose may be removed from either side of apparatus. The center crosslay dividers shall be fabricated of 0.25" aluminum and shall provide adjustment from side to side. The divider shall be unpainted with a brushed finish. Stainless steel vertical scuff plates shall be provided at hose bed ends (each side of vehicle). Bottom of hose bed ends (each side) shall also be equipped with a stainless steel scuff plate. Crosslay bed flooring shall consist of removable perforated brushed aluminum.

The crosslay controls shall be at the pump operator's panel.

There shall be a crosslay cover provided with the apparatus secured along the top closures and ends which protects the crosslay hose. The cover shall prevent hose from deploying during normal operations meeting the current NFPA requirements. The end flaps shall be secured at the bottom. Elastic netting shall be provided across the top and ends of all three (3) crosslay openings to secure the hose during travel. The netting shall be permanently attached at the top center of the crosslay bed and removable on each end.

Section 11.0: Main Hose Hosebed

The main hosebed, shall be capable of holding not less than 1000' of 5" double jacketed supply hose. The hosebed shall be located on top of the rear section of the apparatus and the hose shall deploy from the rear of the vehicle through chutes. The Hosebed shall be completely open across the top, from front to rear. The hosebed shall be free from all sharp objects such as bolts, nuts, etc. to avoid damage to fire hose. The flooring shall be slotted to drain and dry the hose. Hosebed shall be removable to provide access to inner body framework.

The hose bed shall be fabricated of aluminum plate of not less than .125".

The hose in the hose bed shall be restrained by a black nylon Velcro strap at the top of the hose bed and a 1.00" black nylon web design with a 2.00" box pattern at the rear of one (1) hose bed(s). The Velcro strap shall be installed to the top of the hose bed side sheets. The rear webbing shall have 1.00" web straps that loop through footman loops and fasten with spring clip and hook fasteners.

A hose bed divider shall be furnished for the separating hose. The divider shall be constructed of .125" aluminum sheet. The divider shall be fully adjustable by sliding in tracks. The divider shall be unpainted.

Section 12.0: Rear Mounted Aerial Ladder

A rear mounted aerial ladder shall be provided and shall be designed to provide continuous egress for firefighters and civilians from an elevated position to the ground. The rear mounted configuration shall extend over the vehicle cab when retracted and stowed for travel. Where possible, the ladder electrical system shall be included in the multiplex electrical system.

To insure a high strength to weight ratio and an inherent corrosion resistance, the aerial ladder shall be completely constructed of high strength aluminum.

The aerial ladder system shall include hydraulic systems for rotation, extension/retraction, and rotation. These systems shall be NFPA 1901 compliant

The aerial ladder shall consist of three (3) welded extruded aluminum telescopic ladder sections, which shall extend to a minimum height of 75 feet above the ground at full extension and elevation. The measurement of height shall be consistent with the current NFPA 1901 standard.

The operating range of the ladder shall be -8 degrees to +76 degrees.

The aerial ladder shall meet or exceed all applicable requirements of the current edition of NFPA 1901 and shall have a rated tip capacity of not less than 500 pounds unsupported at full extension and 0 degrees elevation. The aerial ladder shall have a rated horizontal reach of not less than 67 feet 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 ladder shall have a minimum safety factor of 2.5 to 1. This structural safety factor shall apply to all structural aerial components including turntable and torque box stabilizer components.

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 braced for maximum lateral stability. This bracing shall extend to the center of each rung to minimize ladder side deflection.

All side rails, rungs, handrails, uprights and braces shall be made of structural aluminum alloy extrusions. All ladder sections shall be welded using inert gas shielded-arc welding methods using aluminum alloy welding wire. 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. Structural rivets or bolts shall not be utilized in the ladder weldment sections.

Each aerial ladder section shall have heat sensor labels that are preset to 300 degrees F with expiration year. The heat labels shall meet the current NFPA 1901 standard.

The aerial ladder shall meet or exceed the current NFPA 1901 standard governing the minimum ladder section width and handrail height.

The ladder rungs shall be spaced on 14" centers and have an integral skid-resistant surface as outlined in the current NFPA 1901 standard. "D" shaped rungs shall be utilized to provide a larger step surface at low angles and a more comfortable grip at elevated positions. The minimum design load of each rung shall be 500 lbs.

To reduce maintenance expense, the aerial ladder shall have a natural aluminum or swirled finish.

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.

Ladder shall have a dual position waterway with rescue and suppression positions.

