Specifications for a 100’ Heavy Duty Aluminum Ladder for the Rapid City Department of Fire & Emergency Services

Bidder Complies	
Yes	No

Purpose of Specifications

The purpose of these specifications is for the purchase of a 100 foot, aerial ladder truck for the City of Rapid City, Department of Fire & Emergency Services. Each proposal shall include TWO (2) options. Option 1 will be for a single cash payment. Option 2 will be a lease purchase plan(s). The lease purchase plan(s) shall be for a period of not more than 9 years and the interest rate shall be clearly stated. Cost savings for any type of cash pre-payment shall be included in the proposals also.

Intent of Specifications

It shall be the intent of these specifications to cover the furnishing and delivery of a complete apparatus equipped as herein specified. These specifications shall cover only the general requirements as to the type of construction and test to which the apparatus shall conform, together with certain details as to finish, equipment and appliances to which the successful bidder shall conform. Minor details of construction and materials, which are not otherwise specified, shall be left to the discretion of the contractor, who shall be solely responsible for the design and construction of all features.

Bidding Company Requirements

Bids shall be considered only from companies that have an established reputation in the field of fire apparatus construction and have been in business for a minimum of 20 years. Furthermore, bidders shall maintain dedicated service facilities for the repair and service of products. Evidence of such a facility shall be included in each bidder's proposal. Each bidder shall furnish satisfactory evidence of their ability to construct the apparatus specified and shall state the location of the factory where the apparatus is to be built. The bidder shall also show that the company is in position to render prompt service and to furnish replacement parts for said apparatus. Each bid shall be accompanied by a set of contractor's specifications, consisting of a detailed description of the apparatus and equipment proposed and to which the apparatus furnished under the contract shall conform. These specifications shall indicate size, type, model and make of all component parts and equipment.

Quality and Workmanship

The design of the apparatus shall embody the latest approved automotive engineering practices. The workmanship shall be of the highest quality in its respective field. Special consideration shall be given to the following points: accessibility of the various units, which require periodic maintenance, ease of operation (including both pumping and driving) and symmetrical proportions. Construction shall be rugged and ample safety factors shall be provided to carry the loads specified and to meet both on and off road requirements and speed conditions as set forth under the Performance Tests and Requirements section of this document.

Welding Requirements

Welding shall not be employed in the assembly of the apparatus in a manner that shall prevent the ready removal of any component part for service or repair. All steel welding shall follow American Welding Society D1.1-96 recommendations for structural steel welding. All aluminum welding shall follow American Welding Society and ANSI D1.2-96 requirements for structural welding of aluminum. The manufacturer shall be required to have an American

Welding Society certified welding inspector in plant during working hours to monitor weld quality.

Delivery
To insure proper break-in of all components while still under warranty, the apparatus shall be delivered under its own power (rail or truck freight shall not be acceptable). A qualified delivery engineer representing the contractor shall deliver the apparatus and remain for a sufficient length of time to instruct personnel in the proper operation, care and maintenance of the equipment delivered.

Delivery Date
An approximate delivery date or work days to complete the project shall be clearly stated in the proposal. Special consideration will be given for a spring or summer 2008 delivery date.

Operation and Maintenance Information
At the time of delivery, the manufacturer shall supply complete operation and maintenance manuals covering the completed apparatus as delivered. A permanent plate shall be mounted in the driver's compartment, specifying the quantity and type of fluids required including engine oil, engine coolant, transmission fluid, pump transmission lubrication, pump primer lubrication, and drive axle oil.

Liability
The successful bidder shall defend any and all suits and assume all liability for the use of any patented process including any device or article forming a part of the apparatus or any appliance furnished under the contract.

Specification Bid Requirements
Bidders shall indicate by checking Yes or No whether their bid complies on each item or paragraph specified. Exceptions shall be allowed if they are equal to or superior to the components specified and provided they are listed and fully explained on a separate page. Proposals taking total exception to specifications shall not be acceptable. Bidders shall also submit a detailed proposal. A letter only, even though written on a company letterhead, shall not be sufficient. For ease of evaluation, comparison and checking compliance, bid proposals shall be submitted in the same sequence as specifications. Any exception to these proposal requirements shall not be tolerated.

Exceptions
All exceptions shall be stated no matter how seemingly minor. Any exceptions not taken shall be assumed by the purchaser to be included in the proposal, regardless of the cost to the bidder.

Vehicle Weight Design
The apparatus shall be designed with due consideration to distribution of load between the front and rear axles. Weight balance and distribution shall be in accordance with the recommendations of the National Fire Protection Association.

Commercial General Liability Insurance
The successful bidder shall, during the performance of the contract and for three (3) years following acceptance of the product, keep in force at least the following minimum limits of commercial general liability insurance:

- Products/completed operations aggregate $2,000,000
- Personal and advertising injury $1,000,000
- Each occurrence $1,000,000

Coverage shall be written on a commercial general liability form. The policy shall be written on an occurrence form and shall include contractual liability coverage subject to the terms and conditions of the policy. The policy shall include the business owner as an additional insured, as their interest may appear.

Umbrella/Excess Liability Insurance
The successful bidder shall, during the performance of the contract and for three (3) years following acceptance of the product, keep in force at least the following minimum limits of umbrella liability insurance:

- Aggregate $25,000,000
- Each occurrence $25,000,000

The umbrella policy shall be written on an occurrence basis and at a minimum provide excess to the bidder's general liability, automobile liability and the employer's liability policies. The business owner shall be included as an additional insured on the general liability policy as their interests may appear. The required limits can be provided by one or more policies, provided all other insurance requirements are met. Coverage shall be provided by a carrier rated A- or better by A.M. Bests. The bidder agrees to furnish the owner with a current certificate of insurance with the coverage's listed above along with its bid. The certificate shall be made out to the purchaser. The certificate of insurance shall endeavor to provide that the owner be given 30 days advance notice of cancellation or nonrenewal in coverage.

Single Source Manufacturer
Bids shall only be accepted from a single source apparatus manufacturer. The definition of single source is a manufacturer that designs and manufactures their products using an integrated approach. An integrated approach includes the chassis, cab, body and aerial device being engineered and designed by the bidder. The warranties relative to the chassis, body and aerial design, excluding component warranties such as engine, transmission, axles, pump, etc., must be from a single source manufacturer and not split between manufacturers such as body, chassis and aerial. The bidder shall provide evidence that they comply with this requirement.

NFPA Standards
The apparatus proposed by the bidder shall meet the applicable requirements of the National Fire Protection Association (NFPA) as stated in the current edition of the NFPA 1901 Standard for Automotive Fire Apparatus at the time of contract execution.

A plate that is highly visible to the driver while seated shall be provided. This plate shall show the overall height, length, and gross vehicle weight rating.

The manufacturer shall also have programs in place for training, proficiency testing, and performance verification for any staff involved with certifications.

Maximum Overall Height
The maximum overall height of the apparatus shall be 156", or less.

Requirements of the Apparatus Manufacturer
The manufacturer of the apparatus must be fully owned and managed by a parent company, corporation, partnership, or a company held 100% in the United States of America.

Bids from any manufacturer that is fully or partially owned and/or operated by a foreign company, corporation, partnership, or company under any type of ownership, partnership, or any similar type of agreement shall be rejected immediately and their bid disqualified. There shall be no exceptions.

Approval Drawing
A drawing of the proposed apparatus shall be provided for approval. The sales representative shall also have a copy of the same drawing. The finalized and approved drawing shall become part of the contract documents. This drawing shall indicate the chassis make and model, location of the lights, siren, horns, compartments and other major components. A revised approval drawing of the apparatus shall be prepared and submitted by the manufacturer to the purchaser showing any changes made to the approval drawing.

Bid Bond
As security for the bid, all bidders shall provide a 10% bid bond to accompany their bid. The bid bond shall be issued by a surety company whose name appears on the U.S. Treasury Department's list of acceptable sureties as published in Department Circular 570. The bid bond shall be issued by an authorized representative of the surety company and shall be accompanied by a certified power of attorney dated on or before the date of bid. The bid bond shall include language, which assures that the bidder shall give a bond or bonds, which may be specified in the bidding or contract documents, with good and sufficient surety for the faithful performance of the contract, including the warranty, and for the prompt payment of labor and material furnished in the prosecution of the contract.

Fire Apparatus Warranty
Each piece of new fire apparatus shall be warranted to be free from defects in material or workmanship under normal use and service. Each manufacturer shall supply, as a part of their bid package, a copy of the warranty or warranties that they propose to provide and in no case shall it be less than one (1) year on the entire apparatus. All other warranties, as outlined in these specifications shall be provided in writing as a part of the bid package. Failure to provide the warranties as outlined throughout these specifications shall be cause for rejection of the bid package.

Aerial Structural Warranty
The aerial device shall be warranted against structural failures caused by defective design or workmanship for a period of twenty (20) years after the date on which the vehicle is first delivered to the original purchaser or 100,000 miles, whichever occurs first.

This warranty shall be limited to the torque box, aerial sections, and other structural components.

A copy of the apparatus manufacturer's warranty shall be included with the bid.

Warranties

Hydraulic Plumbing Components Warranty
All hydraulic plumbing component suppliers shall warrant the hose, adaptors, and fittings from component failure for a period of five (5) years.

Hydraulic Cylinder Warranty
Each hydraulic cylinder shall have a structural warranty of not less than five (5) years and a seal warranty of not less than two and one-half (2.5) years.

Hydraulic System Components Warranty
All hydraulic system component suppliers shall warrant all Motion and Control Group components for a period of five (5) years. Components covered by this warranty shall include all of the following:

- Valves
- Pumps
- Hydraulic motors

A copy of the five (5) year warranty shall be included with the bid.

Frame Rail Warranty
The frame rails shall be guaranteed for the life of the vehicle, which is estimated to be 50 years, against defects in design, material or workmanship, excluding accident or abuse. A copy of the fire apparatus manufacturer's warranty shall be included with the bid.

Front Non-Drive Suspension Axle Warranty
The front non-drive suspension axle system and steering gear shall have a three (3) year parts and labor warranty. There shall also be a one (1) year parts and labor warranty provided for wheel seals. The seal warranty shall apply to the standard non-drive suspension axle supplied wheel seals and shall not apply to any other specified seal. If other seals are specified, the warranty shall be parts only.

Rear Axle Warranty
A three (3) year parts and labor warranty shall be provided with the axle, plus an additional two (2) years of parts only coverage. The apparatus manufacturer shall also provide a one (1) year parts and labor warranty for the wheel seals. The seal warranty shall apply to the standard wheel seals and shall not apply to another specified seal. If other seals are specified, the warranty shall be parts only.

Anti-Lock Brake System and Automatic Traction Control Warranty
The ABS/ATC system shall come with a three (3) year or 300,000 mile parts and labor warranty provided by the manufacture of the system.

Roll Stability Control System Warranty
The RSC system shall come with a three (3) year or 300,000 mile parts and labor warranty provided by the manufacture of the system.

Engine Warranty
The engine shall have a five (5) year or 100,000 mile warranty provided by the engine manufacturer.

Transmission Warranty
The transmission shall have a five (5) year unlimited mileage warranty covering 100% of parts and labor. The warranty shall be provided by Allison Transmission and not the apparatus manufacturer.

Transmission Cooler Warranty
The transmission cooler shall carry a five (5) year parts and labor warranty (exclusive to the transmission cooler). In addition, a collateral damage warranty shall also be in effect for the first three (3) years of the manufacture warranty coverage, and shall not exceed $10,000 per occurrence.

Cab Warranty
The bidder shall furnish a ten (10) year cab warranty.

The warranty shall cover defects in design or workmanship in the cab tubular support and mounting supports and other cab structural components identified in the specifications.

A copy of the warranty shall be submitted with the bid.

Water Tank Warranty
The tank shall have a lifetime warranty.

Body Warranty
A copy of the fire apparatus manufacturer's warranty shall be included with the bid. The warranty shall state that the apparatus body shall be free of structural failures caused by defective design or workmanship for a warranty period of ten (10) years from the date when the new vehicle is first delivered or for 100,000 miles, whichever occurs first. Also, the warranty shall state that defective parts covered under the warranty shall be repaired or replaced without charge to the original purchaser.

Waterous Pump Warranty
A five (5) year warranty shall be provided for the Waterous pump.

Pump Plumbing Warranty
The stainless steel plumbing components and ancillary brass fittings used in the construction of the water and foam plumbing system shall be warranted for a period of ten (10) years or 100,000 miles. This warranty shall cover structural failures caused by defective design or workmanship, or perforation caused by corrosion, provided that the apparatus is used in a

normal and reasonable manner. This warranty shall be extended to the original purchaser only, for a period of ten years from the date of delivery. A copy of the warranty shall be submitted with the bid (no exception).

Pressure Gauge Warranty
The pressure gauge shall come with a ten (10) year warranty on workmanship provided by Class 1.

Paint and Corrosion Stainless Steel Body Warranty
The body exterior paint finish shall be warranted against blistering, peeling, corrosion, lack of adhesion or any other manufacturing or material defect for a period of twelve (12) years.

The body shall also be warranted against corrosion perforation for a period of twelve (12) years.

A copy of the manufacturer's warranty shall be included with the bid.

Paint and Corrosion Cab Warranty
The cab exterior paint finish shall be warranted against blistering, peeling, corrosion, lack of adhesion or any other manufacturing or material defect for a period of ten (10) years.

The cab shall also be warranted against corrosion perforation for a period of ten (10) years.

A copy of the manufacturer's warranty shall be included with the bid.

Certifications

Front Non-Drive Suspension Axle Certification
The front non-drive suspension axle shall have a third party certified turning angle. The front discharge or aluminum wheels shall not infringe on this cramp angle.

Engine Installation Certification
The fire apparatus manufacturer shall provide, at the time of delivery, a letter from the engine manufacturer stating they approve of the engine installation in the bidder's chassis. The engine shall be approved at full horsepower rating in a continuous duty application under all operating conditions, including road and pump. No type of automatic horsepower reduction feature shall be allowed.

There shall be no exception to any portion of the engine installation certification. Nonconformance shall lead to immediate rejection of the bid.

Cab Integrity Certification
The apparatus manufacturer shall provide a cab crash test certification with the bid. The certification shall state that the cab meets or exceeds all the requirements below:

- SAE J2422 Cab Roof Strength Evaluation - Quasi-Static Loading Heavy Trucks
- SAE J2420 COE Frontal Strength Evaluation - Dynamic Loading Heavy Trucks

- Roof crush requirement - The cab shall be subjected to a roof crush force of 100,000 lbs. This value shall be 450% of the ECE 29 criteria, which shall be equivalent to the front axle rating up to a maximum of 10 metric tons.
- Side impact requirement - The cab shall be subjected to dynamic preload with a 13,275 lb moving barrier slammed into the side of the cab at 5.5 mph, striking with an impact of 13,000 ft-lbs of energy. This test shall closely represent the forces a cab would see in a rollover incident.
- Frontal impact requirement - The cab shall withstand a frontal force produced from 65,200 ft-lbs of energy, using a swing-bob type platen.

Nonconformance to any requirement for cab integrity certification shall lead to immediate rejection of bid.

Air Conditioning System Certification
The air conditioning system shall cool down the cab and crew cab to 75 degrees Fahrenheit within 30 minutes in the following conditions:

- 100 degree Fahrenheit ambient temperature
- 50% relative humidity
- Maximum compressor speed

Actual test results from the manufacturer of the air conditioning system, verifying this performance requirement, shall be submitted at delivery of the apparatus.

NFPA Certification
The apparatus shall be third-party, independent, total vehicle audit certified through Underwriters Laboratory (UL) to the current edition of NFPA 1901 standards. The certification shall include all design, production, operational, and performance testing of the apparatus (no exception).

The following tests shall be conducted:

- Magnetic particle inspection shall be conducted on every structural weld to assure the integrity of the weldments and to detect any flaws or weaknesses. Magnets shall be placed on each side of the weld while iron powder is placed on the weld itself. The powder shall detect any cracks that may exist. This test shall conform to ASTM E709 and be performed prior to assembly of the aerial device.
- With aluminum structural components, visual inspection shall be preformed on aluminum surfaces (nonmagnetic.) A liquid penetrant test shall be performed on any suspected defective area. This test shall conform to ASTM E165 and be preformed prior to assembly of the aerial device.
- Ultrasonic inspection shall be used to detect any flaws in pins, bolts, and other critical mounting components.

Functional tests, load tests, stability tests, and visual structural examinations shall be performed. These tests shall determine any unusual deflection, noise, vibration, or instability characteristics of the unit.

<u>Manuals</u>

Fire Apparatus Parts Manuals
There shall be two (2) custom parts manuals provided with the completed fire apparatus. These manuals shall be written in English and shall contain the following sections:

- Job number
- Part numbers with full descriptions of parts
- Table of contents
- Parts section, organized by functional groups reflecting major systems, components, and assemblies
- Parts section, organized alphabetically
- Instructions on how to locate a part

The parts manual shall be specifically written for the chassis and body model being purchased. It shall not be a generic manual for a multitude of different chassis and body types.

Service Parts Internet Site
The service parts information included in this manual shall also be available on the fire apparatus manufacturer's website.

Chassis Service Manuals
There shall be two (2) copies of a chassis service manual, containing parts and service information on the major components, provided with the completed apparatus. These manuals shall be written in English.

The service manual shall be specifically written for the chassis model being purchased. It shall not be a generic manual for a multitude of different chassis types.

The manual shall contain the following sections:

- Job number
- Table of contents
- Troubleshooting
- Front axle and suspension
- Brakes
- Engine
- Tires
- Wheels
- Cab
- Electrical DC
- Air systems
- Plumbing
- Appendix

Chassis Operation Manuals
There shall be two (2) chassis operation manuals provided. They shall be written in English.

Pump Manuals
Two (2) pump manuals from the pump manufacturer shall be furnished with the apparatus. Manuals shall cover pump operation, maintenance, and parts.

Aerial Device Manuals
The aerial manufacturer shall provide two (2) operator maintenance manuals and two (2) wiring diagrams pertaining to the aerial device.

Aerial Device Training
On initial delivery of the apparatus, the manufacturer of the aerial device shall supply a qualified representative to demonstrate the operation and maintenance of the apparatus for a period of not less than three (3) days.

Chassis Specs

Chassis
The chassis provided shall be a new, tilt-type custom fire apparatus. The chassis shall be manufactured in the apparatus body builder's facility, eliminating any split responsibility. The chassis shall be designed and manufactured for heavy-duty service, with adequate strength and capacity for the intended load to be sustained and the type of service required.

Wheelbase
The wheelbase of the apparatus shall be no greater than 245.5".

Gross Vehicle Weight Rating
The gross vehicle weight rating shall be a minimum of 76,800 pounds.

Top Speed
The top speed of the apparatus shall be 72 mph at governed engine rpm 6th gear.

Frame
The chassis frame shall be built with two (2) steel channels bolted to five (5) cross members (or more, depending upon other options selected for the apparatus). The side rails shall have a 13.38" high web over the front and mid sections of the chassis, with a continuous smooth taper to a 10.75" over the rear axle.

Each rail shall have a section modulus of 25.992 inches squared and a resisting bending moment (rbm) of 3,119,040 inch pounds over the critical regions of the frame assembly, with a section modulus of 18.96 inches squared and an rbm of 2,275,200 inch pounds over the rear axle. The frame rails shall be constructed of 120,000 psi yield strength, .38" thick heat-treated steel, with 3.50" wide flanges.

Frame Reinforcement
A main frame inverted L liner shall be provided. It shall be made of heat-treated steel measuring 12.00" wide x 3.00" deep x .25" thick. Each liner shall have a section modulus of

7.795 cubic inches, yield strength of 110,000 psi, and an rbm rating of 857,462 inch-pounds. The total rbm at the wheelbase center shall be 3,750,421 pounds per rail.

Bumper
A one (1) piece, 10-gauge, 304-2B type, polished stainless steel bumper shall be provided. The bumper shall be a minimum of 10.00" high and shall extend 19.00" from the front face of the cab.