Ladder shall have one (1) set of folding steps installed at the tip to provide solid footing for personnel while operating the elevated master stream device. In interest of fire fighter safety, the step surface when both are in the down position shall have a maximum of 1" apart. When folded out of the way, the steps shall not present any obstruction to climbers

Ladder shall be equipped with two (2) load lifting / rappelling eyes at the tip of the fly section. The load lifting /rappelling eyes, as a pair, shall be rated at 500 pounds.

A bolt on removable egress or sacrificial ladder tip shall be installed on the tip of the fly section. Only certified structural fasteners (S/S) shall be utilized to attach the egress to the tip of the fly section. This design shall allow for easy replacement should the egress become damaged during rescue operations.

Ladder shall have a two-way intercom system at the turntable and at the tip of the ladder. The two-way intercom system shall include a master station with volume and Push-To-Talk (PTT) controls and a remote station that provides hands-free operation. The remote station shall always be in transmit mode unless interrupted by a transmission from the master station.

LED rung lighting shall be provided on both sides of the aerial ladder base, mid, and fly sections. The lighting shall be located adjacent to the ladder rungs along the lower rail of the ladder sections and shall run the length of the ladder section.

The color of the sections shall be:

- a) The base section of the ladder to be green.
- b) The mid section of the ladder to be amber.
- c) The fly section of the ladder to be red.

The LED rung lighting shall be activated when a switch at the turntable operator's panel is activated through the aerial master.

Section 12.1: Hydraulic System

Hydraulic power for all aerial ladder operations shall be supplied by a positive displacement hydraulic pump. The system design shall allow the aerial hydraulic system to be engaged at any engine speed without damaging the system. The pump shall be able to supply 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.

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.

A hydraulic fluid reservoir shall be provided 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 buildup 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 1901.

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.

A hydraulic oil pressure gauge and an aerial hour meter 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.

Section 12.2: Elevation System

The main boom section shall be elevated by dual double action hydraulic 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 on the barrel and rod side of the piston to prevent movement of the ladder in case of a loss of hydraulic pressure.

The elevation system shall be meet the current NFPA 1901 standard.

The elevation hydraulic cylinders shall incorporate cushions on the upper limit of travel.

The hydraulic system shall have a hydraulic circuit to reduce the elevation raising speed of the aerial.

When the aerial reaches approximately 65 degrees, the circuit shall be activated and the elevation speed shall be reduced. The reduce speed shall minimize the whipping action of the aerial at maximum elevation.

The hydraulic elevation cylinders shall also serve as a locking device to hold the aerial in the stored position for road travel.

The lowering circuit for the hydraulic cylinders shall have a relief valve to prevent damage to the aerial base section or boom support when the aerial is being stored.

Section 12.3: Extension-Retracton System

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.

The cylinders shall be supplied with dual pilot operated check valves on each stabilizer cylinder to hold the cylinder in position should a charged line be severed at any point in the hydraulic system.

The aerial ladder sections shall slide within each other. Nylatron NSM pads shall be utilized between each section to minimize friction.

Section 12.4: Rotational System

The aerial shall be supplied with a powered rotation system as outlined in the current NFPA 1901 standard. The hydraulic rotation motor shall provide continuous rotation under all rated conditions and be supplied with a brake to prevent unintentional rotation.

A high torque hydraulic motor driven through a spring applied hydraulically released multiple disk brakes into a planetary gearbox shall accomplish rotation.

The turntable bearing, ring gear teeth, pinion gear, planetary gearbox and output shaft shall be certified by the manufacturer of the components for the application.

Section 12.5: Ladder Mounted Devices and Equipment

The following equipment and devices shall be mounted on the ladder:

- Two (2) 10" x 144" x 1/8" (0.125") thick smooth aluminum sign 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 sign plates shall be provided to display the Fire Academy's name. The plates shall be painted job color and lettered as follows:

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- One (1) Plastic Stokes Basket Stretcher shall be provided and stored in brackets on the aerial. Location to be determined at the Pre-construction conference. The stretcher shall be yellow

high-density polyethylene shell, supported by a stainless steel outer rail, permanently attached with stainless steel semi-tubular rivets. Shall include molded runners, fully exposed outer rail, non-absorbent foam pad secured to stretcher and four patient restraint straps. Dimensions shall not exceed 84-1/2" L x 24" W x 7-1/2" H, weight: 31 lbs. with a load capacity of not less than: 1200 lbs

- Ladder shall have two (2) Whelen, blue LED lights: one (1) on each side of the last fly section. Lights shall be steady burn and not flashing.
- The ladder shall have fully adjustable 12 volt LED spot lights of not less than 20,000 lumens installed as follows:
 - One (1) shall be mounted on the driver's side of the base section of the ladder.
 - One (1) shall be mounted on the passenger's side of the base section of the ladder.
 - One (1) shall be mounted on the driver's side tip of aerial.
 - One (1) shall be mounted on the passenger's side tip of aerial.
- Ladder shall have creeper controls for the operator at the tip of the ladder.
- One (1) 14' Duo-Safety roof ladder shall be mounted behind the ladder sign plate.

Section 12.6: Stabilizers

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

One (1) set of extendable stabilizers shall be installed for stability at the rear of the torque box. The jack cylinders shall be equipped with internal holding valves, which shall hold the cylinder wither in the stowed position or the working position should a charged line be severed at any point within the hydraulic system. Cylinder rods shall be fully enclosed by a telescoping inner box to protect them against damage from nicks, abrasion and any other damage that may occur while on the fire ground.

There shall be two (2) flashing LED warning lights installed on the stabilizer cover panel, one (1) each side. The color of these lights shall be red Super LED/clear lens each side. These lights shall be mounted with a flange. These warning lights shall be activated by the same switch as the side warning lights.

Two (2) 4.00" diameter red LED flashing lights shall be mounted on each stabilizer, one (1) facing forward and one (1) facing rearward. The lights shall be recessed in the horizontal beam of the stabilizer. These warning lights shall be activated with the aerial master switch.

A stabilizer deployment warning alarm shall activate by moving the diverter valve to the stabilizer mode and deploying an outrigger shall be provided at each stabilizer to warn personnel. The warning alarm shall deactivate only when all stabilizers are in the load-supporting configuration, or when the diverter switch is no longer in the stabilizer mode.

The stabilizers shall be connected to the hazard light circuit to warn the driver if they are not stowed when the chassis parking brake is released.

Two (2) auxiliary stabilizer pads shall be provided for load distribution.

The stabilizers shall be incapable of movement with aerial ladder out of the travel position, per NFPA 1901.

In compliance with NFPA 1901, the stabilizer controls shall be arranged so that the operator has a direct line-of-sight to the stabilizers being positioned. Use of mirrors or other indirect means of watching the stabilizer deployment are not acceptable.

Stabilizers shall be located at the rear of the apparatus in enclosed compartments, illuminated for nighttime operation and properly labeled. Two (2) control stations shall be provided, one on each side at the rear.

An electrically actuated diverter valve shall be provided in conjunction with the stabilizer controls as a safety device. The diverter valve shall allow the hydraulic fluid to flow to either the stabilizer circuit or the turntable and ladder circuit, but not both simultaneously.

The aerial shall have a cab and body avoidance system, short jack capability and system to stop ladder from operating when stabilization is not safe to operate. The minimum items shall be included in this system shall be:

- Aerial PTO engaged Stabilizer status Aerial Level
- Aerial Reach Aerial Elevation Aerial Load
- Elevated Master Stream PSI Elevated Master Stream GPM Hydraulic Oil Pressure Hydraulic Oil Temperature Ladder Rung Position

Section 12.7: Emergency Controls

The hydraulic system shall be designed with an auxiliary power unit meeting the current NFPA 1901 requirements. The auxiliary power unit shall be a 12-volt pump connected to the chassis electrical system. The pump shall provide operation at reduced speeds to store the aerial device and outriggers for road transportation. Self-centering switches shall be provided at the turntable and each stabilizer control station to activate the system.

An emergency power switch shall be located in a convenient location. The switch shall activate the emergency power unit and allow control of the aerial or stabilizers based on the direction the switch is toggled.

One (1) LED light shall be provided to illuminate the master override controls that shall illuminate when the battery switch is active and the master override door is open.

Section 12.8: Level Indicators

There shall be a liquid filled angle indicator mounted on the base section of the aerial ladder. The indicator shall give accurate elevation in degrees from -20 to +80 degrees in relation to level.

The liquid shall be of proper viscosity and composition to stay in liquid form even when exposed to below zero temperatures. Reading of the indicator shall be accomplished by observing the position of a suspended ball in relation to the degrees of elevation as marked on the indicator housing.

The indicator shall be illuminated for nighttime operations.

Section 12.9: Hydraulic Swivel

A hydraulic swivel shall be provided on the aerial to connect the hydraulic lines from beneath to above the point of aerial rotation. The hydraulic swivel shall allow for 360 degrees continuous rotation of the aerial ladder with no loss of speed or capacity in its functions.

Section 12.10: Electrical Swivel

The ladder shall be equipped with an electric swivel to allow 360 degrees rotation of the aerial while connecting all electrical circuits through the rotation point. Collector rings shall be provided that are capable of supplying 20 amp continuous service. All collector rings shall be enclosed and protected with desiccant plugs against condensation and corrosion.