To provide adequate support strength, the bumper shall be mounted directly to the front of the C channel frame. The frame shall be a bolted modular extension frame constructed of 50,000 psi tensile steel.

Gravel Pan
A gravel pan, constructed of bright aluminum treadplate, shall be furnished between the bumper and the cab face. The gravel pan shall be properly supported from the underside, to prevent flexing and vibration of the aluminum treadplate.

Tow Eyes
Two (2) steel tow eyes shall be mounted through the top of the bumper extension. The inner and outer edges of the tow eyes shall have a .25" radius.

The tow eyes shall be designed and positioned to allow up to a 6,000 lb. straight horizontal pull, in line with the centerline of the vehicle. The tow eyes shall not be used to lift the apparatus.

The tow eyes shall be chrome-plated.

Lift and Tow Mounts With Tow Eyes
There shall be lift and tow mounts mounted to the frame extension. Two (2) painted steel tow eyes shall be incorporated in the mounts. The lift and tow mounts shall be designed and positioned to adapt to certain tow truck lift systems. The tow eyes shall not be used for lifting of the apparatus. The lift and tow mounts with eyes shall be painted the same color as the frame.

Sight Rods
There shall be two sight rods provided. These lighted, polished, stainless steel rods shall be mounted to the outside corners of the front bumper extension.

Passenger Side Bumper Tray
A hose tray shall be provided on the passenger side of the bumper extension. The tray shall be approximately 19.00" wide x 14.50" long x 13.00" deep. The tray shall extend 3.00" beyond the bottom of the bumper. The tray shall be able to hold approximately 100 ft. of 1.75 in. diameter synthetic hose. Rubber grating shall be installed on the floor of the tray to provide proper ventilation.

Hose Hold Down Straps
Black nylon strap, approximately 1.75" wide with Velcro fastener, shall be provided on the passenger side tray. The strap shall be used to secure the hose in the tray.

Front Non-Drive Suspension Axle
The front axle shall be of the independent suspension axle design, with a ground rating of 22,800 pounds.

The independent suspension axle system shall be designed to provide maximum ride comfort. The design shall allow the vehicle to travel at highway speeds over improved road surfaces and at moderate speeds over rough terrain, with minimal transfer of road shock and vibration to the vehicle's crew compartment.

Each wheel shall have a torsion bar type spring. In addition, each front wheel end shall have energy-absorbing jounce bumpers, to prevent bottoming of the suspension. The suspension design shall allow for at least 10.00" of total wheel travel and a minimum of 3.75" before the suspension bottoms.

The torsion bar anchor lock system shall allow for simple lean adjustments, without the use of shims. These adjustments to lean shall be possible to perform within 15 minutes per side. The anchor adjustment design shall allow for ride height adjustment on each side.

Upper and lower control arms shall be used on each side of the suspension. The upper control arm castings shall be made of 8630 steel with yield strength of 100,000 psi, and the lower control arm casting shall be made of 55,000 psi yield ductile iron. The center cross members and side plates shall be constructed of 80,000 psi yield strength steel.

Each control arm shall be mounted to the center section with elastomer bushings. These rubber bushings shall rotate on low-friction plain bearings and shall be lubricated for life. Each bushing shall have a flange end, to absorb longitudinal impact loads, thus reducing noise and vibrations.

There shall be nine (9) grease fittings supplied: one (1) on each control arm pivot and one (1) on the steering gear extension.

The upper control arm shall be shorter than the lower arm, so that the wheel end geometry provides a positive camber when deflected below rated load and negative camber when deflected above rated load. The camber at load shall be zero degrees, for optimum tire life.

The kingpin bearing shall be of a low-friction design and sealed for life. Toe links that are adjustable for alignment of the wheel to the center of the chassis shall be provided.

The wheel ends shall have little to no bump steer when the chassis encounters a hole or an obstacle. The steering linkage shall provide proper steering angles for the inside and outside wheels, based on the vehicle wheelbase.

The independent suspension axle shall have passed a durability test that simulated 140,000 miles of inner city driving. The independent suspension axle shall be designed and assembled exclusively in the United States of America.

The turning angle shall be 45 degrees.

Front Brakes
The service brake system shall be the full air type. The front brakes shall be the disc type with a 17.00" ventilated rotor, operated with automatic slack adjusters.

Shock Absorbers
Heavy-duty, telescoping KONI shock absorbers shall be provided on the front suspension.

Rear Axle
The rear axle shall be a Meritor RT-52-185, tandem axle assembly with a capacity of 54,000 pounds. An inter-axle differential, which divides torque evenly between axles, shall be provided, with an indicator light mounted on the cab instrument panel.

Rear Suspension
The rear suspension shall be a Hendrickson, Model FIREMAAX 540, or equivalent, air ride with a ground rating of 54,000 pounds.

The suspension shall have the following features:
- Outboard vertical mounted, heavy-duty shock absorbers
- Utilizes track bars and torque rods to restrict lateral axle movement and maintain constant pinion angles.
- Super heavy-duty transverse beam to help reduce axle stress while increasing roll stability or resistance to lean
- Low spring rate air springs for excellent ride quality
- Dual height control valves to maintain level vehicle from side to side

Rear Brakes
The rear brakes shall be Meritor Cam-Master 16.50" x 7.00" cam-operated brakes, with automatic slack adjusters.

Axle Seals
Oil seals shall be provided on the front and rear axles. A viewing window for checking the oil level shall be provided on each side of the front axle.

Front Tires
The front tires shall be Michelin 425/65R22.50 20 ply, XTE2 highway rib tread radials.

Front Wheels
The tires shall be mounted on Alcoa 22.50" diameter x 12.25" wide polished aluminum disc hub piloted wheels with a ten (10) stud, 11.25" bolt circle.

Rear Tires
The eight (8) rear tires shall be Michelin 12R22.50 16 ply, XDN2 all season block tread radials.

Rear Wheels
The tires shall be mounted on Alcoa 22.50" diameter x 8.25" wide polished aluminum hub piloted disc wheels with a ten (10) stud, 11.25" bolt circle.

Mud Flaps
Black mud flaps with a logo shall be installed behind the front and rear tires of the apparatus.

All Wheel Lockup
An additional all wheel lockup system, which applies air to the front brakes only, shall be installed. The standard spring brake control valve system shall also be used for the rear brakes.

Hub Covers
Stainless steel hub covers shall be provided on the front axle. An oil level viewing window shall also be provided.

Rear Hub Covers
Stainless steel high hat covers shall be provided over the rear axle hubs.

Lug Nut Covers
The lug nuts shall have chrome-plated, hard plastic covers.

Wheel Chocks
There shall be two (2) pair of folding, wheel blocks with horizontal mounting brackets provided. The chocks shall be mounted below the pump house on each side.

Turning Radius Report
A turning radius analysis of the apparatus being proposed shall be supplied with the bid. This analysis shall specify the inside turning radius, the outside turning radius, the curb-to-curb turning radius, and the wall-to-wall turning radius.

Steering
Dual steering gears, with integral heavy-duty power steering, shall be provided. The power steering shall incorporate a hydraulic pump with integral pressure and flow control.

Anti-Lock Brake System (ABS)
The apparatus shall be equipped with a Wabco 4S4M anti-lock braking system. The ABS shall provide a four-channel anti-lock braking control on both the front and rear tandem wheels. It shall be a digitally controlled system that uses microprocessor technology to control the anti-lock braking system. Each wheel shall be monitored by the system. When any wheel begins to lock up, a signal shall be sent to the control unit. This control unit shall then reduce the braking of that wheel for a fraction of a second and then reapply the brake. This anti-lock brake system shall eliminate the lockup of any wheel.

Automatic Traction Control
An anti-slip feature shall be included with the ABS. The automatic traction control shall be used for traction in poor road and weather conditions. The automatic traction control shall act as an electronic differential lock, which shall not allow a driving wheel to spin, thereby supplying traction at all times. The ABS electronic control unit (ECU) shall work with the engine ECU, sharing information concerning wheel slip. The engine ECU shall use this information to control the engine speed, allowing only as much throttle application as is required for the available traction, regardless how much the driver is applying. A mud/snow switch shall be provided on the instrument panel. Activation of the switch shall allow additional tire slip, to let the truck climb out and get on top of deep snow or mud.

Brake System
The brake system shall include the following:

- Bendix dual brake treadle valve with a vinyl-covered foot surface
- Heated automatic moisture ejector on the air dryer
- Total air system capacity of 5,198 cubic inches
- Two (2) air pressure gauges with a red warning light and an audible alarm, which activate when the air pressure falls below 60 psi
- Spring-set parking brake system
- Parking brake operated by a Bendix PP-1 control valve
- Parking Brake On indicator light on the instrument panel
- Bendix SR-1 valve with automatic spring brake application at 40 psi, in conjunction with a double check valve system

Air Dryer
An air dryer shall be provided.

Brake Lines
Color-coded nylon brake lines shall be provided. The lines in the chassis shall be wrapped in a heat protective loom where necessary.

Brake System Air Compressor
The air compressor shall be a Bendix with 15.80 cubic feet per minute output at 1,250 rpm.

Air Inlets
There shall be one (1) air inlet provided with a male coupling. The inlet 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 the cab. A check valve shall be provided to prevent the reverse flow of air. The inlet shall discharge into the *wet* tank of the brake system. There shall be a mating female coupling provided with the loose equipment.

Engine
A Detroit Diesel Series 60 electronically controlled engine shall power the chassis as described below:

- Model: Series 60, 14.0 LTA (855 cubic inches)
- Maximum Horsepower: 515 hp at 1,800 rpm

- Peak torque: 1,650 ft-lb at 1,200 rpm
- Governed speed: 2,000 rpm
- Bore and stroke: 5.24" x 6.61"
- Number of cylinders: Six (6)
- Compression ratio: 17.25:1

Standard equipment on the engine shall include the following:

- Governor: Limiting speed type
- Injectors: Cam-operated, unit type, clean tip
- Starting motor: 12-volt
- Turbocharger
- Air-to-air aftercooled
- Lube oil cooler
- Lube oil filter: Full flow
- Air cleaner: Farr or equal
- Fuel filters: Dual with check valve
- Coolant filter: Spin-on with shut off valves (precharged with coolant inhibitor)

Radiator

The radiator and the entire cooling system shall meet or exceed all NFPA cooling system standards. The cooling system capacity shall exceed all cooling requirements specified by the engine manufacturer, under all truck operating conditions. It shall have a built-in low coolant sight glass and an electronically controlled low coolant display, mounted on the instrument panel. An integral surge and deaeration tank shall be provided to optimize the cooling system for all operating conditions.

The cooling system shall be designed to maintain a minimum pressure of 9 psi. A drain valve shall be located at the lowest point of the cooling system and at other points to permit complete flushing of the coolant from the system. A heavy-duty fan, shrouded by recirculation shields, shall draw in fresh, cool air through the radiator.

The radiator shall be of the serpentine design and shall be bonded together for increased strength, longer road life, and solder bloom corrosion protection. The completed core shall have a minimum of 1125 square inches of cooling area. The radiator shall be mounted in a manner to prevent the development of leaks caused by twisting or straining when the apparatus operates over uneven ground. The radiator core shall be compatible with commercial antifreeze solutions. The cooling system shall exhibit rapid warm-up without use of radiator shutters.

Auxiliary Cooling System

A supplementary heat exchange cooling system shall be provided, to allow the water from the discharge side of the pump to be used for cooling the engine water. The heat exchanger shall be the cylindrical type and it shall be a separate unit. It shall be installed in the pump or engine compartment, with its control located on the pump operator's control panel. The heat exchanger shall be plumbed to the master drain valve. The engine water lines shall be run inside plastic conduit.

Coolant Lines
Silicone hose shall be used for all engine coolant lines that are installed by the chassis manufacturer. The hoses shall meet J20R1 standards.

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

Fan Clutch
A fan clutch shall be provided. The fan clutch shall operate automatically when the pump transmission is in *Road* or *Pump* position.

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

The ember separator shall be easily accessible through a hinged stainless steel grille, with one (1) flush, quarter-turn latch.

Exhaust System
The exhaust system shall be stainless steel forward of the muffler and aluminized steel behind the muffler from the turbo to the inlet of the diesel particulate filter and shall be 5.00" in diameter. The exhaust system shall include a diesel particulate filter and a diesel oxidation catalyst to meet current EPA standards. The horizontal piping shall exit under the passenger side body compartment, just to the front of the rear wheels. A tailpipe diffuser shall be provided to reduce the temperature of the exhaust as it exits. An insulation wrap shall be provided on the exhaust pipe between the turbo and DPF to minimize the transfer of heat to the cab. Heat deflector shields shall be provided to isolate chassis and body components from the heat of the tailpipe diffuser. The exhaust outlet shall be equipped with a chrome-plated straight tip.

High Idle Switch
A switch to activate and deactivate a high idle condition, which automatically maintains a preset engine rpm, shall be provided inside the cab on the instrument panel.

To enhance safety, the high idle switch shall be operational only when the parking brake is on and the transmission is in neutral. To notify operator, a green indicator light, adjacent to the switch, shall illuminate when both conditions are met. The light shall be labeled "OK to Engage High Idle."

Engine Brake
A Jacob engine brake shall be installed, with its controls located on the instrument panel, within easy reach of the driver. When the engine brake is activated and slowing the vehicle, the brake lights shall be automatically activated.

Depending on the grade of the road under which the truck is being driven, the driver shall be able to turn the engine brake system on and off and shall be able to select from high, medium, and low settings. The ABS system shall automatically disengage the engine brake when required.

Driveline
The driveline shall be a heavy-duty metal tube and shall be equipped with universal joints. For reduced vibration and enhanced driveshaft life, the shafts shall be dynamically balanced before installation.

A spline-type slip joint shall be provided in each drive shaft. The slip joint shall be coated with Glidecoat or an equivalent.

Transmission
Allison Gen IV, Model 4000 EVS PR, electronic, torque-converting, automatic transmission with retarder shall be provided. Two (2) PTO openings shall be located on the left side and the top of the converter housing (positions 8 o'clock and 1 o'clock). A transmission temperature gauge with a red light and an audible alarm shall be installed on the cab instrument panel. The transmission shall have a 1,600 ft-lb torque, medium spring setting for retardation force.

The transmission retarder shall have a master *on/off* switch on the instrument panel. A red indicator light shall be provided to warn that the transmission is being overworked. The transmission retarder control shall be activated 33 percent by letting off the accelerator pedal or 100 percent by applying the brake pedal. A second on/off switch is provided to activate and deactivate the auto apply portion. The retarder shall be wired to the brake lights, so they are energized when the retarder is slowing the vehicle down. The ABS system shall automatically disengage the auxiliary braking device when required.

The transmission retarder control shall be activated 33 percent by letting off the accelerator pedal and shall be activated 100 percent by applying the brake pedal. A second on/off switch shall be provided to activate and deactivate the auto apply portion.

Hot Shift PTO
The engine must be at idle or below 1000 rpm when the hot shift PTO is engaged.

Transmission Shift Selector
A 6-speed, push button shift module shall be mounted to the right of the driver on the console. The shift position indicator shall be indirectly lit, for after dark operation.

The transmission ratios shall be:
- 1st - 3.51 to 1.00
- 2nd - 1.91 to 1.00
- 3rd - 1.43 to 1.00
- 4th - 1.00 to 1.00
- 5th - 0.74 to 1.00
- 6th - 0.64 to 1.00
- Reverse - 4.80 to 1.00

Transmission Cooler
A shell and tube transmission oil cooler shall be provided, using engine coolant to control the transmission oil temperature. The cooler shall have an aluminum shell and copper tubes. The cooler shall be assembled using pressed-in rubber tube sheets to mechanically create a reliable seal between the coolant and the oil. No brazed, soldered, or welded connections shall be used to separate the coolant from the oil.

Transmission Lockup
The direct gear transmission lockup for the fire pump operation shall engage automatically when the pump shift control, in the cab, is activated.

Fuel Tank
A 65-gallon fuel tank shall be mounted at the rear of the chassis. The tank shall be constructed of steel. It shall be equipped with swash partitions and a vent. Tank shall be mounted utilizing stainless steel straps.

A .75" drain plug shall be provided in a low point of the tank, for drainage.
The driver side shall have a fill inlet.

A .50" diameter vent shall be provided, running from the top of the tank to just below the fuel fill inlet. The tank shall meet all FMCSA 393.67 requirements, including a fill capacity of 95% of the tank volume.

Fuel Fill Door
The fuel fill door shall be a spring-loaded stainless steel door.

Fuel Lines
All fuel lines shall be rubber with nylon reinforcement, as recommended by the engine manufacturer.

Auxiliary Fuel Cooling System
A supplementary fuel cooling system shall be provided. The heat exchanger shall be a cylindrical type and shall be a separate unit. The cooler shall operate whenever the pump is discharging water and shall be plumbed to the master drain valve.

Auxiliary Fuel Pump
An auxiliary, electric fuel pump shall be added to the fuel line for priming the engine, with its control located on the cab instrument panel.

Fuel Shutoff Valves
Two (2) shutoff valves shall be installed in the fuel line, one (1) on each side of the fuel filter.

Roll Stability Control
A vehicle control system shall be provided as an integral part of the ABS brake system from Meritor WABCO. The system shall monitor lateral acceleration of the vehicle and activate when safety threshold is exceeded. When activated, the vehicle control system shall

automatically reduce the engine RPM, apply a secondary braking device (if available), and apply the brake to the rear axle.

Cab

The cab shall be designed specifically for the fire service and shall be manufactured by the chassis builder.

The cab shall be constructed of 5052-H32 aluminum that is .125" thick and is welded to extruded aluminum framing. The cab shall be built by the apparatus manufacturer in a facility located on the manufacturer's premises.

The cab shall be a full-tilt style. The engine shall be easily accessible and removable with the cab tilted. The cab shall be capable of tilting 45 degrees as standard and 90 degrees with the assistance of a crane.

The cab shall have three-point rubber mounting and shall be tilted by a hydraulic pump that is connected to two (2) cab-lift cylinders. The cab shall be locked down by a two-point automatic locking mechanism that actuates after the cab has been lowered.

The crew cab shall be of a totally enclosed design, with the interior area between the cab and crew cab completely open, to allow visibility and verbal communication between the occupants.

The cab shall be 96.00" wide, with an interior width of 87.50".

The forward cab section shall have an overall height (from the cab roof to the ground) of approximately 103.00". The crew cab section shall have a 10.00" high raised roof with an overall cab height of approximately 113.00". The overall height listed shall be calculated based on a truck configuration with the lowest suspension weight ratings, the smallest diameter tires for the suspension, no water weight, no loose equipment weight and no personnel weight. Larger tires, wheels and suspension may increase the overall height listed.

The floor-to-ceiling height inside the cab shall be approximately 61". The floor-to-ceiling height inside the crew cab shall be approximately 64" in the center and 69.00" in the outboard positions.

The crew cab floor shall measure approximately 45.00" from the rear wall to the back side of the engine tunnel.

Doors

The front cab and crew cab doors shall be the half-height style door, blistered inward at the bottom to conform to the cab floor for sealing purposes and for easy entry. The front cab doors shall be approximately 37.00" wide x 60.00" high. The crew cab doors shall measure approximately 34" wide x 70.00" high.

The front cab and crew cab doors shall be constructed of extruded aluminum with a nominal material thickness of .125". The exterior door skins shall be constructed from .090" thick aluminum.

Each front cab and crew cab entry door shall contain a roll down window. A flush-mounted, chrome-plated, paddle-type door handle shall be provided on the exterior of each cab door. Each interior cab door handle shall also have a flush paddle handle.

The doors shall be provided with both interior (rotary knob) and exterior (keyed) locks as required by FMVSS 206. The locks shall be capable of activating when the doors are open or closed. The doors shall remain locked if locks are activated when the doors are opened, then closed.

A stainless steel, piano-type hinge with a .25" pin shall be provided on each cab door. There shall be double automotive-type rubber seals around the perimeter of the door framing and door edges to ensure a weather-tight fit.

The cab door panels shall be removable without requiring the disconnection of door and window mechanisms.