Section 12.11: Turntable

A turntable shall be provided at the base of the aerial ladder. The turntable shall be of sufficient size and configuration to allow for the installation of a control station as well as room for personnel to maneuver when entering and exiting the aerial ladder.

Access to the turntable shall be provided by a set of NFPA compliant steps located on the rear of the vehicle. Step illumination shall be recess mounted LED and handrails shall be provided in accordance with NFPA 1901.

The turntable deck shall be covered with slip resistant decking to provide secure footing for the operator in all weather conditions.

A downward lip shall skirt the turntable decking around its entire circumference to provide protection from hazards.

Handrails shall be provided at the turntable. Handrails shall be fabricated from high quality, 1-1/4" diameter, stainless steel or aluminum tubing with a deep knurled finish to meet NFPA slip resistance requirements. Each handrail section shall be of a one-piece construction and provide large sweep corners at the edge of the turntable. Each handrail section shall be 42" high. The handrails shall be installed around the rear 180-degree perimeter of the turntable for operator and personnel safety. Each individual handrail shall be secured to the turntable by the use of two (2) minimum 5/8" anchor bolts on the underside of the turntable. Additionally, chrome plated stanchions with rubber gaskets shall be provided on the top surface of the turntable where each railing meets the decking surface.

All hoses and electrical lines shall be routed under removable covers so they do not present a tripping hazard. The covers shall also be designed to prevent damage to these components. Likewise, the center of the turntable shall have a removable step cover to prevent tripping hazards as well as provide easier transition to the first rung of the aerial ladder.

Section 12.12: Turntable Ladder Control Station

An aerial ladder operators position shall be provided as outlined in the current edition of NFPA 1901.

The operator's position shall be located on the left side of the aerial turntable. (street side)

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 control console shall be angled to face the operator with an etched panel for long service life. The console shall be labeled and supplied with LED lights for night operation.

The aerial ladder control levers shall be installed in the Operator's control station and shall be arranged as per the current edition of NFPA 1901. The aerial ladder control levers shall be capable of being

operated independently or simultaneously. The starting or stopping of any one control shall not affect the movement speed of the other controls when they are being used simultaneously.

The first lever from the left shall be the extension control (forward for extend and back for retract).

The second lever shall be for rotation (forward for clockwise and back for counter clockwise).

The third handle shall control elevation (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 foot-operated deadman switch or other device shall be provided to prevent unintentional movement as outlined in the current edition of NFPA 1901.

Operator's control console shall be provided with a hinged aluminum cover. Controls and indicator lights shall be clearly identified and conveniently located for ease of operation and viewing. Operator's turntable control panel shall include:

- Elevation, Extension and Rotation controls
- Fast idle switch
- LED Panel light
- Rung alignment indicator light
- System pressure gauge
- Indicator/Alarm test switch
- EPU switch
- Load rating tag/decal
- Aerial PTO engaged
- Aerial Level Aerial Reach Aerial Elevation Aerial Load
- Elevated Master Stream Flowmeter
- Aerial Ladder Overload Alarm
- Aerial control pedestal console shall have an emergency stop button. The emergency stop button shall override the creeper controls if turntable operator activates it.
- Aerial Ladder Rung Lights
- Aerial Ladder Floodlights
- Aerial Ladder Tip Lights.
- The controls for aerial master stream: Straight / Fog Up / Down Left / Right
- The operators load chart shall be installed in the aerial pedestal console area.
- An aerial speed control switch shall be provided for speeds; slow, normal and fast.
- An intercom speaker with push-to-talk and volume controls shall be located in the aerial control pedestal.

Section 12.13: Aerial Pivot Pins

The aerial device pivot pins shall be located on the turntable and shall attach the aerial device base section to the turntable. To maintain a suitable safety factor, the pivot pins shall be composed of certified structural steel, thereby ensuring structural integrity.

In the interest of safety, the pivot pins shall be located as low as possible, and shall be at the aerial device base rails. This shall keep the pivot points away from the areas where persons who enter and exit the aerial base section may place their hands.

Aerial pivot pins shall be installed with a means provided to keep the pins in place. The design shall not inhibit the pins from being removed by a trained mechanic.