Steps
The cab and crew cab access steps shall be located below the cab doors and shall be exposed to the exterior of the cab. Each stepping surface shall have a grip strut insert and the tread and risers shall be trimmed with bright aluminum treadplate. The cab steps shall be approximately 25" wide and the crew cab steps shall be approximately 22.00" wide, with an 8.00" minimum depth. The inside cab steps shall not exceed 18.25" in height. All cab entrances shall have a one-step design for easy access to the cab floor. A 20.00" long, slip-resistant handrail shall be provided adjacent to each cab door opening to assist during entry into the cab.

Engine Tunnel
The engine tunnel sidewalls shall be constructed of .50" thick aluminum and the top shall be constructed of .19" thick aluminum. The top edges shall be tapered, to allow for more driver and passenger seating room.

The engine tunnel shall be insulated for heat and sound protection and shall keep noise at dB levels within the limits specified in the current NFPA 1901 standards.

Fender Liners
Full circular inner fender liners in the wheel wells shall be provided.

Windshield
A curved safety glass windshield with more than 2,754 square inches of clear viewing area shall be provided. The cab windshield shall be held in place with rubber molding and bright trim inserts.

Economical windshield replacement glass shall be readily available from local auto glass suppliers.

Windshield Wipers
Two (2) electric windshield wipers with a washer, in conformance with FMVSS and SAE requirements, shall be provided.

The windshield washer fluid reservoir shall be located under the cab floor on the passenger side of the cab. A filler neck shall be extended up into the cab compartment, to allow the fluid to be refilled without requiring the cab to be raised.

Glove Box
A glove box with a drop-down door shall be provided in the passenger side dashboard.

Access to Engine Dipsticks
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. The door shall be approximately 15.00" wide x 10.50" high.

The engine oil dipstick shall allow for checking only. The transmission dipstick shall allow for both checking and filling. An additional tube shall be provided for filling the engine oil.

The door shall have a rubber seal, to protect from noise and heat. Two (2) flush latches shall be provided on the access door.

Crew Cab Notched Roof
The raised roof section of the crew cab shall have a square notch in the center section of the roof. The notch shall be approximately 58.00" wide x 10.00" high x the full length of the crew cab roof. This shall allow the aerial device to be bedded in the same location as a non-raised roof.

The interior of the notched roof shall be covered with padded headliner material.

Cab Lift
A hydraulic cab lift system shall be provided, consisting of an electric-powered hydraulic pump, dual lift cylinders, and all necessary hoses and valves.

The cab lift controls shall be on a panel that is located on the pump panel.

The cab shall be locked down by a two-point, automatic, spring-loaded, hook mechanism that fully engages 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 in the tilt position.

A redundant mechanical stay arm shall be automatically engaged once the cab has been fully raised. Before the cab can be lowered, this device must be disengaged, using a stay arm control that shall be located near the cab raise/lower switch.

Cab Lift to Parking Brake Interlock
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 and the ignition switch is in the on position. If the parking brake is released, the cab tilt mechanism shall be disabled.

Cab Floor
The cab and crew cab floor areas shall be covered with an acoustical floor mat, consisting of a black rubber facing and a closed cell foam decoupler.

The top surface of the floor shall consist of a series of evenly spaced, raised pyramid shapes, which offer a superior gripping surface. The bottom surface shall consist of .25" closed cell foam.

Cab Door Scuff plates
All cab doors shall be provided with a brushed stainless steel scuff plate. The scuff plate shall be full-height.

Cab Door Controls
The front driver and passenger doors shall have a door lock master switch. The master switches shall control the four (4) cab door locks. The rear cab doors shall have the standard manual lock control. Each door shall have a keyed exterior lock. There shall be a concealed switch on the exterior of the cab that operates the cab door locks. Two (2) extra keys shall be provided.

Cab Interior Paint
The cab interior metal surfaces shall be painted red.

Cab Interior
The cab instrument panel shall be a wrap-around design, to provide easy maintenance, and shall be constructed of painted aluminum. The passenger side dashboard shall be constructed of aluminum and covered with 46-ounce leather grain vinyl that is resistant to oil, grease, and mildew.

The engine tunnel shall be 46-ounce leather grain vinyl that is resistant to oil, grease, and mildew. The upper door liners shall be constructed of an aluminum backing covered with padded upholstery.

The headliner shall be installed in both forward and rear cab sections. The headliner material shall be a composition of an aluminum backing covered with a sound barrier and upholstery. The headliner shall be securely fastened to the interior cab ceiling.

The forward portion of the cab headliner shall provide easy access for servicing electrical wiring or performing other maintenance needs, without requiring removal of the entire headliner unit.

Upholstery
The cab interior upholstery shall be silver gray, 46-ounce leather grain vinyl that is resistant to oil, grease, and mildew.

Cab Modification
The engine tunnel shall be designed to provide maximum occupant space and required clearance to the engine and related components. The engine tunnel shall include a modification on the passenger side to accommodate the turbo and related components.

Grab Handle
A black, rubber-covered grab handle shall be mounted on the lower portion of the driver 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 dashboard in front of the passenger.

Cab Windows
All cab windows shall be tinted including the windshield; cab and crew cab door window glass; and all other applicable windows within the sidewalls, rear wall, or roof section.

Windows for Sides of Cab (Center)
One (1) fixed window shall be provided on each side of the cab, to the rear of the cab door. They shall measure approximately 13.00" wide x 21.00" high.

Sun visors
There shall be two (2) sun visors provided. The sun visors shall be located above the windshield, one (1) on the driver side and one (1) on the passenger side.

Mirror
A Ramco, Model 6000PCHR, or equavalent, mirror shall be mounted on each side of the front cab doors. The mirror shall have a polished aluminum finish. A flat mirror section shall be provided that measures 69.00 square inches in reflective area. There shall also be an integral convex mirror section provided that measures 37.00 square inches in reflective area. The flat glass in each mirror shall be heated and adjustable with remote controls that are convenient to the driver. The convex section in each mirror shall also be heated and adjustable with remote controls that are convenient to the driver.

Fender Crowns
There shall be polished stainless steel fender crowns provided around the front cab wheel openings. A rubber welting shall be provided between the cab and the crown, to seal the seam and restrict moisture from entering.

Side Roll Protection Package
An advanced side roll protection system shall be provided. The package shall be a supplemental restraint system designed for use with the seat belts. The system shall be designed for a fast or slow 90-degree roll to the side, in which the vehicle comes to rest on its side. The system shall consist of the following key components:

- Side air bags shall only be provided outboard of the driver and passenger forward positions. The side air bag shall be a tubular structure that extends diagonally across the width of the side window to help keep the occupant's head inside the vehicle and away from the window opening.
- An integral, suspension seat safety system shall be installed on the driver's seat. When activated, this system shall remove excess slack from the seat belt and retract the seat to its lowest travel position.

- Seat belt pretensioners shall be provided in the remaining seating positions. When activated, these pretensioners shall remove excess slack from the seat belt.
- Sidewall impact-absorbing cushions shall be provided outboard of the crew cab seating positions.
- A side roll sensor shall be installed in the cab above the engine tunnel between the headliner and the cab roof skin. The sensor shall analyze the vehicle's angle and rate of roll to activate the advanced occupant restraints 120 ms before the cab reaches 60 degrees from vertical. In the event of a side roll, the sensor shall activate the advanced occupant restraints. The sensor shall not activate in the event of a frontal impact, side impact, or any other incidents not involving a vehicle side rollover. If more than eight (8) protective devices are required, a slave side roll sensor shall be provided with capacity for additional protective devices. The sensor shall perform real time diagnostics of all critical subsystems and shall record sensory inputs immediately before and during a side roll event.
- A fault-indicating light shall be provided on the vehicle's instrument panel.

Seat Belt Height Adjustment
All seating positions that are furnished with three-point, shoulder-type seat belts shall include a height adjustment for the belt's D loop assembly. This adjustment shall optimize the belt's effectiveness and the user's comfort.

Seating Capacity
The cab shall have a seating capacity of six (6).

Driver Seat
An adjustable air ride seat shall be provided in the cab for the driver. The seat shall be the scissor action type, with air suspension. The seat back shall be a high back style. The back shall be removable, for easy access to components located behind the driver seat.

The driver seat shall be furnished with a three-point, shoulder type seat belt. The seat belt shall be furnished with an automatic retractor. Extensions shall be provided with the seat belt, so the male end of the seat belt can be easily grasped and the female end of the seat belt can be easily located when in a normal sitting position. The seat belt webbing shall be red in color.

Front Passenger Seat
A fixed seat shall be provided in the cab for the passenger. The seat shall be fixed, with no suspension. The seat back shall be an SCBA back style.

The passenger seat shall be furnished with a three-point, shoulder type of seat belt. The seat belt shall be furnished with an automatic retractor. Extensions shall be provided with the seat belt, so the male end of the seat belt can be easily grasped and the female end of the seat belt can be easily located when in a normal sitting position. The seat belt webbing shall be red in color.

A compartment shall be provided under the passenger seat. The inside compartment dimensions shall be approximately 16" wide x 8" high x 14" deep. A drop-down door with a chrome plated lift and turn latch shall be provided for access. The compartment shall be constructed of smooth aluminum and painted to match the cab interior.

Rear Facing Outboard Seats
There shall be one (2) rear facing, fixed seats provided, one each side in the outboard position in the crew cab. The seat backs shall both be an SCBA back style.

The seat shall be furnished with a three-point, shoulder type of seat belt with automatic retractors. Extensions shall be provided with the seat belt, so the male end of the seat belt can be easily grasped and the female end of the seat belt can be easily located when in a normal sitting position. The seat belt webbing shall be red in color.

Forward Facing Jump Seats
Two (2) flip down jump seats shall be provided outboard, one on each side, mounted on the rear wall of the cab. 3 point seat belts shall be provided.

Seat Upholstery
All seats shall be upholstered be gray/black Imperial 1200 material.

Seat Back SCBA Holders
All SCBA type seats in the cab shall have a "Hands-Free" auto clamp style bracket in its backrest. For efficiency and convenience, the bracket shall include an automatic spring clamp that allows the occupant to store the SCBA bottle by simply pushing it into the seat back. For protection of all occupants in the cab, in the event of an accident, the inertial components within the clamp shall constrain the SCBA bottle in the seat for up to a 30G’s. Bracket designs with manual restraints (belts, straps, buckles) shall not be acceptable.

There shall be a total of three (3) SCBA brackets provided. Brackets will hold MSA low pressure bottles that are approximately 7” in diameter.

Cab Medical Compartment
A cabinet shall be provided in the crew cab area along the rear wall of the cab. This cabinet will be used to store medical supplies and equipment. The size should be approximately 36” wide 24” deep and run from floor to ceiling. There shall be two adjustable shelves provided.

A single rollup door shall be provided on the front of the compartment

This compartment shall have both 120 volt AC from shore power and 12 DC power sources.

Cab Defroster
A 41,000-btu defroster unit shall be provided inside the cab, under the engine tunnel. The defroster ventilation shall be built into the design of the cab dash instrument panel and shall be easily removable for maintenance. The defroster ducts shall be designed to provide maximum defrosting capabilities for the windshield.

A temperature control and a three-speed blower shall be provided with the defroster units. The defroster controls shall be located on the cab instrument panel, within easy reach of the driver.

Cab/Crew Cab Heater
Two (2) 32,000-btu auxiliary heaters shall be provided inside the cab, one in each rear-facing seat riser. Louvers for the heaters shall be located below each rear-facing seat riser and below the fronts of the driver and passenger seats, for efficient airflow.

A temperature control and a three-speed blower shall be provided for each heater unit. The heater controls shall be located on the cab instrument panel, within easy reach of the driver and the passenger.

Air Conditioning
A high-performance air conditioning system shall be furnished inside the cab and crew cab. A 19.1 cubic inch compressor shall be installed on the engine.

A combination condenser/evaporator with a BTU rating sufficient to meet the performance specification shall be installed on each side of the cab roof. The entire unit shall be mounted externally in a treadplate enclosure. There shall be airflow outlets in the following locations:

- Two (2) in the ceiling, just above the driver and passenger
- Six (6) in the crew cab, mounted in the ceiling and positioned to maximize cooling

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

Interior Cab Insulation
The cab and crew cab walls shall be insulated with 1.50" of insulation. The rear wall shall be insulated with 2.00" of insulation. The roof shall be insulated with 1.50" of insulation. The insulation shall be installed wherever possible, in locations that shall aid in cooling the cab.

The insulation shall be covered with upholstered liners or with metal panels painted to match the interior.

Rear Wall Covering
The exterior surface of the rear wall of the cab shall be overlayed with bright aluminum treadplate, except for areas that are not typically visible when the cab is lowered.

Electrical Wiring Diagrams
There shall be two (2) hard copies of the electrical wiring diagrams prepared and provided for the apparatus.

Electrical Component Installation
All 12-volt electrical equipment and 12-volt wiring installed by the apparatus manufacturer shall conform to DOT requirements. Wiring shall be run in loom where exposed and have grommets where wire passes through sheet metal. Wiring shall be color, function, and number coded. Function and number codes shall be continuously imprinted on all wiring harness conductors at 2.00" intervals. Exterior exposed wire connectors shall be positive

locking and environmentally sealed to withstand elements such as temperature extremes, moisture, and automotive fluids.

Electrical wiring and equipment shall be installed utilizing the following guidelines:

1. All holes made in the roof shall be caulked with silicon (no exception). Large fender washers, liberally caulked, shall be used when fastening equipment to the underside of the cab roof.
2. Any electrical component that is installed in an exposed area shall be mounted in a manner that shall not allow moisture to accumulate in it. Exposed area shall be defined as any location outside of the cab or body.
3. Electrical components designed to be removed for maintenance shall not be fastened with nuts and bolts. Metal screws shall be used in mounting these devices. Also a coil of wire shall be provided behind the appliance to allow them to be pulled away from mounting area for inspection and service work.
4. Corrosion-preventative compound shall be applied to all terminal plugs located outside of the cab or body. All non-waterproof connections shall require this compound in the plug to prevent corrosion and for easy separation of the plug.
5. All lights with sockets in a weather-exposed area shall have corrosion preventative compound added to the socket terminal area.
6. All electrical terminals in exposed areas shall have silicon (1890) applied completely over the metal portion of the terminal. All emergency light switches shall be mounted on a separate panel installed in the cab. A master warning light switch and individual switches shall be provided to allow pre-selection of emergency lights. The light switches shall be *rocker* type with an internal indicator light to show when switch is energized. All switches shall be properly identified and mounted in a removable panel for ease in servicing. Identification of the switches shall be done by either printing or etching on the switch panel. The switches and identification shall be illuminated.

An operational test shall be conducted to ensure that any equipment that is permanently attached to the electrical system is properly connected and in working order.

The results of the tests shall be recorded and provided to the purchaser at time of delivery.

General Electrical System Design for Alternating Current (AC)

Any fixed line voltage power source producing alternating current (AC) line voltage shall produce electric power at 60 cycles plus or minus 5 cycles.

Except where superseded by the requirements of NFPA Standards, 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

Grounding shall be in accordance with NEC Section 250-6 "Portable and Vehicle Mounted Generators." 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 NEC Section 250-91 "Grounding Conductor Material."

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 NEC Section 200-6 "Means of Identifying Grounding Conductors."

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% of the nameplate current rating of the power source specification label as defined in NEC Section 310-15 "Amp Capacities." 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.

Operation
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.

Direct drive (PTO) and portable generator installations shall comply with Article 445 "Generators" of the NEC.

Over current 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" (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 degrees Fahrenheit (90 degrees Celsius).

For portable power supplies, conductors located between the power source and the line side of the main over current 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).

Wiring Methods
Fixed wiring systems shall be limited to the following:

- 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)

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 run as follows.

- Separated by a minimum of 12" (305 mm), or properly shielded, from exhaust piping
- Separated from fuel lines by a minimum of 6" (152 mm)

Electrical cord or conduit shall be supported within 6" (152 mm) of any junction box and at a minimum of every 24" (610 mm) 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.

Wiring Identification
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. When prewiring for future power sources or devices, the unterminated ends shall be labeled showing functions and wire size.

Wet Locations
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" (610 mm) from the ground. Receptacles on off-road vehicles shall be a minimum of 30" (762 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.

Dry Locations
All receptacles located in a dry location shall be of the grounding type. Receptacles shall be not less than 30" (762 mm) above the interior floor height.

All receptacles shall be marked with the type of line voltage (120-volt or 240-volt) and the current rating in amps. If the receptacles are direct current, or other than single phase, they shall be so marked.

Listing
All receptacles and electrical inlet devices shall be listed to UL498 "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.

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 circuits closed. This test shall be conducted after all bodywork 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 NFPA 1901 Chapter 19-14.4
The apparatus manufacturer shall perform the following operation test and shall certify that the power source and any devices that are attached to the line voltage electrical system is properly connected and in working order.

The prime mover shall be started from a cold start condition and the line voltage electrical system loaded to 100% of the nameplate rating.

The power source shall be operated at 100% of its nameplate voltage for a minimum of two (2) hours, unless the system meets category certification as defined in NFPA Standards.

Where the line voltage power is derived from the vehicle's low voltage system, the minimum continuous electrical load as defined in NFPA Standards shall be applied to the low voltage electrical system during the operational test.

Electrical Power Control System
A compartment shall be provided in or under the cab to house the vehicle's electrical power, circuit protection, and control components. Power, signal protection, and control components shall be protected against corrosion, excessive heat, excessive vibration, physical damage, and water spray. Serviceable components shall be readily accessible.

All circuit protection devices shall be sized to prevent wire and component damage when subjected to extreme current overload. General protection circuit breakers shall be Type-I automatic reset (continuously resetting) and conform to SAE J553 or J258. PTO power circuits shall be protected by Type III manual reset non-cycling circuit breakers conforming to SAE J553 or J258, which remain open until manually reset. When required, automotive type fuses conforming to SAE J554, J1284, J1888 or J2077 shall be utilized to protect electronic equipment.

Power control relays and solenoids shall have a direct current rating of 125% of the maximum current for which the circuit is protected per NFPA.

Visual status indicators shall be supplied to identify control safety interlocks and vehicle status. Audible alarms, designed to provide early warning of problems before they become critical, shall be used.

Voltage Monitor System
A voltage monitor system shall be provided to indicate the status of each battery system connected to the vehicles electrical load. The monitoring system shall provide visual and audio warning when the system voltage is above or below optimum levels.

EMI/RFI Protection
The electrical system shall reduce undesired electromagnetic and radio frequency emissions. State-of-the-art electrical system design and components shall be used to insure that radiated and conducted electromagnetic interference (EMI) and radio frequency interference (RFI) emissions are suppressed at their source.

The apparatus shall have the ability to operate in the electromagnetic environment typically found in fire ground operations. The contractor shall be able to demonstrate the EMI and RFI testing, which has been done on similar apparatus and shall certify that the vehicle meets SAE J551 requirements.

EMI/RFI susceptibility shall be controlled by applying immune circuit designs, shielding, twisted pair wiring, and filtering. The electrical system shall be designed for full compatibility with low-level control signals and high-powered two-way radio communication systems. Harness and cable routing shall be given careful attention to minimize the potential for conducting and radiated EMI/RFI susceptibility.

Cab Instrumentation
The function of instrument panel controls and switches shall be identified by imprinted word adjacent to each item. Actuation of the headlight switch shall illuminate wording for after dark operation. Turn signal and high beam headlight indicator lights shall also be provided.

Warning indicators shall not be illuminated unless necessary. The built-in emergency light switch panel shall have a master switch plus individual switches for selective control. The switch panel shall be located on top of the engine tunnel within easy reach of the driver. Switches shall be rocker type containing an indicator light, which is an integral part of the switch. The emergency switch control panel configuration shall be such that the driver shall be the primary user.

Instrument panel gauges, vehicle lights, and other electrical accessories shall have proper size wiring to accommodate the expected current load. Wiring shall meet SAE J-1128 specifications for high temperature (250 degrees Fahrenheit minimum) conditions and shall be color, number, and function coded.

Cab instruments and controls shall be conveniently located within the forward cab section. Gauges and emergency vehicle switches shall be installed on removable panels for ease of service. The following gauges and controls shall be furnished:

- Speedometer/Odometer (electric)
- Tachometer (electric)
- Hour meter for engine
- Engine oil pressure gauge (red warning light and an audible alarm)
- Engine coolant temperature gauge (red warning light and an audible alarm)
- Automatic transmission oil temperature gauge (red warning light and an audible alarm)

- Two (2) air pressure gauges (red warning lights and an audible alarm)
- Voltmeter (warning light and audible alarm indicating high or low voltage)
- Low coolant indicator light (amber with an audible alarm)
- Fuel gauge
- Low fuel indicator light (audible alarm)
- Keyless ignition switch (green indicator light)
- Starter control
- Heater controls
- Headlight switch
- Self canceling turn signal switch (arm with visual indicators)
- Headlight dimmer and hazard switch (incorporated into turn signal arm)
- Warning light switch control panel
- Parking brake control (red indicator light)
- Horn button (center of the steering wheel for dual electric horns)
- Control to check engine warning system indicators

Air Restriction Indicator
An air restriction indicator for the air cleaner shall be provided. The air restriction indicator shall alert electronically.

Hour meter
An hour meter shall be provided inside the cab for the aerial device.

Windshield Wiper Control
There shall be a two-speed windshield wiper control with an intermittent feature provided.

The control shall have a return to park provision that allows the wipers to return to the stored position when the wipers are not in use.

A windshield washer control shall also be included.

Two-Way Radio Antenna Mount
There shall be two (2) antenna-mounting bases provided for the two-way mobile radios. Roof mount locations shall be up too the manufacture. Coax cables shall be run to the center of the dog house on the inside the cab

Cellular Phone Antenna
A cellular telephone antenna shall be provided and installed on the cab roof.

The cable shall be routed to the officer side seat box with enough cable to route to the instrument panel if needed.

MDT Computer Mount
A MDT mount shall be provided in a location that can be accessed easily by the front passenger while seated and belted in. A mount for the processor and radio shall be provided in a location the cab. The final location to be determined

12 Volt Outlets
There shall be three (3) 12 volt “cigarette lighter” or other types of power sources shall be provided in the apparatus cab. One shall be near the MDT mount, one in the EMS compartment, and the other on the dog house.

Steering Wheel
The steering wheel shall be approximately 18.00" in diameter, have tilting and telescoping capabilities, and a two-spoke design.

Switch Panel
The emergency light switch panel shall have a master switch plus individual switches for selective control. The switch panel shall be located on the driver side to allow for easy access. The switches shall be rocker-type with an integral indicator light.

Aerial Switch
There shall be a master switch installed for the aerial operating electrical system that meets NFPA requirements.

Aerial PTO Switch
There shall be a PTO switch with an indicator light provided within reach of the driver.

Battery System
A single start battery system shall be provided. An ignition switch and starter button shall be located on the instrument panel.

Master Battery Switch
A master battery switch, which activates the battery system, shall be provided inside the cab within easy reach of the driver.

A green indicator light, labeled "Battery On," shall be provided on the instrument panel to notify the driver of the position of the battery switch.

Engine Starting Batteries
There shall be six (6), Group 31, 12-volt DC batteries supplied and installed by the apparatus manufacturer.

Each battery shall have a rating of 950 CCA and a reserve capacity of 190 minutes.

Each battery shall be provided with threaded posts for cable connections.

Battery Compartments
The batteries shall be stored in well-ventilated compartments that are located under the cab and bolted directly to the chassis frame. A non-corrosive mat shall be provided on the floor of each compartment.

There shall be access panels in the crew cab floor, to provide access to the battery terminals.

Battery Trays
There shall be ABS plastic battery trays with drain tubes provided for the batteries to sit in.

Alternator System
A C.E. Niehoff, Model C656, alternator or equivalent, shall be provided. It shall have a rated output current of 400 amps, measured according to the methods specified in SAE standards. It shall also have a custom three-set point voltage regulator. The alternator shall be connected to the power and ground distribution system with heavy-duty cables, sized to carry the full rated alternator output.

Amp Draw Report
The bidder shall provide, at the time of bid and delivery, an itemized print out of the expected amp draw of the entire vehicle's electrical system.

The manufacturer of the apparatus shall provide the following:
1. Documentation of the electrical system performance tests.
2. A load analysis report, which shall include the following:
   - The nameplate rating of the alternator.
   - The alternator rating under the conditions specified per NFPA 1901.
   - The minimum continuous load of each component that is specified per NFPA 1901.
   - Additional loads that, when added to the minimum continuous load, determine the total connected load.
   - Each individual intermittent load.

All of the above listed items shall be provided by the bidder per NFPA 1901.

Electronic Load Management
There shall be a Kussmaul electronic load management (ELM) system provided that monitors the vehicle's 12-volt electrical system and automatically reduces the electrical load in the event of a low voltage condition. This shall ensure the integrity of the electrical system.

The ELM shall monitor the vehicle's voltage after the parking brake has been set. It shall sequentially shut down individual electrical loads when the system voltage drops below a preset level. Five (5) separate electrical loads shall be controlled by the load manager. The ELM shall sequentially re-energize electrical loads as the system voltage recovers.

The ELM shall also include a sequencer function for the five (5) managed loads and two (2) additional loads.

Battery System Charger
There shall be one (1) Kussmaul battery charger installed in the seat box. A display bar graph, indicating the state of charge, shall be mounted on the driver side seat riser. The charger shall have a maximum output of 40 amps and fully-automatic regulation. The battery charger shall be wired to the shoreline to activate automatically when power is connected.

Battery Jumper Studs
There shall be one (1) set of battery jumper studs with plastic, color-coded covers located on the driver side battery box. A tag shall be provided for positive/negative terminals.

Battery Direct Power
There shall be one (1) pair of wires installed. The pair shall include one (1) positive and one (1) negative wire to create a complete circuit that does not pass through the battery disconnect switch and is powered at all times for radio and computer operations. The wires shall be connected to the battery and protected by a 15-amp fuse. The wires shall end in the compartment over the engine, terminating at a wire stud. Wires shall be sized to 125% of the 15-amp fuse.

Front Clearance & Identification Lights
There shall be five (5) amber LED clearance lights installed. Two (2) on the outside corners of the cab, three (3) on the front center of the cab roof. The lights shall be as near to the top of the cab as practical, equally spaced from the vertical centerline of the cab. The lights shall activate with the headlight switch. The lights shall meet DOT requirements.

Headlights
There shall be four (4) front headlights installed inside two (2) rectangular-shaped chrome housings on each side of the face of the cab. The inside headlights shall be high beam halogen lights. The outside headlights shall be low beam halogen lights. The headlights shall meet DOT requirements.

Headlight Flasher
The high beam headlights shall flash alternately between the left and right side, with a control switch located on the cab instrument panel.

Alternating function shall be controlled by a solid state electronic flashing module.

The flash mode shall automatically cancel upon headlight flash deactivation or when the parking brake is set.

Front Directional Lights
There shall be two (2) amber, flashing LED, front directional lights provided that meet DOT requirements. The lights shall be located to the outside of the headlights. The lights shall be activated with the directional light lever or the four-way flash switch.

Front Side Lower Clearance/Directional Lights
There shall be two (2) amber, LED combination clearance and directional lights installed on the side of the cab behind the front directional light, one (1) each side, to meet DOT requirements. The lights shall be activated with the headlight switch.

Side Marker Directional Lights
There shall be one (1) amber, LED light installed near the apparatus midpoint on each side. The lights shall meet the DOT intermediate marker light requirements and also act as a side directional light.

Rear Directional Lights
There shall be two (2) amber, LED populated arrow directional lights installed at the rear of the apparatus that meet DOT requirements. The lights shall be activated with the directional light lever or four-way flash switch.

Stop/Tail Lights
Two (2) red, LED stop/tail lights shall be provided. The lights shall be mounted on the rear bulkhead, one (1) on each side. These lights shall meet DOT requirements.

Backup Lights
There shall be two (2) LED backup lights provided at the rear of the apparatus to meet DOT requirements.

Tail Light Bezels
There shall be two (2) four-light, vertical housings provided at the rear of the apparatus.

Backup Alarm
There shall be one (1) solid-state electronic audible backup alarm provided under the rear of the apparatus. The alarm shall actuate when the truck is shifted into reverse. The device shall sound at 60 pulses per minute and automatically adjust its volume to maintain a minimum 5 dB above the surrounding environmental noise levels.

Rear Identification Lights
There shall be three (3) red, LED lights surface mounted on the rear of the apparatus to meet DOT requirements. The lights shall be protected by a mounting bracket. The lights shall be activated with the headlight switch.

Rear Clearance Lights
There shall be four (4) red LED clearance lights installed on the rear of the apparatus.

The two (2) rear facing lights shall indicate the overall width of the apparatus. The two (2) side facing lights shall indicate the overall length of the apparatus. The lights shall be activated with the headlight switch. The lights shall be protected by a mounting bracket. The lights shall meet DOT requirements.

License Plate Holders
There shall be a black, painted license plate holder provided at the rear of apparatus. There shall be an incandescent light provided to illuminate the area. A license plate holder shall also be provided on the front of the truck.

Reflectors
Reflectors shall be installed around the apparatus to meet DOT requirements.

Do Not Move Apparatus Indicator
A large red, incandescent flashing light shall be located in the driving compartment. The light shall be illuminated automatically per NFPA standards. The light shall be labeled "Do Not Move Apparatus When Light is On."

A pulsing alarm shall sound when the *Do Not Move Apparatus* indicator is activated and the parking brake is released.

Open Door Indicator Lights
There shall be two (2) red indicator lights provided and located in clear view of the driver to warn of an open door. There shall be one (1) light to indicate the status of the driver side doors and one (1) to indicate the status of the passenger side and rear compartment doors.

Siren
There shall be one (1) electronic siren controller located centered overhead between the driver and passenger in a swivel bracket. The siren shall include the following features:

- 100 watts
- Permanent microphone for public address
- Radio rebroadcast

Siren Speaker
There shall be one (1) 100 watt siren speaker provided. The speaker shall be installed recessed into the center of the bumper. The speaker shall be chrome with a rectangular face shape. The speaker shall be connected to the required siren.

Mechanical Siren
There shall be one (1) Federal Signal, Q2B, mechanical siren installed far outside above the deck plate on the driver side outboard position D. A siren brake button shall be installed on the driver side switch panel.

Mechanical Siren Control
The auxiliary mechanical siren shall be controlled by the following:

- A foot switch on the driver side cab floor
- A push button on the passenger side dashboard

Air Horn System
There shall be two (2) air horns recessed into the front bumper, inside each of the frame rails. The horn system shall be connected to the air brake system wet tank. A pressure protection valve shall be installed in the connective tubing, to prevent loss of air in the air brake system.

Air Horn Control in the Cab
The air horn shall be activated by the following:

- The steering wheel horn ring
- A push button on the passenger side dashboard

The controls for the air horn shall be activated with the battery switch.

Warning Lights

Light bars
There shall be two (2) Whelen Freedom, or equivalent, LED light bars mounted on the cab roof. Each light bar shall be 28.50" long x 12.00" wide x 3.75" high. The light bars shall be activated by a switch in the cab. The light bar assembly shall consist of a series of red clear and blue lights.

Driver & Passenger Side Front (NFPA)
There shall be two (2) Whelen, Model 60*02F*RR, red, Super-LED or equivalent, flashing lights provided, one each side. The lights shall have a red lens. These lights shall be controlled by a switch in the cab.

Driver& Passenger Side Front Additional
There shall be two (2) Whelen, Model 60*02F*RR, red, Super-LED, or equivalent, flashing lights provided. The lights shall have a red lens. These lights shall be controlled by a switch in the cab.

Side Front (NFPA)
There shall be two (2) Whelen, Model 90**5F*RR, red, Super-LED, or equivalent, flashing lights provided on the side of the front bumper. The lights shall have a red lens. These lights shall be controlled by a switch in the cab.

Side Midship (NFPA)
There shall be two (2) Whelen, Model 90**5F*RR, red, Super-LED, or equivalent, flashing lights provided. The lights shall have a red lens. These lights shall be controlled by a switch in the cab.

Front & Rear Stabilizer
There shall be one (1) Whelen, Model 90**5F*RR, red, Super-LED, or equivalent, flashing, warning light installed on each front and rear stabilizer pan, facing the side of the apparatus. The lights shall have a red lens. Each of the outrigger lights shall be activated when the side warning switch is engaged.

Side Rear (NFPA)
There shall be two (2) Whelen, Model 60*02F*RR, red, Super-LED, or equivalent, flashing lights provided on the center of the rear fender. The lights shall have a red lens. These lights shall be controlled by a switch in the cab.

Driver & Passenger Side Lower Rear (NFPA)
Two (2) Whelen, Model 60*02F*RR, red, Super-LED, or equivalent, flashing lights shall be provided above the stop/tail light on the driver and passenger side. The lights shall have a red lens. This light shall be controlled by a switch in the cab.

Side Zone Upper
There shall be one (1) Whelen, Model 90**5F*RR, red, Super-LED, or equivalent, flashing lights installed on each side of the air conditioning housing. The lights shall have a red lens. The lights shall include a wide beam lens and shall be controlled by the roof light switch.

Driver & Passenger Side Upper Rear (NFPA)
There shall be two (2) Whelen, Model L360, or equivalent, red beacon provided, one each side.. These lights shall be controlled by a switch in the cab.

The rear zone upper warning lights shall be mounted on the top of the compartments with all wiring totally enclosed.

Driver & Passenger Side Upper Rear Blocking (NFPA)
Two (2) Whelen, Model 90**5F*RR, red, Super-LED, or equivalent, flashing light shall be provided, one each side. The light shall have a red lens. The light shall be activated whenever the rear upper zone switch is on and the parking brake is set.

Cab and Crew Cab Door Warning Lights
There shall be one (1) amber, Whelen, Model 50A03FAR, Super-LED, or equivalent, light installed to the outside of each cab and crew cab door pan.

The lights shall flash when the associated door is in the open position.

Rear Traffic Directing Lights
There shall be one (1) Whelen TAM65, or equivalent, traffic directing light module centered below the turntable on the rear of the vehicle. This module shall be surface mounted with an aluminum treadplate cover. This module shall consist of six (6), Super-LED, amber lights. This module shall measure approximately 2.75" high x 36.00" long x 2.25" deep.

There shall be one (1) Whelen TACTLD1, or equivalent, control head installed within reach of the driver in the cab. The control unit shall simulate the action of the light at the rear of the vehicle.

The rear traffic directing lights shall be activated in the flashing mode by the switch on the control head.

Marker Lights
There shall be two (2) amber and red LED marker lights with a rubber arm installed at the rear of the truck. The amber lens shall face the front and the red lens shall face the rear of the truck. These lights shall be activated with the running lights.

Cab Dome Lights
There shall be two (2) Weldon, Model 8081-6978-68, or equivalent, clear/red incandescent dome lights installed in the cab. Each light shall be mounted in a gray flange, one (1) overhead on the driver side and one (1) overhead on the passenger side. The forward, clear, lights shall be controlled by the door switch and the lens switch. The rear, red, lights shall be controlled by the lens switch only.

Crew Cab Dome Lights
There shall be two (2) Weldon, Model 8081-6978-68, or equivalent, clear/red dome lights installed in the crew cab ceiling. Each light shall be mounted in a gray flange, one (1) overhead on the driver side and one (1) overhead on the passenger side. The door switch shall activate the forward, clear, lights. Each light can be manually activated or deactivated by depressing the respective lens.

Map Lights
There shall be two (2) adjustable map lights provided. The lights shall be located in the cab ceiling, one (1) over the driver seat and one (1) over the passenger seat. Each light shall include a switch.

Engine Compartment Light
There shall be one (1) incandescent light installed in the engine compartment. This light shall be activated by an automatic switch when the cab tilts.

Step Lights
There shall be four (4) Truck-Lite, Model 44, or equivalent, LED step lights provided. The lights shall be installed, one (1) per step, in the driver side front doorstep, driver side crew cab doorstep, passenger side front doorstep and passenger side crew cab doorstep.

The lights shall be activated when the adjacent door is opened.

Body Step Lights
Each stepping surface on the body shall be illuminated per NFPA requirements.

There shall be one (1) Ritar, Model M27HW2, or equivalent, LED step light installed in the following locations:
- driver side front bulkhead
- passenger side front bulkhead

Cab Perimeter Scene Lights
Truck-Lite, Model 44042, or equivalent, LED perimeter scene lights shall be installed under the cab exit areas to meet NFPA requirements.

Additional Perimeter Scene Lights
Truck-Lite, Model 44042C, or equivalent, LED perimeter scene lights shall be installed in the following locations:

- Two (2) lights under the pump panel running boards, one (1) on each side
- Two (2) lights under the turntable access steps, one (1) on each side

The perimeter scene lights shall be activated when the parking brake is activated

EMS Compartment Lights
There shall be two (2) Krystal-lite Super Bright strip lights provided in the EMS compartment. One (1) strip shall be mounted vertically along each side of the door framing.

Truck Body Compartment Lighting
There shall be two (2) Krystal-lite Super Bright strip lights, or equivalent, provided in all compartments. One (1) strip shall be mounted vertically along each side of the door framing.

These lights shall be controlled by an automatic door switch.

Scene Lights
A HID scene light shall be mounted in a bezel high on the driver side near the crew cab door activated by,

- opening either the driver side cab or crew cab door
- a switch on the driver side cab switch panel

A HID scene light shall be mounted in a bezel high on the passenger side near the crew cab door activated by,

- opening either the passenger side cab or crew cab door
- a switch on the driver side cab switch panel

A HID scene light mounted on the front brow of the truck activated by a separate switch on the driver's cab switch panel.

Hose Bed Lights
There shall be one (1) flood light located on the driver & passenger side rear of the hose bed. The light shall be controlled by a switch on the light head.

120 Volt Cab Outlets
Two (2) 120 volt duplex receptacles shall be provided in the cab. One (1) receptacle shall be located on or near the dog house. These receptacles will be used for handheld radio chargers.

The other receptacle shall be located on the rear cab wall in the medical cabinet

Two (2) 120 volt Streamlights w/ chargers shall be provided and located on or near the dog house. These can be wired direct to the 120 volt shore line.

The electrical receptacles shall be a 120-volt, 15 amp and shall be wired to the outlets with no less than 14-gauge wire that is properly supported and shielded from injury. These outlets shall receive power from the auto eject receptacle.

AC Wattage Calculation
The AC wattage calculator indicates that the generator chosen shall not be capable of supplying enough power for all AC loads to be active simultaneously. This calculation shall be indicated via the wattage calculator in the truck configuration. The sales representative has accepted the calculation.

Generator
There shall be one (1) Harrison 10.0 MCR Stealth hydraulic, single-phase generator installed on the apparatus. The generator shall have a continuous duty rating of 10,000 watts.
A Harrison digital meter shall be included with the generator.

Power Take Off
The hot shift power take off (PTO) shall power the generator.

Mounting
The generator shall be permanently mounted above the fire pump, in the cargo bed. All generator components that need regular maintenance shall be easily accessible. Removable panels shall be provided, if needed, to meet this accessibility requirement.

Shoreline Inlet
There shall be a Kussmaul Super Auto Eject, 20 amp shoreline inlet provided to operate the 120-volt circuits on the truck without the use of the generator. This shoreline inlet shall be supplied by Kussmaul with an appropriately rated mating female plug. The shoreline inlet shall be located in the middle of the driver side of the cab, to the front of the cab door. A red, weatherproof, flip-up cover shall be provided.

Breaker Panel
A Cutler-Hammer, 16-place circuit breaker panel shall be installed in the driver side compartment above the front stabilizer on the lower outside of the left wall. A circuit directory for each breaker shall be provided adjacent to the circuit breaker panel. Identification of circuits shall be done in a durable manner that provides years of service. The breaker panel shall be powered by the generator.

A main breaker shall be included with the main circuit breaker panel.