Section 13.0: 110/240 Volt Electrical System

A complete 120/240 volt electrical system shall be installed and shall include the following components, capabilities and design criteria:

- All fixed line voltage power source producing alternating current (ac) line voltage shall produce electric power at 60 cycles plus or minus 3 cycles.
- Except where superseded by the requirements of NFPA 1901, all components, equipment and installation procedures shall conform to NFPA 70, National Electrical Code (herein referred to as the NEC).
- Line voltage electrical system equipment and materials included on the apparatus shall be listed and installed in accordance with the manufacturer's instructions. All products shall be used only in the manner for which they have been listed.
- Grounding shall be in accordance with Section 250-6 "Portable and Vehicle Mounted Generators" of the NEC. Ungrounded systems shall not be used. Only stranded or braided copper conductors shall be used for grounding and bonding.
- An equipment grounding means shall be provided in accordance with Section 250-91 (Grounding Conductor Material) of the NEC.
- The grounded current carrying conductor (neutral) shall be insulated from the equipment grounding conductors and from the equipment enclosures and other grounded parts. The neutral conductor shall be colored white or gray in accordance with Section 200-6 (Means of Identifying Grounding Conductors) of the NEC.
- In addition to the bonding required for the low voltage return current, each body and driving or crew compartment enclosure shall be bonded to the vehicle frame by a copper conductor. This conductor shall have a minimum amperage rating of 115 percent of the nameplate current rating of the power source specification label as defined in Section 310-15 (amp capacities) of the NEC. A single conductor properly sized to meet the low voltage and line voltage requirements shall be permitted to be used.
- All power source system mechanical and electrical components shall be sized to support the continuous duty nameplate rating of the power source.

Section 13.1 Operation of the 120/240 Volt Electrical System

Instructions that provide the operator with the essential power source operating instructions, including the power-up and power-down sequence, shall be permanently attached to the apparatus at any point where such operations can take place.

Provisions shall be made for quickly and easily placing the power source into operation. The control shall be marked to indicate when it is correctly positioned for power source operation. Any control device used in the drive train shall be equipped with a means to prevent the unintentional movement of the control device from its set position.

A power source specification label shall be permanently attached to the apparatus near the operator's control station. The label shall provide the operator with the information detailed in Figure 19-4.10.

Section 13.2: Overcurrent protection

The conductors used in the power supply assembly between the output terminals of the power source and the main over current protection device shall not exceed 144.00" (3658 mm) in length.

For fixed power supplies, all conductors in the power supply assembly shall be type THHW, THW, or use stranded conductors enclosed in nonmetallic liquid tight flexible conduit rated for a minimum of 194 degree Fahrenheit (90 degrees Celsius).

For portable power supplies, conductors located between the power source and the line side of the main overcurrent protection device shall be type SO or type SEO with suffix WA flexible cord rated for 600-volts at 194 degrees Fahrenheit (90 degrees Celsius).

Section 13.3 Wiring Methods and Identification

Fixed wiring systems shall be metallic or nonmetallic liquid tight flexible conduit rated at not less than 194 degrees Fahrenheit (90 degrees Celsius) or Type SO or Type SEO cord with a WA suffix, rated at 600 volts at not less than 194 degrees Fahrenheit (90 degrees Celsius) shall be utilized.

Electrical cord or conduit shall not be attached to chassis suspension components, water or fuel lines, air or air brake lines, fire pump piping, hydraulic lines, exhaust system components, or low voltage wiring. In addition the wiring shall be no closer than 12 inches or properly shielded, from exhaust piping. All fuel lines shall be no closer 6.00" distance to electrical components.

Electrical cord or conduit shall be supported within 6.00" of any junction box and at a minimum of every 24.00" of continuous run. Supports shall be made of nonmetallic materials or corrosion protected metal. All supports shall be of a design that does not cut or abrade the conduit or cable and shall be mechanically fastened to the vehicle.

All line voltage conductors located in the main panel board shall be individually and permanently identified. The identification shall reference the wiring schematic or indicate the final termination point.

Section 13.4: Electrical System Testing

The wiring and associated equipment shall be tested by the apparatus manufacturer or the installer of the line voltage system.

The wiring and permanently connected devices and equipment shall be subjected to a dielectric voltage withstand test of 900-volts for one (1) minute. The test shall be conducted between live parts and the neutral conductor, and between live parts and the vehicle frame with any switches in the circuit(s) closed. This test shall be conducted after all body work has been completed.

Electrical polarity verification shall be made of all permanently wired equipment and receptacles to determine that connections have been properly made.

Operational Test per the NFPA 1901 Standard shall be performed and documented.

The apparatus manufacturer shall perform operation tests and ensure that the power source and all devices that are attached to the line voltage electrical system are properly connected and in working

order. The test shall be witnessed and the results certified by an independent third-party certification organization.

Section 13.5 Hydraulic Generator

The apparatus shall be equipped with a complete hydraulic generator electrical power system. The generator shall be a hydraulically driven generator of not less than 10 kW. The wiring and generator installation shall conform to the present National Electrical Codes Standards of the National Fire Protection Association.