Aerial 120-Volt AC, 20-Amp System
This system shall consist of one (1) 120-volt, 20-amp power circuit routed from the chassis circuit breaker panel through the aerial swivel to the aerial ladder tip. The circuit shall be protected by a circuit breaker installed in the chassis circuit breaker panel and labeled "Aerial Ckt #1". This power circuit shall power one (1) receptacle installed at the ladder tip.

Flood Lights
There shall be two (2) 1000 watt or larger, 240-volt, halogen infrared reflected, fixed pedestal light installed. One (1) each on the driver & passenger side front catwalk. The lights shall be powered by the generator.

Outlets
One (1) 120-volt AC, 20-amp, NEMA number L5-20 twist lock single receptacle shall be provided at each location. A gray weather resistant flip-up cover shall be provided for each outlet also. Each outlet shall be powered by the generator. The locations are as follows:

- Passenger side front bulkhead of body.
- High on the driver & passenger side rear fender panel, in front of the rear axle.
- Driver & passenger side rear inside of the tail lights.

Electric Cord Reel
There shall be a Hannay Reels, Model ECR1618, or equivalent, electric cord reel provided in the cargo bed. The reel shall be filled to capacity with heavy duty 12/3 gauge three wire rubber coated cord. It shall terminate with a 20 amp outlet with L5-20 twist lock duplex

receptacle and cover. The cord reel shall have an overall width of approximately 21". The cord reel shall be painted the job color. The cord reel shall be powered by the generator. A label shall be provided in a readily visible location adjacent to the reel. The label shall indicate the following:

- Current rating
- Current type
- Phase
- Voltage
- Total cable length

Roller Guide

A stainless steel captive roller assembly shall be provided to aid in the payout and loading of the reel. A ball stop shall be provided to prevent the cord from being wound on the reel.

Electric Rewind Switch

This cord reel shall include a 12-volt, momentary push button, 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 on the passenger side pump panel at a height not to exceed 72" above the operator's standing position.

Pump

The pump shall be a Waterous CSU 2,000 gpm, single-stage, midship-mounted centrifugal type. (NO EXCEPTION) The pump shall be the class A type and shall deliver the percentages of rated discharge capacity at the pressures that are specified below:

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

The pump body shall be close-grained gray iron and bronze fitted, and it shall be horizontally split into two (2) sections, for easy removal of the entire impeller shaft assembly (including the wear rings). The pump shall be designed for complete servicing from the bottom of the truck, without disturbing the pump setting or the piping of the apparatus. The pump case halves shall be bolted together on a single horizontal face to minimize the chances of leakage and to facilitate easy reassembly. No end flanges may be used.

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

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

Pump Transmission
The pump transmission shall be made of a three (3) piece, horizontally split casing. Power transfer to the pump shall be through a Morse HY-VO drive chain.

Drive shafts shall be a minimum diameter of 2.35" and made of hardened and ground alloy steel. All shafts shall be ball bearing supported. The case shall be designed to eliminate the need for water-cooling.

Pump Packing
The stuffing boxes shall be the conventional two-piece, split-gland type, to allow adjustment or replacement of the Grafoil packing without disturbing the pump. When the pump is operating, water shall be fed into stuffing box lantern rings for proper lubrication and cooling.

The lantern rings shall be located at the inner ends of the stuffing boxes, to avoid the need for their removal when pump packing is replaced.

The wear rings shall be made of bronze and shall be easily replaceable, to allow the restoration of original pump efficiency without needing to replace the entire pump casing, because of wear.

Pump Shift
An air-actuated pump shift shall be provided. It shall be engaged with a two-position sliding collar that is actuated pneumatically (by air pressure) from a three-position air control switch, located in the cab. A manual override shift control, to serve as a backup, shall be located on the driver side pump panel.

Two (2) indicator lights shall be provided, adjacent to the pump shift inside the cab. One (1) green light shall indicate when the pump shift has been completed and shall be labeled "Pump Engaged." The second green light shall indicate when the pump has been engaged and 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 shall indicate which of two conditions is true: 1) the pump is engaged and the road transmission is in pump gear; and 2) 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."

Pump Test
The pump shall be tested, approved and certified by Underwriters Laboratories Inc. (UL), at the manufacturer's expense. These test results, along with the pump manufacturer's certification of a hydrostatic test, the engine manufacturer's certified brake horsepower curve and the manufacturer's record of pump construction details, shall be forwarded to the fire department.

Pump Intake Relief Valve
A 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 - 250 psig.

The outlet shall terminate below the frame rails with a 2.50" National Standard hose thread adapter and shall have a warning tag that reads "Do Not Cap".

The control for the relief valve shall be located behind an access door at the passenger side pump panel.

Pressure Controller
A Class 1 Captain pressure-sensing governor (PSG) system shall be provided. The PSG system shall eliminate the need for a discharge pressure relief valve.

The pressure governor system shall either be connected directly to the engine-mounted electronic control module (ECM) or it shall be an integral part of the engine ECM. A pressure transducer shall be installed in the water discharge manifold on the pump. The transducer shall continuously monitor pump pressure and send signals to the pressure governor. The pressure governor shall then send signals to the engine ECM, which shall modulate fueling to maintain a set pressure or engine speed (within engine and pump operating capabilities). There shall be no user-serviceable items or maintenance required on the PSG system. The PSG system shall not require any mechanical drive, oil, or air supply for its means of control.

The PSG system shall be operable only after the vehicle parking brake has been set, the transmission is in pumping mode, and the fire pump has been engaged.

The PSG shall have two (2) modes of operation: Pressure and rpm.

In its pressure mode, the PSG system shall automatically maintain the discharge pressure set by the operator, regardless of flow (within engine operation capabilities).

In its rpm mode, the PSG system shall automatically maintain a set engine speed, regardless of engine load (within engine operation capabilities).

A pump cavitations protection feature shall be provided, which shall return the engine to idle speed if the pump cavitates.

Engine Throttle
There shall be one (1) engine throttle included with the pressure controller.

Pump Primer
The pump primer shall be an electrically driven, positive displacement, vane type pump. It shall conform to the standards outlined in the current edition of the NFPA 1901 standards.

The primer shall be environmentally safe and shall be the self-lubricating style. One (1) priming control shall both open the priming valve and start the priming motor.

Side Control Pump Compartment
The pump compartment shall be separate from the rear body, so that each may flex independently of the other. It shall be a fabricated assembly of steel tubing, angles, and channels that supports both the fire pump and the side running boards, and shall be approximately 52.00" long.

The pump compartment shall be mounted on the chassis frame rails with rubber isolators in a four-point pattern to allow for chassis frame twist.

The pump compartment with the pump, plumbing, and gauge panels shall be removable from the chassis in a single assembly.

Pump Compartment Light
There shall be one (1) incandescent light provided inside the passenger side pump enclosure. The light shall be accessible through a door on the pump panel.

Pump Mounting
The pump shall be mounted to a substructure that shall be mounted to the chassis frame rail using rubber isolators. The mounting shall allow chassis frame rails to flex independently without damage to the fire pump.

Cold Weather Pump Enclosure & Heater
A cold weather enclosure shall be provided for around the pump. The enclosure shall be designed to capture heat from the exhaust hold heat from a hot water heater that will be provided. A control switch shall be provided for the heater on the pump panel.

Pump Panels
All pump controls and gauges shall be located on the driver side of the apparatus and shall be properly labeled.

The layout of the pump operator's control panel shall be ergonomically efficient and systematically organized. It shall be removable in two (2) main sections for ease of maintenance. The upper control panel shall contain sub panels for the mounting of the pump pressure control device, engine monitoring gauges, electrical switches, and foam system controls. The sub panels shall be removable from the face of the pump panel for ease of maintenance. All valve controls and line pressure gauges shall be located below the sub panels. The lower control panel shall contain all inlets, outlets, bleeders, and drains.

The pump panel on the passenger side shall be removable with lift-and-turn fasteners.

Polished stainless steel trim collars shall be installed around all inlets and outlets.

All push/pull valve controls shall have quarter-turn locking control rods with polished, chrome-plated zinc tee handles. Guides for the push/pull control rods shall be chrome-plated zinc castings that are securely mounted to the pump panel. The push/pull valve controls shall be lockable in any position. The control rods shall pull straight out of the panel and shall be equipped with universal joints to eliminate binding.

All discharge outlets shall have color-coded identification tags, and the tags associated with each discharge shall have a unique color. The color-coding shall include the labeling of the outlet and the drain for each corresponding discharge.

The pressure gauges for all lines shall be mounted in individual chrome-plated castings, with the identification tag recessed in the casting below the gauge. The identification tag for each valve control shall be recessed in the face of its tee handle. Identification tags for drains,

switches, and other controls and gauges shall be mounted on the pump control panels in chrome-plated bezels.

Mounting of the castings and identification bezels shall use either screws or threaded pegs cast on the back side of each bezel.

Pump Panel Light Shield / Step
To illuminate the controls, switches, gauges, instruments and instructions on the driver side pump panel, incandescent lights shall be provided, installed under an aluminum diamond plate combination step/light shield.

When the pump is shifted into gear from inside the cab, one (1) light on the pump operator's control panel shall switch on, providing illumination for an operator who is approaching the panel. The remaining lights for this control panel shall be actuated from a switch on the panel.

One (1) Weldon 9186-23882-30 or equivalent, incandescent step light shall also be provided. The stepping surface shall be at least 8.00" deep and the light shall be installed to illuminate the top of the step, for nighttime vision. The step light shall be activated from a switch on the pump operator's control panel.

All external illumination of the pump panels shall conform to the current version of the NFPA standards.

Passenger Side Pump Panel Light Shield / Step
A light shield/ step shall be provided above the passenger side pump panel. The step shall have a stepping surface of at least 8.00" and shall be reinforced to support a firefighter's weight in excess of 200 lbs.
This pump panel shall be illuminated by incandescent lights, installed under an aluminum treadplate step. The lights shall be actuated from a switch on the pump operator's panel.

One (1) Weldon 9186-23882-30 or equivalent, incandescent step light shall also be provided. The step light shall be installed to illuminate the top of the step for nighttime vision, and shall be activated by a switch on the pump panel.

Pump Panel Material
The pump panels on both sides of the apparatus shall be constructed of brushed stainless steel. Polished trim molding shall be provided around each pump panel.

Pump Access Panel
The passenger side pump panel shall be removable and fastened with swell type fasteners.

Driver & Passenger Side Running Board
The driver side running board shall be fabricated of .125" thick bright aluminum treadplate and supported by structural steel angle assemblies that are bolted to the chassis frame rail. This running board shall be 13.00" deep and spaced away from the body by .50". A splashguard shall be provided to keep road dirt and water from splashing up onto the pump panels.

Slide out Platform
A slide out platform with a tread-grip insert shall be attached to the driver side running board. The platform shall be 22.00" deep x 35.00" wide. The platform shall lock in the retracted and the extended positions. The platform shall be wired to the *Do Not Move Truck* indicator in the cab.

Stirrup Step
A stirrup step shall be attached to the passenger side running board.

Engine Status Indicator Lights
The following engine status indicator lights shall be provided:

- Check Transmission Warning
- Stop Engine Warning
- Check Engine Warning

These indicators shall be located at the pump panel.

Pump Panel Gauges and Controls
The following gauges and controls shall be provided on the pump and gauge panels, in a neat and orderly arrangement:

- Engine oil pressure gauge, with visual and audible indicators
- Engine water temperature gauge, with visual and audible indicators
- Tachometer (electric)
- Master pump drain control
- Voltmeter

Master Gauges for Pump Vacuum and Pressure
The pump vacuum and pressure master gauges shall be interlube-filled. The fluid fill shall include an anti-freeze agent that acts as a lubricant and a shock absorber. The accuracy of the gauges shall be compliant with the ANSI B40.1 Grade B standards. The temperature range for both gauges shall be from -40 degrees to +150 degrees (Fahrenheit).

The cases for both gauges shall be constructed of aluminum. The gauge lenses shall be made of a high-impact resistant acrylic, with captive O-rings, and each shall be secured with a polished chrome bezel. The gauges shall be at least 4.0" in diameter and each shall have a white face.

The pump intake gauge shall have a pressure range of -30 inches Hg to 600 psi. The pump discharge gauge shall have a pressure range of -30 inches Hg to 600 psi. The pump pressure gauge and the vacuum gauge shall be installed adjacent to each other at the pump operator's control panel.

Test port connections shall also be provided at the pump operator's panel, one connected to the intake side of the pump and the other connected to the discharge manifold of the pump. Each shall have 0.25" standard pipe thread connections and polished stainless steel plugs. Each gauge shall be clearly marked with a label.

Pressure Discharge Gauges

The individual line pressure discharge gauges at the pump operator's panel shall be interlube filled. The fluid fill shall include an anti-freeze agent, acting as a lubricant and shock absorber. The accuracy shall comply with ANSI B40.1 "Grade B" requirements and the temperature range shall be from -40 degrees F to +150 degrees F.

The construction of the gauge case shall be of tough corrosion and impact resistant. The lens shall be made of a high impact resistant acrylic with captive O ring and secured with a polished chrome bezel. These gauges shall be a minimum 2.00" in diameter and shall have a pressure range of 30in-0-400 psi. The gauges shall have a white face. The gauges shall be installed as close to the outlet control as practical

Main Inlet for Driver & Passenger Side
A pump manifold inlet that terminates with male 6.00" National Standard hose thread shall be provided on the driver and passenger side of the apparatus, at the pump panel. The suction inlet shall include removable die-cast zinc screens that are designed to provide cathodic protection, to reduce corrosion in the pump.

A 6” NST x 5” Storz piston intake valve with adjustable pressure relief valve, and a 5” Storz cap w/ chain or cable shall be provided.

Plumbing
All inlet and outlet lines 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 either stainless steel or ductile cast iron.

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

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

Auxiliary Inlet for Driver Side Pump Panel
An inlet line with 2.50" plumbing shall be provided, with its termination on the driver side of the apparatus, recessed in the pump panel. The inlet shall have an Akron Brass 8000 series, or equivalent, 2.50" valve and shall terminate with 2.50" female swivel National Standard hose thread and a strainer.

This inlet line shall have a heavy-duty style valve with a stainless steel ball, a simple two-seat design, and no lubrication or regular maintenance required. The valve shall have a direct control, with the operating mechanism acting as the position indicator, located at the valve.

A chrome-plated plug with NST threads shall be provided for the inlet line. This plug shall incorporate a thread design that automatically relieves pressure stored in the line when it is disconnected.

Tank to Pump, Main
The booster tank shall be connected to the intake side of the pump with 4.00" heavy-duty piping and a 3.00" valve. A rubber coupling shall be included in this line to prevent damage from vibration or chassis flexing. A check valve shall be installed in line to prevent the possibility of back filling the water tank. The line shall be designed to comply with the current NFPA requirements for flow.

This inlet line shall have a heavy-duty style valve with a stainless steel ball, a simple two-seat design, and no lubrication or regular maintenance required. The valve shall have a remote control, with the operating mechanism acting as the position indicator, located at the pump operator panel.

Driver Side 2 ½” Discharges
Two (2) outlet lines with 2.50" plumbing shall be provided, on the driver side of the apparatus. The outlets shall terminate with male 2.50" National Standard hose thread. The discharge shall be color-coded

The outlet lines shall have an Akron Brass 8000 series, or equivalent, heavy-duty style valve with a stainless steel ball and a simple two-seat design, with no lubrication or regular maintenance required. The valve shall have a remote control with an operating mechanism acting as the position indicator, located at the pump operator panel.

A chrome-plated, 45-degree elbow shall be provided for each outlet line. The elbow shall be female NST threads on one end and with male NST threads on the other end. A chrome-plated cap with NST threads and a chain shall be provided for teach outlet line. This cap shall incorporate a thread design that automatically relieves pressure stored in the line when it is disconnected.

Passenger Side 2 ½” Disharges
Two (2) outlet lines with 2.50" plumbing shall be provided, on the passenger side of the apparatus. The outlets shall have a 2.50" valve and shall terminate with male 2.50" National Standard hose thread. The discharges shall be color-coded.

The outlet lines shall have an Akron Brass 8000 series, or equivalent, heavy-duty style valve with a stainless steel ball and a simple two-seat design, with no lubrication or regular maintenance required. The valves shall have a remote control with an operating mechanism acting as the position indicator, located at the pump operator panel.

A chrome-plated, 45-degree elbow shall be provided for the outlet line. The elbow shall be female NST threads on one end and male NST threads on the other end. A chrome-plated cap with NST threads and a chain shall be provided for the outlet line. This cap shall incorporate a thread design that automatically relieves pressure stored in the line when it is disconnected.

Passenger Side Large Diameter Discharge
An outlet line with 4.00" plumbing shall be provided, with its termination on the passenger side of the apparatus. The outlet shall have a 4.00" valve and shall terminate with male 4.00"

National Standard hose thread. The discharge shall be color-coded. The discharge tag shall be labeled "PASSENGER SIDE LARGE DIAMETER DISCHARGE".

The outlet line shall have an Akron Brass 8000 series, or equivalent, heavy-duty style valve with a stainless steel ball and a simple two-seat design, with no lubrication or regular maintenance required. The valve shall have a 6-inch, chrome-plated hand wheel control with a dial post indicator in the control, located at the pump operator panel.

A 30-degree elbow shall be provided. The elbow shall have female 4” NST threads and a 5.00 Storz w/ cap and cable or chain.

Waterway Outlet
The waterway outlet shall be plumbed from the pump to the water tower line with a 3.50" valve and 5.00" plumbing. The discharge shall be color-coded. The discharge tag shall be labeled "AERIAL DISCHARGE".

The outlet line shall have a ball valve, with a solid ball that is chromium-plated, for a hard and durable surface. The spring-loaded, floating seal assembly of this valve requires no adjustment, yet provides a tight seal against both pressure and vacuum pressures. The valve shall have a 6-inch, chrome-plated hand wheel control with a dial position indicator in the control, located at the pump operator panel.

Tank Fill Outlet
A combination tank fill and pump recirculation line with a 1.50" valve and 1.50" plumbing shall be provided. The discharge shall be color-coded. The discharge tag shall be labeled "TANK FILL".

The outlet line shall have an Akron Brass 8000 series or equivalent, heavy-duty style valve with a stainless steel ball and a simple two-seat design, with no lubrication or regular maintenance required. The valve shall have a remote control with an operating mechanism acting as the position indicator, located at the pump operator panel.

Front Bumper Discharge
An outlet line with 2.00" plumbing shall be provided, with its termination of a polished stainless steel swivel on top of the outer passenger side of the front bumper, and with automatic drains at the low points in the outlet. The outlet shall have a 2.00" valve and shall terminate with male 1.50" National Standard hose thread. The discharge shall be color coded. The discharge tag shall be labeled "FRONT DISCHARGE".

The outlet line shall have an Akron Brass 8000 series or equivalent, heavy-duty style valve with a stainless steel ball and a simple two-seat design, with no lubrication or regular maintenance required. The valve shall have a remote control with an operating mechanism acting as the position indicator, located at the pump operator panel.

Crosslay Outlets
Two (2) outlet lines with 2.00" plumbing shall be provided, with its termination of a 90-degree swivel in the bed. The outlets shall have a 2.00" valve and shall terminate with male 1.50" National Standard hose thread. The front discharge tag shall be labeled "NO.

1 CROSSLAY". This discharge shall be color-coded. The rear discharge tag shall be labeled "NO. 2 CROSSLAY". This discharge shall also be color-coded.

One (1) outlet line with 2.50" plumbing shall be provided, with its termination of a 90-degree swivel in the 2.5in crosslay. The outlet shall have a 2.50" valve and shall terminate with male 2.50" National Standard hose thread. The discharge shall be color-coded. The discharge tag shall be labeled "2 1/2" CROSSLAY".

These outlet lines shall have an Akron Brass 8000 series or equivalent, heavy-duty style valve with a stainless steel ball and a simple two-seat design, with no lubrication or regular maintenance required. The valves shall have a remote control with an operating mechanism acting as the position indicator, located at the pump operator panel.