The generator shall be mounted in the in the cargo area above the pump on the driver's side. The flooring in this area shall be either reinforced or constructed, in such a manner, that it shall handle the additional weight of the generator. The installation shall be designed for continuous operation without overheating and undue stress on components.

The generator shall include the following performance criteria:

- Nominal Rating: 10,000 watts
- Continuous Duty Rating: 10,000 watts
- Nominal Volts: 120/240
- Amperage: 84 @ 120volts, 42 @ 240 volts
- Phase: Single
- Cycles: 60 hertz
- Engine Speed at Engagement: Idle

The generator package shall include the following design and operational characteristics:

- The generator shall be driven by a transmission power take off unit, through a hydraulic pump and motor.
- The generator shall use a structural steel frame which provides protection to the components and provides a unitized mounting module.
- The generator shall use a cover consisting of NFPA approved diamond tread plate.
- The generator shall use a Self-Sealing Air Intake to prevent recirculation of exhaust air.
- The generator shall use a Twin Draft Air Duct for the alternator and heat exchanger; located on the same side of the generator.
- The generator shall be designed to utilize Dual-Fan Technology for cooling.
- The generator shall use a single heat exchanger to cool the hydraulic oil.
- The generator shall use an industrial type alternator with heavy-duty bearings and a brushless design.
- The generator shall use an axial piston hydraulic motor.
- The generator shall use an axial piston variable displacement hydraulic pump.
- The generator shall use a meter to monitor the frequency, voltage and amperage of each leg.
- The generator shall have top access to the oil filter, oil fill tube and electrical interface box.
- The generator shall not utilize electronic controls or a multiplex system to control the frequency.
- The generator shall be capable of producing the full nameplate power when driven from the vehicle PTO from idle to maximum engine speed.
- The generator shall be capable of being used while vehicle is either stationary or in motion.

- The generator shall be capable of normal operation using a commonly available premium hydraulic oil; Mobile DTE series or equivalent. All fluid service points shall be in close proximity to the reservoir for ease of scheduled maintenance.
- The generator shall be warranted for a period of not less than two (2) years or 2000 hours, whichever should come first.
- The generator shall include an electrical control inside the cab. The hydraulic engagement supply shall be operational only after the chassis parking brake is applied.
- An electric/hydraulic valve shall supply hydraulic fluid to the clutch engagement unit provided on the chassis PTO drive.
- The generator hydraulic circuit shall include a soft start valve to protect the generator components during PTO engagement.

Section 13.6: Generator Instruments and Controls

So as to monitor the generator performance, a digital meter panel shall be furnished and mounted next to the circuit breaker panel. The meter shall indicate the following items:

- Voltage
- Amperage for both lines
- Frequency
- Generator run hours
- Over current indication
- Over temperature indication
- "Power On" indication
- Two (2) fuse holders with two (2) amp fuses (for indicator light protection)

The gauges and controls shall be installed near eye level in the compartment. Instruments shall be flush mounted in an appropriate sized weatherproof electrical enclosure. All instruments used shall be accurate within +/- two (2) percent. The load center shall have a circuit breaker to assure overload protection. The breaker furnished shall be properly sized to the generator output.

The system shall be installed by highly qualified electrical technicians to assure the required level of safety and protection to the fire apparatus operators. The wiring, electrical fixtures and components shall be to the highest industry quality standards available on the domestic market. The equipment shall be the type as designed for mobile type installations subject to vibration, moisture and severe continuous usage.

All electrical wiring shall be fine stranded copper type. The wire shall be sized to the load and circuit breaker rating; ten (10) gauge on 30 amp circuits, 12 gauge on 20 amp circuits and 14 gauge on 15 amp circuits. The cable shall be run in corner areas and extruded aluminum pathways built into the body for easy access.

Section 13.7: Circuit Breaker Panel

A fully enclosed circuit breaker panel shall be provided. The location shall be determined at the pre-construction conference. The panel shall include circuit breakers specifically designed to be used as circuit breakers and switching systems.

Individual breakers, sized for the circuit they feed, shall be provided for all on-line equipment and shall prevent a tripped breaker from affecting any other on-line equipment.

Section 13.8: Electric Cord Reel and Junction Box

One (1) 120/240 volt AC electrical system cord reel shall be provided and installed. The reel shall be located over the pump panel on the opposite side of the vehicle from the generator and shall include a protective cover.

The reel shall include a 12 volt electric rewind switch that is guarded to prevent accidental operation and labeled for its intended use. The switch shall be protected with a fuse and installed at a height not to exceed 72.00" above the operators standing position.