Crosslay Hose Bed
A crosslay hose bed with the capacity to hold two (2) each 200’ 1 ¾” double jacket polyester hose & one (1) 200’ of 2 ½” double jacket polyester hose preconnects. The location shall be above the pump in the pump compartment

Stainless steel vertical scuff plates shall be provided at the crosslay hose bed ends, on both sides of the vehicle. The bottoms of these hose bed ends shall also be equipped with stainless steel scuff plate.

The crosslay bed flooring shall be made of perforated brushed aluminum and shall be removable.

Crosslay Dividers
There shall be two (2) single sheets; crosslay dividers provided that shall be adjustable from side to side. Each divider shall be fabricated of 0.25" thick aluminum that is unpainted with a brushed finish. The remainder of the hose bed shall be painted in the job color.

Crosslay Walls
The front and rear crosslay walls shall be painted the job color.

Crosslay Hose Restraint
Elastic netting shall be provided across the top and on the ends of each crosslay to secure the hose during travel.

Bleeder Valves
A .75" quarter-turn bleeder valve shall be provided for each outlet and inlet that is 1.50" or larger unless otherwise stated.

The valves shall be located behind the pump panel with a swing handle control extended to the outside of the side pump panel. The handles shall be chrome plated with a visual indication of the valve position. The swing handle shall provide an ergonomic position for opening the valve without twisting the wrist and providing excellent leverage. Water that is discharged by the valves shall be routed below the chassis frame rails.

Water Tank
The tank shall be constructed of polypropylene plastic, by United Plastic Fabricating, and it shall have a water capacity of 500 gallons. The tank joints and seams shall be nitrogen-welded, inside and out.

The tank shall be baffled in accordance with the current NFPA 1901 requirements. The tank baffles shall have vent openings at both the top and bottom, to permit movement of air and water between compartments.

Longitudinal partitions shall be constructed of .38" polypropylene plastic and they shall extend from the bottom of the tank through the top cover, to allow for positive welding. Transverse partitions shall extend from 4.00" off the bottom of the tank to the underside of the top cover.

All partitions shall interlock and shall be welded to the tank bottom and sides.

The tank top shall be constructed of .50" polypropylene and shall be welded to the tank sides and the longitudinal partitions. The tank top shall be supported sufficiently to keep it rigid during fast filling conditions.

The tank construction shall include 2.00" polypropylene dowels spaced no more than 30.00" apart and welded to the transverse partitions. Two (2) of the dowels shall be drilled and tapped (.50" diameter, 13.00" deep) to accommodate lifting eyes.

A sump shall be provided at the bottom of the water tank. The sump shall include a drain plug and the outlet for the tank.

The tank shall be installed in a fabricated cradle assembly constructed of structural steel. A sufficient number of crossmembers shall be provided to properly support the bottom of tank.

The tank shall float in this cradle to avoid torsion stress caused by chassis frame or aerial torque box flexing. Rubber cushions shall be placed on all horizontal surfaces that the tank rests upon.

A secure means of tank retention shall be provided to prevent the tank from bouncing excessively when it is empty and the vehicle is moving. The tank mounting system shall have approved the tank manufacturer.

Overflow/Fill Tower
A fill tower to aid in filling the tank with water shall be provided. The fill tower shall be constructed of .50" polypropylene and measure 8.00" wide x 14.00" long. The fill tower shall be furnished with a .25" thick polypropylene screen and a hinged cover.

A 4.00" diameter pipe that is constructed of schedule 40 polypropylene shall be installed approximately halfway down the fill tower. The pipe shall extend through the water tank and dump to the rear of the rear axle. The pipe shall function as an overflow to discharge water to the ground once the tank is filled to capacity. The pipe shall also function as a vent to allow air to enter/escape during pumping, dumping, and filling operations.

Master Level Gauge for Water Tank
An electronic water level gauge shall be provided at the pump operator's panel, to indicate the water level using five (5) colored LED lights. This light display shall be a durable, ultra-bright, five (5) LED design that is viewable through 180 degrees, to indicate the following conditions:

- 100% (tank full) = green
- 75% = yellow
- 50% = yellow
- 25% = yellow
- Refill (tank empty) = red

Each light shall flash when the water tank level drops below the corresponding fill level, to provide indication for each one-eighth increment. To further alert the pump operator, the lights shall all flash sequentially when the water tank is empty.

The LED display shall be constructed of a solid plastic material with a chrome-plated die cast bezel, to reduce vibrations that can cause broken wires and can loosen electronic components. An encapsulated design shall provide complete protection from water and environmental elements. An industrial transducer shall be mounted on the outside of the tank.

The water level gauge shall be capable of field calibration, and shall sense head pressure of the fluid in the tank, to provide accurate readings of the tank level.

Compartmentation
The compartmentation shall be fabricated of 304L stainless steel with a tensile strength of 80,000 psi.

The side compartments shall be an integral assembly with the rear fenders.

Circular fender liners shall be provided, for prevention of rust pockets and ease of maintenance.

The compartment flooring shall be of the sweep out design, with the floor higher than the lower compartment doorframe. The compartment door openings shall be framed by flanging the edges in 1.75" and bending them out again by .75" to form an angle. Drip protection shall be provided above the door openings, using bright aluminum extrusion or formed bright aluminum treadplate.

The tops of the compartments shall be covered with bright aluminum treadplate and shall have edges that are rolled over to the front, rear and outward sides. The corners of the covers shall be TIG-welded. The covers shall be separate parts from the compartment tops.

A bright aluminum treadplate cover shall be provided on the front wall of each body side compartment. These covers shall be separate parts from the body front walls.

All screws and bolts that protrude into a compartment shall have acorn nuts covering their ends, to prevent injuries.

Typical equipment carried in the compartments will be: two (2) PPV fans, 2- long back boards, 3- additional SCBA’s, salvage covers, gas powered saws, nozzles, axes, pry bars, shovels, tubs, portable extinguishers, portable lights, power cords, rescue ropes and harnesses, and other misc. small hand tools.

Provisions for tool mounting shall be provided in a minimum of two compartments. These provisions may include sliding or swinging tools boards, or tool boards mounted on the sides of these compartments. The exact number and location will be determined.

All body compartments shall be vented to provide one way airflow out of the compartment that prevents water and dirt from gaining access to the compartment

Side Compartment Doors
Compartment doors shall be swinging doors, where practical, of double pan construction. “D” handle latches, and hold open devises provided where needed. Each compartment door shall be wired to a door open indicator light in the cab. Each compartment shall also have compartment lighting activated when the door is opened.

Drip protection shall be provided above the doors.

Rear Compartment Door
The rollup door shall have a double-faced aluminum construction. The door exterior shall be a satin finish.

Between each slat shall be a PVC inner seal to prevent metal-to-metal contact and to prevent dirt and moisture from entering the apparatus.

A stainless steel non-locking lift bar shall be provided for opening the door. The lift bar shall be located at the bottom of the door and shall have latches on the outer extrusion of the door frame. A ledge shall be supplied over the latch to allow additional area to aid in closing the door.

The slats shall be the double-wall, box-frame extrusion type. The exterior surfaces shall be flat. The interior surfaces shall be concave to provide strength and to prevent loose equipment inside the apparatus from jamming the door.

Each door shall have a 4" counterbalance to make lifting the door easier.

A heavy-duty magnetic switch shall be used to activate the Open Compartment Door warning lights.
Driver

Body Support System
Because of the severe loading requirements of this aerial apparatus, a method of compartment body support that is suitable for the intended load shall be provided.

The backbone of the support system shall be the chassis frame rails, which are the strongest components of the chassis and which shall be designed for sustaining maximum loads.

A support system that incorporates a floating substructure with Neoprene elastomer isolators shall be used. The isolators shall allow the body to remain rigid while the chassis goes through its natural flexing. The isolators shall have a broad range of proven viability in vehicular applications, shall be of a fail-safe design and shall allow for all necessary movement in three transitional and rotational modes.

The compartmentation in front of the rear axle shall include 3.00" steel support assemblies that are bolted to the chassis frame rails. A steel framework shall be mounted to the body above these support assemblies. The framework shall be connected to the support assemblies with isolators. The framework shall be coated, to isolate dissimilar metals. There shall be one support assembly mounted to each chassis frame rail.

The compartmentation behind the rear axle shall include 3.00" steel support assemblies that are bolted to the chassis frame rails and extend underneath, to the outside edge of the body. The support assembly shall be coated, to isolate dissimilar metals. There shall be one support assembly mounted to each chassis frame rail.

The result of the design shall be a 500-pound equipment rating for each lower compartment of the body.

A design with body compartments that hang unsupported on the chassis shall not be acceptable.

Testing of Body Design
The body design shall have been fully tested. Proven engineering and test techniques, such as finite element analysis, model analysis, stress coating and strain gauging shall have been performed, with special attention given to fatigue life and structural integrity of the compartment body and substructure.

Louvers
Louvers shall be stamped into compartment walls to provide the proper airflow inside the body compartments and to prevent water from dripping into the compartment. Where these louvers are provided, they shall be formed into the metal and not added to the compartment as a separate plate.

Special Body Modifications
The following body modifications that are required for the stabilizer penetration shall be provided:

The front and rear (if applicable) compartments above the stabilizers shall be decreased in height by 4.00". The door opening shall also move up 4.00", but the clear door opening dimensions shall remain the same. The outrigger frame opening as well as the stabilizer pan shall be increased in height by 6.00".

Compartment Forward Of Pump Panel
A compartment shall be provided on each side of the apparatus, forward of the front body, utilizing the available depth full width of the cab to the boom support.

Each compartment shall be approximately 8.00" wide x 22.75" deep. The height of each compartment shall be the same as the cab (raised roof).

The compartment shall be made of aluminum tread plate. A single pan door, fabricated from bright aluminum tread plate, shall be provided for each compartment. Two (2) D ring latches shall be provided on each door.

Driver Side Compartmentation
A vertically hinged, single pan, polished stainless steel door compartment in the area above the front stabilizer shall be provided. The interior dimensions of this compartment shall be 18.00" wide x 22.50" high x 24.25" deep.

A compartment in the area ahead of the rear wheels shall be provided. The interior dimensions of this compartment shall be approximately, 42" wide x 55" high x 24.25" deep.

A compartment in the upper area over the forward tandem axle wheel shall be provided. The interior dimensions of this compartment shall be approximately 72" wide x 26.50" high x 24.25" deep.

A compartment in the upper area over the rear tandem axle wheel shall be provided. The interior dimensions of this compartment shall be approximately, 39" wide x 26" high x 21" deep.

A full-height compartment in the area behind the rear wheels shall be provided. The interior dimensions of this compartment shall be approximately, 44" wide x 57" high x 21" deep. A full depth roll out tray shall be provided on the floor of this compartment.

The body compartments shall be fully open from compartment ceiling to compartment floor and shall be designed so that no permanent dividers are required. Compartment depth shall be measured with the doors closed. Closing body compartment doors shall not require releasing, unlocking, or unlatching any mechanism.

Passenger Side Compartmentation
A vertically hinged, single pan, polished stainless steel door compartment in the area above the front stabilizer shall be provided. The interior dimensions of this compartment shall be approximately, 18" wide x 23" high x 12" deep.

A full-height compartment in the area ahead of the rear wheels shall be provided. The interior dimensions of this compartment shall be approximately, 42" wide x 55" high x 24" deep in the lower 30” of the compartment and 12" deep in the remaining upper portion. A full depth roll out tray shall be provided on the floor of this compartment.

A compartment in the upper area over the forward tandem axle wheel shall be provided. The interior dimensions of this compartment shall be approximately, 72" wide x 27" high x 12"

deep. A full depth, roll out/ tip down tray shall be provided on the floor of this compartment.

A compartment in the upper area over the tandem axle rear wheel shall be provided. The interior dimensions of this compartment shall be approximately, 39" wide x 26" high x 12" deep.

A full-height compartment in the area behind the rear wheels shall be provided. The interior dimensions of this compartment shall be approximately, 44" wide x 57" high x 21" deep in the lower 30" of the compartment and 12" deep in the remaining upper portion. A full depth roll out tray shall be provided on the floor of this compartment.

The body compartments shall be fully open from compartment ceiling to compartment floor and shall be designed so that no permanent dividers are required. Compartment depth shall be measured with the doors closed. Closing body compartment doors shall not require releasing, unlocking, or unlatching any mechanism.

Compartment Shelving
An adjustable shelf shall be provided in the following compartment locations. They shall be constructed of 0.125" thick aluminum with four (4) 2.00" formed sides. They shall be secured to vertical tracks by threaded fasteners for convenient adjustment of its vertical position. The rated capacity of the shelf shall be 215 pounds.

-Driver side ahead of the rear wheel upper section.

-Driver side forward compartment over the tandem axle wheels upper section

-Driver side compartment behind the rear wheel upper section

-Passenger side full-height compartment ahead of the rear wheel upper section

-Passenger side compartment behind the rear wheel upper section.

-Passenger side compartment behind the rear wheel upper section

Slide out Trays
The four (4) slide-out trays shall be mounted to the compartment floor, where they shall be directly supported by steel supports.

The tray's rated capacity for its fully extended position shall be 500 pounds. The tray shall have four (4) sides, each 2.00" high.

The trays shall be equipped with ball bearing slides for ease of use and for years of dependable operation. A locking mechanism shall automatically lock the tray into its extended position and into its retracted position. The lock release mechanism shall be located at the front of the tray, and it shall be easy to operate with a gloved hand.

Compartment Shelf Mounting Tracks
There shall be four (4) vertical shelf tracks installed in the following compartments. Adjustable shelves shall be mounted to these tracks.

Driver side full height compartment in front of the rear wheels.

Driver side full height compartment behind the rear wheels.

Passenger side full height compartment in front of the rear wheels.

Passenger side front compartment above the rear wheels

Passenger side full height compartment behind the rear wheels.

Driver & Passenger Side Turntable Steps
Steps to access the turntable from both sides shall be provided just behind the compartmentation. The steps shall be a swing-down design, with the stepping area made of Morton Tread-Grip channel, or equivalent. The step height for the bottom step (the distance from the top surface of the step to the ground) shall not exceed 24.00" with the step in its extended position. No step height (the distance between the top surfaces of any two (2) adjacent steps) shall be greater than 14.00". The step well shall be lined with bright aluminum treadplate to act as scuff plates. The steps shall be connected to the *Do Not Move Truck* indicator. A handrail shall be provided on each side of the access steps.

Driver & Passenger Side SCBA Bottle Compartments
Storage compartments that are sized to accommodate 7.75” MSA air cylinders shall be provided in the fender panels. The floor of each compartment shall be lined with rubber and shall have a drain hole. Each compartment shall have a door with a chrome-plated latch. A dielectric barrier shall be provided between the fastener for each door hinge and the apparatus body. The following storage compartments shall be provided on the driver & passenger side of the apparatus:

- Two (2) single, round air cylinder compartments, each 7.75" in diameter and 26.00" deep with a stainless steel door, shall be located over the rear wheels.
- One (1) single, round air cylinder compartment that is 7.75" in diameter and 26.00" deep, with a stainless steel door, shall be located in front of the rear wheels.
- One (1) single, round air cylinder compartment that is 7.75" in diameter and 26.00" deep, with a stainless steel door, shall be located behind the rear wheels.

Scuff plate
A stainless steel scuff plate shall be provided around each air cylinder compartment opening. The scuff plates shall not be visible when the air cylinder compartment door is closed.

Rub rail
The bottom edges of the exposed body compartments shall be trimmed with a bright aluminum extruded rub rail. The rub rail shall be approximately 2" high with flanges turned outward for rigidity. The rub rail shall not be an integral part of the body construction, to allow for its replacement in the event of damage.

Body Fender Crowns
Polished stainless steel fender crowns shall be provided around the body rear wheel openings.

A rubber welting shall be provided between the body and the crown, to seal the seam and to restrict moisture from entering.

A dielectric barrier shall be provided between the fender crown fastener screws and the fender sheet metal, to prevent corrosion.

LDH Hose Bed
The hose bed shall be fabricated of .125" thick 5052-H32 aluminum with a tensile strength range of 31,000 to 38,000 psi. The sides of the hose bed shall not form any portion of the fender compartments. The upper and rear edges of the hose bed side panels shall have a double break for rigidity. The hose bed shall be located ahead of the ladder turntable.

There shall be one (1) hose chute to the rear of the hose bed, on the passenger side, to allow for payout/removal of the hose. The hose chute shall be enclosed with a full-height aluminum treadplate door and a spring-loaded hinge at the top of the door.

The hose bed flooring shall consist of removable aluminum grating with a top surface that is corrugated to aid in hose aeration. The grating slats shall be .50" wide x 4.50" long with spacing between the slats for hose ventilation.

The hose bed shall be sized for 600' of 5in Double Jacket Poly hose with a packing factor of 100%.

Hose Bed Cover
There shall be a vinyl hose bed cover with Velcro fastening strips along its front and sides provided. A snap fastener shall be installed in each corner of the cover to prevent the wind from lifting the cover during faster travel speeds. The cover shall be black in color. The cover shall have a rear flap with a chain weight and spring clip-and-hook hold downs.

Tow Eyes
Two (2) painted steel tow eyes shall be located at the rear of the apparatus and shall be mounted directly to the torque box. The inner and outer edges of the tow eyes shall be rounded.

Rear Bumper
A rear bumper that is 5.00" deep x 5.00" high shall be provided. The bumper shall be constructed of steel framework and covered with polished aluminum treadplate. The bumper shall be spaced away from the body by approximately 1.00" and it shall extend the full width of the body.

Pump Panel Handrails
There shall be one (1) vertical handrail mounted on the driver side front bulkhead and one (1) vertical handrail mounted on the passenger side front bulkhead. The handrails shall be 1.25" in diameter and constructed of anodized aluminum extrusion, with a ribbed design, to provide a positive gripping surface. Chrome-plated end stanchions shall support each handrail. Plastic gaskets shall be used between end stanchions and any painted surfaces. Drain holes shall be provided in the bottom of the handrails.

Additional Handrails
There shall be one (1) horizontal handrail on the cargo bed flange, on the driver side.

There shall be one (1) horizontal handrail on the cargo bed flange, on the passenger side.

Driver & Passenger Side Body Front Steps
There shall be two (2) bright finished folding steps provided on the front of the driver side body and two (2) folding steps on the front of the passenger side body for a total of four (4).

Long Item Storage
The ground ladders and pike poles shall be stored within the torque box, and they shall be removable from the rear of the vehicle. The ladders shall be stored in full length stainless steel slides, and the pike poles shall be stored in full length tubes. The ladders shall be arranged in such a manner that any one (1) ladder can be removed without having to move or remove any other ladder. The torque box shall be enclosed to prevent road dirt and debris from fouling or damaging the equipment within.

A stainless steel plate with a two (2)-bend flange and a stainless steel hinge shall be provided to secure the aerial ladder complement. The plate assembly shall be mounted to the bottom of the entrance of the torque box ladder storage area. When the plate is vertical, it shall secure the ladders and prevent them from migrating to the rear of the apparatus. When the plate is down and not securing the ladders, the roll-up door cannot close, which shall activate the Open Door indicator light within the cab. The roll-up door together with hinge friction shall secure the plate in place during driving operations.

Ground Ladders
The following ladders shall be provided and mounted in the torque box:

One (1) 24' aluminum two-section, extension

One (1) 28’ aluminum two-section extension

One (1) 35' aluminum two-section, extension

Two (2) 16' aluminum, roof ladders w/ folding hooks

One (1) 10' aluminum, folding attic ladder w/ a stainless steel trough provided for storing the ladder.

One (1) 14’ aluminum, two-section extension attic ladder

Pike Poles
The following pike poles shall be provided and mounted in the torque box:

Two (2) 6' fiberglass straight handle with a general purpose hook.

Two (2) 8' fiberglass straight handle with a general purpose hook.

Two (2) 12’ fiberglass straight handle a general purpose hook.

<u>Four-Section 100' Aerial Ladder</u>

Construction Standards
A telescoping, elevating, four-section heavy-duty aluminum ladder shall be provided.

The ladder shall be constructed to meet all requirements described in the current edition of NFPA 1901 standards. Some portions of this specification exceed minimum NFPA recommendations and shall be considered a minimum requirement to be met.