The reel shall be capable holding 200' of 10/4, 600 volt cable and shall include a cord consisting of one (1) length of 200 feet yellow 10/4 electrical cord. One (1) L5-15R 15 amp, 120 volt, female twist lock connector body shall be installed on the end of the cord.

The exterior finish of the reel(s) shall be powder coated silver from the reel manufacturer.

A ball stop shall be provided to prevent the cord from being wound on the reel.

A label shall be provided in a readily visible location adjacent to the reel. The label shall indicate current rating, current type, phase, voltage and total cable length.

One (1) Power Box electrical junction box shall be provided that is listed for use in wet locations and provided with a light to indicate power on. The box shall be designed to keep the exterior electrical components above 2 inches of standing water, protected from corrosion, and capable of being carried with a gloved hand.

The electrical box shall include:

- Junction box shall include strain relief cord connector and include the male cord end allowing it to be connected to the specified cord reel.
- Shall be constructed of cast aluminum alloy, with stainless steel hardware.
- GFCI protection, for safety, with four outlets, capable of mounting Twist Lock or Straight Blade,
- Outlets shall be at prescribed heights for water protection and shall be placed on sides of box.
- Integral carrying handle which is easily handled with gloved hands.
- Bright indicator light, covered with strong, protective Lexan® globe and is clearly visible in a 360° plane.
- Springloaded, weatherproof flip-lids and cover plates with neoprene gaskets to keep out dust and water.
- Powder coated High Visibility Yellow.
- Weight Approx. 7 lbs.
- Shall include truck mount bracket for vertical mounting on the vehicle.

The junction box shall include the following receptacles:

- Two (2) 120 vac, 15 amp straight blade duplex (household) receptacles
- Two (2) 120 vac, 20 amp twist lock receptacles to match the cord reel end

Section 13.09: 120 Volt Receptacles

All wet location receptacle outlets and inlet devices, including those on hardwired remote power distribution boxes, shall be of the grounding type provided with a wet location cover and installed in accordance with Section 210-7 "Receptacles and Cord Connections" of the NEC.

All receptacles located in a wet location shall be not less than 24.00" (610 mm) from the ground.

The face of any wet location receptacle shall be installed in a plane from vertical to not more than 45 degrees off vertical. No receptacle shall be installed in a face up position.

All receptacles located in a dry location shall be of the grounding type.

All receptacles shall be marked with the type of line voltage (120-volts or 240-volts) and the current rating in amps.

All receptacles and electrical inlet devices shall be listed to UL 498, Standard for Safety Attachment Plugs and Receptacles, or other appropriate performance standards. Receptacles used for direct current voltages shall be rated for the appropriate service. 15 amp 120 volt AC three (3) wire twist lock receptacle(s) with waterproof flip up cover(s) shall be installed as follows:

- Two (2) on the rear of the apparatus, one (1) each side one
- One (1) behind Drivers Side crew door.
- One (1) behind Passenger side crew door.

The NEMA configuration for the receptacles shall be L5-15R.

The receptacle(s) shall be powered from the generator through the specified circuit breaker box.

There shall be a label installed near the receptacle(s) that state the following:

- Line Voltage
- Current Rating (amps)
- Phase
- Frequency
- Power Source

Section 14.0 Cab, Body and Ladder Paint Finish

The body exterior shall have no mounted components prior to painting to assure full coverage of metal treatments. Box pan compartment doors shall be painted separately to assure proper paint coverage on body, doorjamb, and door edges.

All painting shall be in accordance with the paint manufacturer's recommendations so as to provide a lasting and high quality gloss finish and include:

Metal surfaces shall be sanded to remove all burrs and imperfections, before etching and treatment.

A wax & grease solvent shall be used to clean and prep the aluminum surface. The surface shall then be rinsed with fresh water. This step removes wax, grease and other surface contaminants, thus leaving a bright, clean, and conditioned surface.

A self-etching, metal primer shall be applied next. The self-etching primer shall fill all of the minor imperfections, scratches, etc. in the metal. This step produces a corrosion resisting conversion coating that prevents off oxidation and other surface contaminants leaving a surface that gives excellent paint adhesion.

A sandable primer shall be sprayed on the metal that seals the surface for the polyurethane paint. A minimum coating thickness of 2 MIL shall be applied. Primer is then sanded smooth leaving the best surface for topcoat.

The apparatus body shall then be painted with a minimum of three-(3) coats of color.

The body and components shall be thoroughly protected against corrosion and/or oxidation caused by contact between dissimilar metals. These areas shall be protected by the use of corrosion resistant primers, gaskets and "ECK" (electrolytic corrosion material) or any equivalent material.