A safety factor of 2:1 is desired for environmental loading (wind plus .25" of ice build-up). This structural safety factor shall apply to all structural aerial components including turntable and torque box stabilizer components. Definition of the structural safety factor shall be as outlined in NFPA standards:

- DL = Dead load stress. Stress produced by the weight of the aerial device and all permanently attached components.
- RL = Rated capacity stress. Stress produced by the rated capacity load of the ladder.
- WL= Water load stress. Stress produced by nozzle reaction force and the weight of water in the water delivery system.
- FY = Material yield strength. The stress at which material exhibits permanent deformation.

2.5 x DL + 2.5 x RL + 2.5 x WL equal to/less than FY. The minimum NFPA specification is exceeded here by requiring a safety margin above 2:1 while flowing water.

2.0 x DL + 2.0 x RL + 2.0 x WL + 2.0 x ice loading equal to/less than FY. The stability factor or tip over safety margin shall be a minimum of 1.5 to 1 as defined by NFPA standards.

An independent engineering firm shall verify the aerial safety factor. Design verification shall include computer modeling and analysis and extensive strain gauge testing witnessed by an independent registered professional engineer. Verification shall include written certification from the independent engineering firm made available by the manufacturer upon request from the purchaser.

All welding of aerial components, including the aerial ladder sections, turntable, pedestal, and outriggers shall be performed by welders who are certified to American Welding Society (AWS) standards and shall be performed by personnel who are certified as qualified under AWS welding codes. The weldment assemblies of each production unit shall be tested visually and mechanically by an ASNT certified level II non-destructive test technician to comply with NFPA standards. Testing procedures shall conform to the AWS standards guide for non-destructive testing. Test methods may include dye penetrant, ultrasound, and magnetic particle where applicable.

Ladder Construction

The ladder shall be designed to provide continuous egress for firefighters and civilians from an elevated position to the ground. 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 ladder shall have the capability to support a minimum of 750 lbs. at the tip and 100 lb. equipment allowance in the unsupported configuration, based upon 360-degree rotation, up to full extension and from 8 degrees below horizontal to 76 degrees above horizontal. All side rails, rungs, handrails, uprights and K braces shall be made of structural 6061T6 alloy aluminum extrusions.

All material shall be tested and certified by the material supplier. All ladder sections shall be semi-automatically welded by shielded arc welding methods using 5356 aluminum alloy welding wire. Structural rivets or bolts shall not be utilized in the ladder weldment sections. Due to the unpredictable nature of fire ground operations, a minimum safety factor of 2.5:1 is desired without .25" of ice build-up.

The aerial ladder shall consist of four (4) welded, extruded aluminum telescopic ladder sections. Each ladder section shall consist of two (2) extruded aluminum side rails and a combination of aluminum rungs, tubular diagonals, verticals and two (2) full-length handrails. The rungs on all sections shall be K braced for maximum lateral stability. This K bracing shall extend to the center of each rung to minimize ladder side deflection.

The ladder rungs shall be designed to eliminate the need to replace rubber-rung covers. The rungs shall be spaced on 14.00" centers and have an integral skid-resistant surface as outlined in NFPA standards. An oval shaped rung shall be utilized to provide a larger step surface at low angles and more comfortable grip at elevated positions. The minimum design load shall be 500 lbs. distributed over a 3.50" wide area as outlined in NFPA standards.

Each aerial ladder section shall have heat sensor labels that are preset to 300 degrees Fahrenheit with expiration year. The heat labels shall meet NFPA standards.

The aerial ladder shall exceed NFPA standards governing the minimum ladder section width and handrail height:

- Base section: 44.38" wide x 36.56" high
- Lower mid-section: 34.75" wide x 31.69" high
- Upper mid-section: 27.50" wide x 27.19" high
- Fly section: 21.38" wide x 23.63" high

Vertical Height
The ladder shall extend to a minimum height of 100' above the ground at full extension and elevation. The measurement of height shall be consistent with NFPA standards.

Horizontal Length
The rated horizontal reach shall be 92'. The measurement of horizontal reach shall be consistent with NFPA standards. The measurement shall be from the outermost rung at full extension to the centerline of turntable rotation.

Operation Range
The operating range of the ladder shall be 8 degrees below horizontal to 76 degrees above horizontal.

Turntable
The upper turntable assembly shall connect the aerial ladder to the turntable bearing. The steel structure shall have a mounting position for the aerial elevation cylinders, ladder connecting pins, and upper turntable operator's position.

An approximate 47" diameter turntable bearing with a 3.00" drive gear face shall be bolted to the top of the bearing mounting plate with .88" diameter Grade 8 plated bolts. The gear teeth

shall be stub tooth form. The rated overturning moment of the turntable bearing shall be a minimum of 441,000 ft. lbs.

The operator's turntable platform shall be constructed of 1.00" steel deck plate with non-skid aluminum oxide surface. The platform shall extend from the left side of the aerial control station to the right side ladder rail. The platform shall extend approximately 23.00" from the turntable control station base with a width of approximately 18.00". The rear of the platform shall extend approximately 26.00" back from the turntable and shall be approximately 38.00" wide at the rear. The platform shall be fastened by Grade 8 bolts.

The turntable handrails shall be a minimum of 42.00" high and shall not increase the overall travel height of the vehicle. The handrails shall be constructed from 1.25" diameter extruded 6063-T6 aluminum with a slip-resistant, knurled surface. The handrails shall be anodized to resist corrosion.

The turntable shall be lighted for nighttime operation with two (2) work lights activated by the aerial master switch.

Folding Steps
One (1) set of folding steps with detents shall be supplied to provide sufficient footing at the tip of the ladder.

Elevation System
Dual 6.00" diameter elevating cylinders shall be mounted on the underside of the base section of the ladder. Two (2) 2.50" diameter stainless steel pins shall fasten the cylinder to the turntable and also fasten to the ladder. The pins shall have 125,000 psi minimum yield strength and will be secured with .50" Grade 8 bolts with lock nuts. The bolts are to ensure that the pins do not walk out of the mounting brackets on the turntable and base section.

The elevating cylinders shall be mounted utilizing maintenance-free spherical bearings on both ends of the cylinders (no exception). The aerial base pivot bearings shall be maintenance-free type bearings with no external lubrication required (no exception). 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 operation envelope shall be 8 degrees below horizontal to 76 degrees above horizontal.

The elevation system shall be designed following NFPA standards. 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 reduced speed shall minimize the whipping action of the aerial at maximum elevation. This circuit shall only be for the raise function of the aerial. 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.

Extension/Retraction System
Both power extension and retraction shall be furnished and meet the requirements of NFPA standards. Extension shall be by way of two (2) extending cylinders mounted underneath the base section of the 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. No hoses shall be permitted between a holding valve and cylinder. The extension cylinders shall have a 4.00" internal diameter (bore) and a 119.00" stroke. The cylinders shall operate through a block and tackle cable arrangement to extend and retract the ladder. Maximum extension of the ladder is to be automatically limited by the stroke of the cylinders. All cylinder and sheave pivot pins shall be made of 125,000 psi yield stainless steel material. The cylinder and sheaved bearing shall be designed to not require external lubrication (maintenance free).

The normal operating cable safety factor shall be 5:1, and the stall safety factor shall be 2:1 based on the breaking strength of the cables. The minimum ratio of the diameter of wire rope used to the diameter of the sheave used shall be 1:12. The first section shall have four (4), two (2) extend and two (2) retract, 1/2" 7 x 19 galvanized cables. The second section shall have four (4), two (2) extend and two (2) retract, 5/16" 7 x 19 galvanized cables.

The ladder assembly shall consist of four (4) separate weldments that shall extend and retract within each other. Slide pads shall be utilized between each section to minimize friction. Four (4) T type interlocking load transfer stations shall enclose the slide pads. The transfer stations shall be located at the upper portion of the base and second ladder sections. Additional guide pads shall be located along the aerial section to guide the ladder during retraction and extension.

Rotation System
The aerial shall be supplied with a powered rotation system as outlined in NFPA standards. The hydraulic rotation motor shall provide continuous rotation under all rated conditions and be supplied with a brake to prevent unintentional rotation. The swing drive brake shall meet the side pull test as stated in NFPA standards. A high torque, hydraulic motor driven through a spring applied hydraulically released multiple disk brakes into a planetary gearbox shall accomplish rotation. The gearbox shall have a minimum continuous torque rating of 60,000 in. lbs. and a minimum intermittent rating of 130,000 in. lbs. 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.

Rotation Interlock
A permanently installed, prevention mechanism shall be provided as part of the rotation system to prevent the rotation of the aerial device to a side where the stabilizers have not been fully deployed or are "short-jacked" (no exception). The mechanism shall allow full and unrestricted use of the aerial in the 180-degree area on the side where the stabilizers have been fully deployed.

The system shall also have a manual override to comply with NFPA standards.

Load Capacities
The following load capacities shall be established with the stabilizers at full horizontal extension and placed in the down position to level the truck and to relieve the weight from the tires and axles. Capacities shall be based upon full extension and 360-degree rotation. A load chart, visible at the operator's station, shall be provided. The load chart shall show the recommended safe load at any condition of the aerial device's elevation and extension (no exception).

The aerial device shall have a rated capacity of 750 lbs. consistent with standards. The rated capacity shall include 750 lbs. in personnel allowance and 100 lbs. for equipment mounted at the tip of the ladder. The aerial device shall be rated in multiple configurations as outlined in NFPA standards.

A sign mounted at the control station of the aerial shall communicate the following ratings in the unsupported, fully extended configuration (in addition to 100 lbs. of equipment mounted at the tip) while maintaining a 2:1 safety margin with a 35 mph wind as defined in NFPA standards:

35 MPH Wind Conditions/Waterway Dry

Degrees of Elevation	-8 to 9	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 76
Egress/Fly	750	750	750	750	750	1000	1000
Upper Mid	-	-	-	-	250	500	750
Lower Mid	-	-	-	250	500	750	750
Base	-	-	250	500	750	750	750

35 MPH Wind Conditions/Waterway Charged

Degrees of Elevation	-8 to 9	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 76
Egress/Fly	500	500	500	500	750	1000	1000
Upper Mid	-	-	-	-	250	500	750
Lower Mid	-	-	-	250	250	500	750
Base	-	-	250	500	500	500	750

Reduced loads at the fly can be redistributed to the mid or base sections as needed.

Aerial Pedestal
The pedestal shall be a welded assembly made of .25" structural steel tube with 1.00" thick top plate. The 1.00" thick machined bearing plate shall have an approximately 47.00" outside diameter for connecting the rotation bearing to the pedestal.

Torque Box
A torsion box sub frame shall be installed between the two (2) sets of stabilizers. The torque box shall be constructed of .50" thick steel plate (50,000 psi yield), with steel tubing reinforcement on each side of the box in the turntable area. The torque box shall be approximately 41.00" wide x 29.00" high x 253.50" long.

The torque box sub frame assembly shall be capable of withstanding all torsion and horizontal loads when the unit is on its stabilizers. The torque box shall be bolted to the chassis frame rails using 20 SAE Grade 8, .75" diameter bolts with nuts.

Boom Support
A heavy-duty boom support shall be provided for support of the ladder in the travel position. On the base section of the ladder, a stainless steel scuff plate shall be provided where the ladder comes into contact with the boom support.

Boom Support Location
The boom support shall be located just to the rear of the cab.

Hydraulic System
All high pressure hoses shall have an abrasion resistant cover, and have a rating greater than or equal to the working pressure of the circuit in which they are installed. All hydraulic fittings will be plated to minimize corrosion. The fitting shall use an O ring face seal, where possible, to minimize hydraulic leaks. All pressure carrying hydraulic hoses shall have a 4:1 safety rating based on burst pressure.

An interlock shall be provided that prevents activation of the hydraulic pump until the transmission is placed in neutral and the parking brake is set as outlined in NFPA standards.

The hydraulic system shall be of the load sense design to minimize heat build up and provide smooth control of the aerial ladder. The system shall meet the performance requirement in NFPA standards, which requires adequate cooling after less than 2 1/2 hours of operations.

All hydraulic components that are non-sealing, where failure could result in the aerial movement, shall comply with NFPA standards and have burst strength of 4:1. Dynamic sealing components, where failure could cause aerial movement, shall have a margin of 2:1 on maximum operating pressure per NFPA standards. All hydraulic hoses, tubes, and connections shall have minimum burst strength of 3:1 per NFPA standards.

A hydraulic oil pressure gauge shall be supplied at the base control location per NFPA standards.

The aerial 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 into cylinders. To insure reliable performance of holding valves, no hoses or tubing shall be permitted between a holding valve and cylinder. The aerial shall incorporate the use of trombone steel tubes inside the stabilizer beams to eliminate hydraulic hose wear and leaks. Hydraulic power to the ladder shall be transferred from the pedestal by a hydraulic swivel.

Hydraulic Reservoir
The hydraulic system shall consist of an approximately 50-gallon reservoir mounted to the torque box and plumbed to the hydraulic pump. There shall be plumbing for a supply and return line and a tank drain on the reservoir.

The hydraulic pump suction line shall have a shut-off ball valve for pump servicing.

The hydraulic oil reservoir fill shall be labeled per NFPA standards. The hydraulic system shall use multiweight, SAE grade oil. ISO grade will be based on geographical location. The manufacturer shall certify that the oil meets or exceeds the hydraulic cleanliness rating of 18/15/13 per ISO 4406:1999 before delivery.

Hydraulic Filters
The system shall incorporate the following filters to provide dependable service:

- Separate magnet (not on strainer)
- Reservoir suction strainer: 125 mesh
- Pressure filter with by-pass indicator: 2/3/5 micron, Beta rating of 2/20/75 or better
- Return filter with by-pass indicator: 2/3/5 micron, Beta rating of 2/20/75 or better
- Desiccant breather filter: Water capacity 4 fluid oz, 5 micron rating

Hydraulic Cylinders
All hydraulic cylinders used on the aerial device shall be produced by a manufacturer that specializes in the production of hydraulic cylinders.

Each hydraulic cylinder shall have a structural warranty of not less than five (5) years, and a seal warranty of not less than two and one-half (2 1/2) years (no exception).

Power Takeoff/Hydraulic Pump
The apparatus shall be equipped with a power takeoff driven by the chassis transmission and actuated by an electric shift located inside the cab. The power takeoff, which drives the hydraulic pump, shall meet all the requirements for the aerial unit operations. The hydraulic pump shall be a variable displacement piston pump, for consistent and rapid response, and be capable of supplying hydraulic oil at a nominal 26 gpm flow at pressures up to 2800 psi. The system shall operate between 500-2800 psi with flow controls to protect hydraulic components and incorporate a relief valve set at 2950 psi to prevent over pressurization. The hydraulic pump shall be solely dedicated to aerial operations (no exception). An amber indicator light shall be installed on the cab instrument panel to notify the operator that the power takeoff is engaged.

An interlock shall be provided that allows operation of the aerial power takeoff shift only after the chassis spring brake has been set and the chassis transmission has either been placed in the neutral position or drive position after the driveline has been disengaged from the rear axle.

Emergency Pump
The hydraulic system shall be designed with an auxiliary power unit meeting the guidelines of NFPA standards. 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. The system shall be designed to provide a minimum of 30 minutes of hydraulic power to operate functions (no exception).

Stabilizers

There shall be two (2) sets of extendable stabilizers with a span of 12' provided. A yellow reflective stripe shall be provided on the vertical and horizontal beams of each stabilizer. The stabilizers shall be of a double-box design, with jack cylinders that have a 4.50" internal diameter (bore), a 3.00" diameter cylinder rod, and an approximate 29" stroke.

The jack cylinders shall be equipped with integral holding valves. If a hose is severed at any point in the hydraulic system, these valves shall hold each cylinder in the stowed position or the working position. The vertical jack cylinders rods shall be fully enclosed by a telescoping inner box to protect the cylinder rods against any damage that could occur.

The stabilizers shall be capable of a minimum of 18.00" of ground penetration, so the apparatus can be set up on uneven ground.

Extension of the horizontal beams shall be activated by an extension cylinder with a 2.25" internal diameter (bore), a 1.375" diameter cylinder rod, and a 27.25" stroke. The extension cylinders shall utilize a trombone style oil distribution system, reducing the number of hoses. The cylinders shall be totally enclosed within the extension beams and shall be equipped with internal adjustable decelerators.

The extension box beams shall be constructed of 100,000 psi steel, with cross section dimensions of approximately 7" wide x 9.00" high. The top and bottom plates shall be .75" thick and the side plates shall be .50" thick.

The stabilizer controls, located at the rear of the apparatus, shall be arranged to provide the operator with a full view of the stabilizer being positioned. The control functions for each stabilizer shall be operated independently, so the vehicle can be set up in a restricted area or on uneven terrain.

As a safety device, an electrically actuated diverter valve shall be provided in conjunction with the stabilizer controls. The diverter valve shall allow the hydraulic fluid to flow either to the stabilizer circuit or to the turntable and ladder circuit, but not to both simultaneously. To aid in leveling the unit, a bubble-type gauge shall be provided adjacent to the stabilizer controls.

A *Stabilizers Not Stowed* indicator shall be provided in the driver's compartment. It shall illuminate automatically whenever the stabilizers are not fully stowed to prevent damage to the apparatus if it is moved. The stabilizer system shall also be wired to the *Do Not Move* indicator light, which shall flash whenever the apparatus parking brake is not fully engaged and the stabilizers are not fully stowed.

Stabilizer Pads
There shall be a one-position floating stabilizer pad provided on each stabilizer. The pads shall require no operator adjustment during setup. The stabilizer pad shall have the ability to pivot 20 degrees from horizontal, in a 360-degree plane, for setup on uneven terrain.

Auxiliary Stabilizer Pads
A set of four (4) auxiliary pads shall be provided for additional load distribution on soft surfaces. The pads shall be 24.00" square composite material. The ground contact area for each stabilizer shall be such that a unit pressure not greater than 75 psi (500 kPa) shall be exerted over the ground contact area when the apparatus is loaded to its maximum in-service weight and the aerial device is carrying its rated capacity (in every position permitted by the manufacturer). One (1) auxiliary pad shall be stored adjacent to each stabilizer.

Stabilizer Beam Warning Lights
There shall be two flashing LED lights mounted on each stabilizer: one (1) facing forward and one (1) facing rearward. The lights shall be red with a red lens, 4.00" in diameter, and recessed in the horizontal beam of the stabilizer. These warning lights shall be activated with the aerial master switch.

Swivels

Hydraulic Swivel
The aerial ladder shall be equipped with a high pressure hydraulic swivel which shall connect the hydraulic lines from the hydraulic pump and reservoir, through the rotation point, to the aerial control bank. The hydraulic swivel shall allow for 360-degree continuous rotation of the aerial.

Electric Swivel
The ladder shall be equipped with an electric swivel to allow 360-degree rotation of the aerial while maintaining connections in all electrical circuits through the rotation point. A minimum of 28 collector rings that are capable of supplying 30-amp continuous service shall be provided. All collector rings shall be enclosed and protected against condensation and corrosion (no exception).

Raised Aerial Pedestal
The aerial pedestal shall be raised.

Waterway
There shall be a 5.00" diameter pipe that is connected to the water supply on one end and to a waterway rotation swivel with a 4.00" internal diameter at the rotation point of the turntable. The waterway rotation swivel shall allow 360-degree continuous rotation of the aerial device.

The waterway shall be routed through the rotation swivel up to the horizontal swivel and two slip-tube assemblies, separated by a flexible connection. The horizontal swivel and slip-tube assemblies shall allow the water to flow to the ladder pipe, while the aerial ladder is elevated from -8 degrees to +76 degrees. The heel pivot pin shall not be integral with the waterway

swivel at any point. The design of the waterway shall allow complete servicing of the waterway swivel without disturbance to the heel pivot pin.

The integral telescopic water system shall consist of the following sections:

- 5.00" diameter tube in the base section
- 4.50" diameter tube in the lower mid-section
- 4.00" diameter tube in the upper mid-section
- 3.50" diameter tube in the fly section

The rotational torque shall have sufficient power to rotate the ladder into a full 1,500 gpm water stream directed at 90 degrees to the side, while maintaining the 500 pound tip load. The aerial shall be capable of discharging up to 1,000 gpm at 100 psi parallel to the ladder and 90 degrees to each side of center, 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.

Waterway Seals

The waterway seals shall offer maximum stability and extrusion resistance on the waterway. The seals shall be capable of withstanding pressures up to 2,000 psi and temperatures in excess of 250 degrees Fahrenheit, and shall have resistance to all foam generating solutions. The seals shall be internally lubricated.

The waterway seals shall have automatic centering guides constructed of synthetic thermal polymer. To insure longer service life and smoother operation, the guides shall provide positive centering of the extendable sections within each other and the base section.

Aerial Waterway

A Class 1 Flowminder, with totalizer, shall be provided for the aerial waterway. The read out shall be located at the turntable.

Waterway Locking System

The aerial ladder waterway monitor shall be capable of being positioned at either the fly section or at the next lower section of the ladder.

The monitor's location shall be changeable by the use of a single handle, on the side of the ladder. The handle, attached to a cam bracket, shall simply be moved forward to lock the monitor at the fly section and moved back to lock it to the previous section. There shall be no pins to remove and reinstall.

The monitor shall be operational at all times, regardless of its position, without requiring the connection or disconnection of electrical lines.

Waterway Inlet

One (1) 5.00" NST inlet to the aerial waterway shall be provided at the rear of the apparatus. It shall be furnished with a 5.00" Storz adapter and a 5.00" Storz cap.

Pressure Gauge
The pressure gauge for the inlet shall be a fluid filled compound type, with a vacuum/pressure range of 30.00"/0 to 400 lbs. It shall have a minimum diameter of 3.50" and a white face with black lettering, and it shall be installed as close to the inlet as is practical.

Waterway Accessory

Auxiliary Outlet
A 2.50" auxiliary outlet with a 2.50" gate valve shall be supplied at the passenger side of the aerial waterway. An aluminum spacer flange shall be installed between the end of the waterway and the monitor, complete with a 2.50" threaded weld pipe, elbow, red painted gate valve, close nipple, and a chrome adapter. A second gate valve and adapter shall be installed at the aerial tip for the monitor nozzle. A counter weight may be required to avoid an overweight aerial tip.

Monitor
A TFT electronically controlled monitor shall be mounted on the aerial waterway. The monitor shall be capable of delivering flows of 1500 gpm minimum. The monitor will be controlled from the tip of the aerial ladder as well as the turn table control console. Provisions for a remote control automatic nozzle shall be provided.

Aerial Monitor Nozzles
A TFT 1250 PGM automatic master stream nozzle with electrically operated pattern control shall be provided. The nozzle design shall allow for straight stream through dense wide fog patterns.

The nozzle shall have a flow capability of 300 to 1250 gpm minimum. It shall have a user adjustable pressure rating of 80 psi to 120 psi.

A smooth bore stacked tip set shall be provided. The set shall consist of four (4) tips and a stream straightener. The tip sizes shall be 2 ¾”, 2 ½”, 2 ¼”, & 2”. The stream straightner can be integrated into the 2 ¾” tip.

Aerial Tip Lights
There shall be two (2) adjustable head 120 volt 500 watt halogen lights shall be provided at the tip of the aerial, one on each side of the aerial device when in the stowed position.

An individual master switch with appropriate identification labels shall be provided at the operator control station. An individual switch shall be provided on the light for on/off control.

Aerial Tracking Lights, 12-Volt DC
There shall be two (2) 12-volt DC spot/floodlights provided on the base section, one (1) on each side.

An individual master switch with appropriate identification labels shall be provided at the operator control station.

An individual switch shall be provided on the light for on/off control and spot/flood pattern selection.

Aerial Electrical System
The aerial electrical system shall be designed and manufactured in such a way that the power and signal protection and control compartments shall contain circuit protection devices and power control devices. The power and signal protection and control components shall be protected against corrosion, excessive heat, excessive vibration, physical damage, and water spray.

The aerial electrical system shall be designed and manufactured to allow the following:
- All of the serviceable components shall be readily accessible.
- Circuit protection devices shall be utilized to protect each circuit.
- All circuit protection devices shall be sized to prevent wire and component damage when subjected to extreme current overload.
- General protection circuit breakers shall be Type-I automatic reset (continuously resetting) or Type-II (manual resetting) and conform to SAE requirements. When required, automotive type fuses conforming to SAE requirements shall be utilized to protect electronic equipment.
- Power control relays and solenoids, when utilized, shall have a direct current (dc) rating of 125% of the maximum current for which the circuit is protected.

The aerial electrical system shall be designed and manufactured to allow the following:
- Toggle switches shall be utilized that are certified for the outside conditions that fire apparatus experience (no exception).
- All wiring shall be protected through conduit or loom.
- All wiring harnesses shall be properly supported to eliminate harness damage through rubbing.
- All connectors utilized in the system shall be of a waterproof design.
- An inductive proximity switch and illumination light shall be incorporated into the boom support.
- The aerial master and aerial PTO can be engaged after the water pump has been engaged without having to bring the RPM back to idle.
- Standard cabling to the tip of the aerial shall consist of one (1) 16/20 cable and one (1) 12/8 cable.

Driver Side Torque Box Power Distribution Panel
A fuse and relay panel, located behind the driver side stabilizer, shall include the following:

- NEMA 4x rated weatherproof enclosure
- Relays, fuses, and circuit breakers for aerial and stabilizer control power and interlocks

Turntable Lighting
The turntable shall be lighted for nighttime operation with a minimum of two (2) work lights activated by the aerial master switch. A foot switch shall be located at the turntable console to allow hydraulic flow to the aerial device. The foot switch shall be protected by a cover to prevent accidental activation. Activation of the foot switch is necessary for aerial device operation.

Turntable Console
The following switches and indicator lights shall be standard on the turntable console:

- High idle on/off switch
- Tip/Tracking light switch
- Indicator and alarm test switch
- Emergency hydraulic power switch
- *Stabilizers Not Fully Extended* amber indicator light
- Rung alignment green indicator light

The turntable control station shall be lighted for nighttime operation with one (1) work light activated by the aerial master switch. A fuse panel shall be located in the turntable console.

Turntable Override Controls
The aerial manual override controls shall be located in the turntable console.

Boom Support
An inductive proximity switch shall be provided on the boom support to detect if the aerial device is fully stowed within the boom support.

Stabilizer Indicator
A *Stabilizers Not Stowed* indicator light shall be provided in the driver's compartment. It shall illuminate automatically whenever the stabilizers are not fully stowed to prevent damage to the apparatus if it is moved. The stabilizer system shall also be wired to the *Do Not Move* indicator light, which shall flash whenever the apparatus parking brake is not fully engaged and the stabilizers are not fully stowed.

Cradle Interlock System
A cradle interlock system shall be provided to prevent against lifting the aerial from its nested position until after the operator has positioned all the stabilizers in a load-supporting configuration. A switch shall be installed at the cradle to prevent operation of the stabilizers after the aerial has been elevated from its nested position.

Stabilizer Alarm
An electronic warning device shall be provided at each stabilizer to warn personnel that the stabilizers are being deployed. The alarms shall activate whenever a stabilizer control switch is operated and shall produce a fast-pulsing 90 dB signal. The alarms shall cancel when the stabilizer control switch is released.

Stabilizer Scene Lights
A clear floodlight with a diameter of 4.00" shall be provided on each stabilizer to illuminate the surrounding area. The light shall be activated by the aerial master switch.

Turntable Control Station
There shall be a turntable control station located on the left hand side of the turntable so the operator shall be able to easily observe the ladder tip while operating the controls. The controls shall permit the operator to regulate the speed of the aerial functions within safe

limits (as determined by the manufacturer and NFPA standards). The controls shall be clearly marked and lighted for nighttime operation. A hinged aluminum cover shall be provided. The momentary foot switch located at the turntable control station shall activate the aerial function controls.

The following controls and indicator lights shall be clearly identified, illuminated, and conveniently located for ease of operation and viewing:

- Elevation, extension/retraction, and rotation controls
- High idle switch
- Rung alignment indicator light
- Tip/Tracking lights switch
- Hydraulic system pressure gauge
- Indicator/Alarm test switch
- EPU switch
- Operator's load chart
- Stabilizer Not Fully Extended indicator light and alarm
- Monitor controls
- Aerial waterway flow meter

There shall also be a minimum of two (2) 12-volt work lights installed on the turntable to illuminate the surrounding area for nighttime operation. The work lights shall be activated by the aerial master switch.

Stabilizer Control Station

There shall be two (2) easily accessible control stations, one (1) for driver side stabilizers and one (1) for passenger side stabilizers, located at the rear of the apparatus.

The following controls and indicator lights shall be clearly identified, illuminated, and conveniently located for ease of operation and viewing at each of the control stations except where otherwise noted:

- Left Rear Stabilizer Firm On Ground indicator light (driver side panel only)
- Left Rear Stabilizer Fully Extended Indicator light (driver side panel only)
- Left Rear Stabilizer In/Out switch (driver side panel only)
- Left Rear Stabilizer Up/Down switch (driver side panel only)
- Left Front Stabilizer Firm On Ground indicator light (driver side panel only)
- Left Front Stabilizer Fully Extended indicator light (driver side panel only)
- Left Front Stabilizer In/Out switch (driver side panel only)
- Left Front Stabilizer Up/Down switch (driver side panel only)
- Right Rear Stabilizer Firm On Ground indicator light (passenger side panel only)
- Right Rear Stabilizer Fully Extended indicator light (passenger side panel only)
- Right Rear Stabilizer In/Out switch (passenger side panel only)
- Right Rear Stabilizer Up/Down switch (passenger side panel only)
- Right Front Stabilizer Firm On Ground indicator light (passenger side panel only)
- Right Front Stabilizer Fully Extended indicator light (passenger side panel only)
- Right Front Stabilizer In/Out switch (passenger side panel only)
- Right Front Stabilizer Up/Down switch (passenger side panel only)
- Hydraulic emergency power switch

- High idle switch

Mansaver Bars
Mansaver bars shall be installed at the aerial turntable in place of the standard chains.

Lifting Eyes for Rope Rescue Attachment
Two (2) eyes shall be welded, one (1) to each ladder beam, at the ladder egress. A spreader bar shall be mounted between the eyes. A single lifting eye on the spreader bar shall distribute loads evenly across the ladder beams.

The spreader bar shall retained by two (2) locking pins, one (1) at each end outboard of each eye. Leveling shall be maintained by the bar rotating in the eyes.

Aerial Intercom
A two-way communication system between the aerial tip and the turntable operator's position shall be provided. A master control at the turntable operator's console shall be provided, with a push-to-talk button and a volume control.

A self-contained, hands-free speaker microphone shall be located at the aerial tip. No operator action shall be required to transmit or receive messages at this speaker microphone.

Ladder Fly Mounted Equipment

The following equipment shall be mounted on the fly section of the aerial ladder within reach of a firefighter working from the tip.

One (1) additional 12’ aluminum roof ladder w/ folding hooks

One (1) 6lb fiberglass handle pick head axe

Aerial Device Paint
All areas to be painted or have the swirl finish shall be sanded to remove any metal flakes and smooth any rough surfaces. All steel surfaces to be painted shall be shot blasted to remove metal impurities, aid paint adhesion, and inhibit rust and then prime painted with an epoxy primer. All aluminum surfaces to be painted shall be pre-treated with an aluminum etch solution to remove metal impurities and aid in paint adhesion and then prime painted with an epoxy primer.

All aerial device structural components above the rotation point that are not chrome-plated, stainless steel, or e-coated shall have the swirl finish. All aerial device structural components below the rotation point shall be painted high-gloss black. The tip of the ladder shall be painted a contrasting color for high visibility.

Turntable, console, lift cylinders, extension cylinders, and guards shall be finish painted white with durable, high quality paint (manufacturer's standard brand).

All buy out components such as a monitor, nozzle, or gauge shall be supplied as received from the vendor.

Truck Paint
The cab shall be two-tone, with its upper section painted White and its lower section painted Candy Apple Red. The entire apparatus body shall also be painted Candy Apple Red.

There shall be a standard paint breaks provided.

Paint Procedure
The exterior custom cab and body painting procedure shall consist of a six-step finishing process.

1. Manual Surface Preparation - All exposed metal surfaces on the custom cab and body shall be thoroughly cleaned and prepared for painting. Areas that are not painted include all chrome-plated surfaces, polished stainless steel, anodized aluminum, and bright aluminum treadplate. Each imperfection on the exterior metal surface shall be removed or filled and then sanded smooth for a smooth appearance. All seams shall be sealed before painting.
2. Chemical Cleaning and Treatment - The metal surfaces shall be properly cleaned, using a high-pressure and high-temperature acid etching system. Surfaces shall be chemically cleaned to remove all dirt, oil, grease, and metal oxides to ensure proper bonding of paint. A final rinse of ultra pure water shall be applied to all metal surfaces, excluding undercarriage components, as the final step after the cleaning and treatment process.
3. Primer/Surfacer Coats - A two-component urethane primer/surfacer shall be hand applied to the chemically treated metal surfaces, to provide a strong corrosion-protective base coat and to smooth out the surface.
4. Hand Sanding - The primer/surfacer coat shall be lightly sanded to an ultra smooth finish.
5. Sealer Primer Coat - A two-component sealer primer coat shall be applied over the sanded primer.
6. Topcoat Paint - Two (2) coats of an automotive grade, two-component acrylic urethane paint shall be applied.

All removable items such as brackets, compartment doors, door hinges, and trim shall be removed and painted separately to insure that there is paint behind all mounted items. Body assemblies that cannot be finish painted after assembly shall be finish painted prior to assembly.
Prior to reassembly and reinstallation of lights, handrails, door hardware and any miscellaneous items, an isolation tape, gasket, or dielectric material shall be used to prevent damage to the finish painted surfaces (no exception). A nylon washer shall be installed under each acorn nut or metal screw that is fastened directly to an exterior painted surface.

Paint - Environmental Impact
The contractor shall meet or exceed his or her current State regulations concerning paint operations. Pollution control shall include measures to protect the atmosphere, water, and soil.

The contractor shall, upon demand, provide a description of the methods used and shall present evidence that his or her manufacturing facility is in compliance with his or her State EPA rules and regulations.

Compartment Interior Finish
The interior of the body compartments shall be painted with gray spatter paint.

Painted Chassis Frame Assembly
The chassis frame assembly shall be painted black before the installation of the cab and body and before the installation of the engine and transmission assembly, air brake lines, electrical wire harnesses, and related parts. Components included with the chassis frame assembly that shall also be painted black are the frame rails, cross members, axles, suspension, steering gear, fuel tank, body substructure supports, and miscellaneous mounting brackets.

Undercoating
The underside of the apparatus shall be undercoated with asphalt, petroleum-based material that is dark in color. The undercoating material used on the apparatus shall be formulated to resist corrosion and deaden unwanted sounds and road noise. The coating texture shall appear firm, flexible, and resistant to abrasion. The minimum dry film thickness shall be in the range of 8.00-12.00 mils.

The material shall be applied to the following areas:
- Body and cab wheel well fender liners (on the back side only)
- Underside of body and cab sheet metal and structural components
- Underside and vertical sides of all sheet metal compartmentation (including support angles)
- Structural support members under running boards, rear platforms, battery boxes, walkways, etc.
- Inside surfaces of the pump heat enclosure (when installed)
- Suspension mounts
- Transmission cooler fittings
- Engine mounts
- Bottom of torque boxes (if applicable)

Cab Door Reflective Stripes
There shall be a ruby red 6.00" x 16.00" reflective stripe provided across the interior of each cab door. The stripes shall be located approximately 1.00" above the bottom of each door, on the stainless steel door panels. The stripes shall meet the current NFPA 1901 standards.

Front and Side Triple Reflective Stripe
There shall be a 1.00" white reflective stripe, a 6.00" white reflective stripe, and a 1.00" white reflective stripe provided across the front of the apparatus and along the sides of the cab and body. There shall be a 1.00" gap between each pair of adjacent stripes. Also, a 4.00" white reflective stripe shall be provided at the rear of the apparatus.

The reflective band provided on the cab face shall be located below the stainless steel trim band and the front bumper.

Reflective Chevron Striping
A series of ruby red and yellow 4.00" wide reflective stripes, shaped in an inverted V pattern, shall be applied to the rear bumper.

Reflective Striping on Aerial Stabilizers
A 4.00" wide red and yellow candy-striped reflective band shall be provided on each side of the aerial stabilizers.

Cab Trim Band
A 10.00" wide band of 22 gauge pattern finish stainless steel shall be installed across the cab face, centered in line with the headlights.

Chrome Molding on Cab Sides
Chrome molding shall be provided on each side of the cab.

Gold Leaf Lettering
28ea 3” gold leaf letters to spell out the words “Rapid City” & “Truck”, and 44ea 2” gold leaf letters to spell out the words “Fire & Emergency Services”, shall be provide. The letters shall be shadowed in black to match existing apparatus lettering. The “Rapid City Fire & Emergency Services” shall be installed on the rear cab door. “Truck” will be installed on the front cab door high enough to leave room for the department door decal.

Lettering Panels
A separate panel shall be provided on each side of the base ladder/boom section. The panel shall be painted high gloss black, lettered with white reflective lettering “Rapid City Fire Department”

Torque Wrench
There shall be one (1) torque wrench provided. The wrench shall have a 4:1 multiplier and all extensions, sockets, and adapters that are required for the apparatus.

Nuts and Bolts
There shall be one (1) bag of chrome-plated, stainless steel-plated, or cadmium-plated screws, nuts, bolts and washers provided, like those used in the construction of the apparatus.

Emergency Triangles
There shall be one (1) set of reflective emergency triangles provided

Pre-Delivery Inspection Trip
Expenses for four (4) people to conduct a pre-delivery inspection shall be included. This inspection will be done at the builder’s factory when the apparatus is completed and just prior to the delivery of the apparatus.

Loose Equipment
The following equipment shall be provided and shipped loose:
800 ft 5” rubber coated large diameter fire hose w/ Storz couplings
600 ft 1 ¾” NH synthetic Double Jacket attack hose w/ 1 ½” couplings. 300’ yellow, 300’ tan
300 ft 2 ½” NH double jacket fire hose, white.

Specifications for a 100’ Heavy Duty Aluminum Ladder for the Rapid City Department of Fire & Emergency Services	Bidder Complies	
	Yes	No

One (1) 6 lb flathead axe fiberglass handles, w/ truck mount
Two (2) 6 lb pick head axe fiberglass handles, w/ truck mounts, one to be mounted on the ladder fly section.
One (1) 20 A, 80 BC, portable dry chemical extinguisher w/ truck bracket
One (1) 2 ½ gal pressurized water extinguisher w/ truck bracket
One (1) 10# CO^2 extinguisher w/ truck bracket
Four (4) medium spanner wrenches w/ 2 truck brackets
Two (2) hydrant wrenches, one of these can be included with one of the wrench brackets above, the other loose
One (1) 2 ½” double female NH w/ bracket
One (1) 2 ½” double male NH
One (1) 2 ½” hydrant valve
Four (4) LDH Storz spanner wrenches w/ 2 brackets for 2 ea
One (1) 5” Storz x 2 ½” male adapter w/ 5” Storz mounting plate
One (1) 5” Storz x 4 ½” female NH adapter loose
One (1) 2 ½” gated wye NH w/ bracket
One (1) 36” “Hooligan” or “Super Quic” bar w/ bracket
One (1) 20” gas powered 21” positive pressure vent fan
125’ 3/8” utility rope w/ bag
Two (2) approximately 12’ x 18’ canvas salvage covers
One (1) approximate 30” wide rug runner 20’ long
One (1) gas powered Stihl MS 460R rescue saw w/ 20”bar and depth limiter
Two (2) 2 ½” smooth bore nozzles w/ 1” tips w/ mounting brackets
Two (2) 2 ½” combination fog nozzles w/ mounting brackets
One (1) hose clamp w/ bracket
Two (2) 3’ fiberglass D handle pike poles