Section 14.1: Paint Colors

The cab shall be shall be painted in a two tone paint pattern. It shall be painted white from the bottom of the window line up and red from the bottom of the window line down. The body shall be painted red. Exact colors shall be chosen at the pre-construction conference from manufacture supplied color chips.

The frame rails and associated components shall be high gloss black.

Ladder mounted hydraulic cylinders and associated equipment and devices shall be painted white to match the cab roof color. The bolt on removable egress or sacrificial ladder tip on the tip of the fly section shall be painted high visibility orange color.

Section 14.2 Striping and Lettering

Striping and Lettering shall be applied as follows:

Scotch-Lite Stripe

A 6" white scotch-lite stripe with two (2) 1 inch stripes shall be provided around the perimeter of the vehicle. The stripe shall be installed to meet the current NFPA requirements. The 1 inch stripes shall be located, 1 above and 1 below the 6 inch stripe. The Scotch-Lite stripe layout shall be finalized at the pre-construction meeting.

Chevron Striping

All rear facing body panels shall be covered with 6" wide reflective striping in an alternating red and yellow chevron pattern. The stripes shall run at a 45 degree downward angle from the top center of the apparatus. All rear facing compartment doors shall be included in the chevron striping.

Interior Cab Door Striping

On the interior lower section of each cab door, reflective chevrons full door width, shall be installed. They shall be alternating yellow and red.

Lettering

The apparatus shall be lettered using imitation gold leaf vinyl letters. So that the lettering can be proportional in size and appearance, the font and size shall be determined at the pre-construction conference. The lettering shall be as follows:

Front Cab Doors:

Tennessee Fire & Codes Academy

Ladder Sign Plates:

Tennessee Fire & Codes Academy

ADDITIONAL SPECS

(A) DELIVERY - ALL DELIVERIES ARE TO BE MADE BETWEEN THE HOURS OF 8:00 A.M. AND 3:00 P.M. MONDAY THROUGH FRIDAY. VENDOR SHOULD NOTE THE DELIVERY ADDRESS ON THE PURCHASE ORDER AS MOST UNITS NO LONGER SHIP TO THE MOTOR VEHICLE MANAGEMENT OFFICE LOCATION.

(B) ACCEPTANCE - DELIVERY DOES NOT MEAN ACCEPTANCE. ALL VEHICLES ARE SUBJECT TO INSPECTION TO ESTABLISH CONFORMITY TO SPECIFICATIONS PRIOR TO ACCEPTANCE.

INVOICING OF VEHICLES & EQUIPMENT

AFTER RECEIPT OF A PURCHASE ORDER, THE VENDOR WILL BE REQUIRED TO SUPPLY AN INVOICE TO ORDERING AGENCY WHEN THE UNIT SPECIFIED IS BEING DELIVERED. FAILURE TO SUPPLY AN INVOICE MAY RESULT IN THE UNIT BEING RETURNED TO THE VENDOR UNTIL AN INVOICE CAN BE SUPPLIED.

THE SUCCESSFUL BIDDER SHALL SUPPLY THE "MSO" (MANUFACTURERS STATEMENT OF ORIGIN) AND AN ODOMETER STATEMENT WITH EACH APPLICABLE UNIT AT THE TIME OF DELIVERY. BACK OF MSO MUST BE COMPLETED AS FOLLOWS: MOTOR VEHICLE MANAGEMENT, 6500 CENTENNIAL BLVD. NASHVILLE, TN 37243-0543

- 1) MINIMUM OF 1/4 TANK OF FUEL (BY FUEL GAUGE) UPON DELIVERY
- 2) SUCCESSFUL BIDDER TO SUPPLY THREE (3) SETS OF IGNITION KEYS AND THREE (3) SETS OF OTHER COMPONENT KEYS PER UNIT
- 3) PRE-DELIVERY ACCORDING TO MANUFACTURER'S STANDARD REQUIREMENTS
- 4) INVOICE TO INCLUDE IGNITION AND ALL OTHER KEY NUMBERS.

5) VEHICLE TO BE CLEAN INSIDE AND OUT WITH ALL APPLICABLE STICKERS REMOVED. PROTECTIVE COVERINGS AND PLASTIC TO BE REMOVED FROM SEATS.

6) WARRANTY: WILL BEGIN ON DATE VEHICLE IS PLACED IN SERVICE NOT TO EXCEED SIX (6) MONTHS FROM DELIVERY DATE.

7. DELIVERY MILEAGE - Warranty time and mileage will begin upon delivery and acceptance and will be added to the full manufacturer's warranty. i.e, warranty mileage plus delivery mileage equals total warranty mileage.