SPECIFICATIONS FOR A 105' HEAVY DUTY AERIAL LADDER
Performance Specification

INTENT OF SPECIFICATIONS

It shall be the intent of these specifications to cover the furnishing and delivery of a complete fire apparatus. These detailed specifications shall cover the 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 with which the successful bidder shall conform. Minor details of construction and materials, which are not otherwise specified, are left to the discretion of the contractor. The manufacturer shall provide loose equipment only when specified by the customer. Otherwise, in accordance with NFPA 1901, 2016 edition, the proposal shall specify whether the fire department or apparatus dealership shall provide required loose equipment.

Bids shall only be considered 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. Further, bidder shall maintain dedicated service facilities for the repair and service of products. Evidence of such a facility shall be included in bidder 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.

Each bid shall be accompanied by a detailed set of "Contractor's Specifications" consisting of a detailed description of the apparatus and equipment proposed, and to which the apparatus furnished under 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 that 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 "Performance Tests and 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 D1.1-2004 recommendations for structural steel welding. All aluminum welding shall follow American Welding Society and ANSI D1.2-2003 requirements for structural welding of aluminum. All sheet metal welding shall follow American Welding Society B2.1-2000 requirements for structural welding of sheet metal. Flux core arc welding to use alloy rods, type 7000, American Welding Society standards A5.20-E70T1. Employees classified as welders are tested and certified to meet American Welding Society codes upon hire and every

three (3) years thereafter. The manufacturer shall be required to have an American Welding Society certified welding inspector in plant during working hours to monitor weld quality.

DELIVERY

Apparatus, to insure proper break in of all components while still under warranty, **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.

INFORMATION REQUIRED

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

SAFETY VIDEO

Documentation provided at the time of delivery shall also include an apparatus safety video, in DVD format. This video shall address key safety considerations for personnel to follow when they are driving, operating, and maintaining the apparatus. Safety procedures for the following shall be included: vehicle pre-trip inspections, chassis operation, pump operation, aerial operation, and maintenance.

PERFORMANCE TESTS AND REQUIREMENTS

A road test shall be conducted with the apparatus fully loaded and a continuous run of ten (10) miles or more shall be made under all driving conditions, during which time the apparatus shall show no loss of power or overheating. The transmission drive shaft or shafts, and rear axles shall run quietly and be free from abnormal vibration or noise throughout the operating range of the apparatus. Vehicle shall adhere to the following parameters:

A) The apparatus, when fully equipped and loaded, shall have not less than 25% nor more than 50% of the weight on the front axle, and not less than 50% nor more than 75% on the rear axle.

B) The apparatus shall be capable of accelerating to 35 mph from a standing start within 25 seconds on a level concrete highway without exceeding the maximum governed rpm of the engine.

C) The service brakes shall be capable of stopping a fully loaded vehicle in 35 feet at 20 mph on a level concrete highway. The air brake system shall conform to Federal Motor Vehicle Safety Standards (FMVSS) 121.

D) The apparatus, fully loaded, shall be capable of obtaining a speed of 50 mph on a level concrete highway with the engine not exceeding its governed rpm (full load).

FAILURE TO MEET TEST

In the event the apparatus fails to meet the test requirements of these specifications on the first trial, second trials may be made at the option of the bidder within 30 days of the date of the first trial. Such trials shall be final and conclusive and failure to comply with these requirements shall be cause for rejection. Failure to comply with changes to conform to any clause of the specifications, within 30 days after notice is given to the bidder of such changes, shall also be cause for rejection of the apparatus. Permission to keep or store the apparatus in any building owned or occupied by the purchaser or its use by the purchaser during the above-specified period with the permission of the bidder shall not constitute acceptance.

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 also indicate in the "yes/no" column if their bid complies **on each item** (PARAGRAPH) specified. Exceptions shall be allowed if they are equal to or superior to that specified and provided, they are listed and fully explained on a separate page.

Proposals taking total exception to specifications shall not be acceptable.

Also, bidders shall submit a detailed proposal. A letter only, even though written on a company letterhead, shall not be sufficient. Bid proposals shall be submitted in the same sequence as specifications for ease of evaluation, comparison and checking of compliance. **An exception to these 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.

GENERAL CONSTRUCTION

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:

Each Occurrence	$1,000,000
Products/Completed Operations Aggregate	$1,000,000

Personal and Advertising Injury $1,000,000
General Aggregate $5,000,000

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 for bodily injury and property damage subject to the terms and conditions of the policy. The policy shall include owner as an additional insured when required by written contract.

COMMERCIAL AUTOMOBILE LIABILITY INSURANCE

The successful bidder shall, during the performance of the contract keep in force at least the following minimum limits of commercial automobile liability insurance:

Each Accident Combined Single Limit: $1,000,000

Coverage shall be written on a Commercial Automobile liability form.

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 Employer's Liability policies. Owner shall be included as an additional insured on the General Liability policy when required by written contract.

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(s) rated A- or better by A.M. Bests.

Bidder agrees to furnish owner with a current Certificate of Insurance with the coverages listed above along with its bid. The certificate shall show the purchaser as certificate holder. The Certificate of Insurance shall provide the following cancellation clause: Should any of the above described polices be cancelled before the expiration date thereof, the issuing insurer shall endeavor to mail 30 days written notice to the certificate holder named to the left, but failure to do so shall impose no obligation or liability of any kind upon the insurer, its agents or representatives.

ISO COMPLIANCE

The manufacturer shall operate a Quality Management System under the requirements of ISO 9001. These standards sponsored by the "International Organization for Standardization

(ISO)" specify the quality systems that shall be established by the manufacturer for design, manufacture, installation and service. A copy of the certificate of compliance shall be included with the bid.

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, including 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 (i.e. body, chassis and aerial). The bidder shall provide evidence that they comply with this requirement.

NFPA 2016 STANDARDS

This unit shall comply with the NFPA standards effective January 1, 2016, except for fire department specifications that differ from NFPA specifications. These exceptions shall be set forth in the Statement of Exceptions.

Certification of slip resistance of all stepping, standing and walking surfaces shall be supplied with delivery of the apparatus.

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 have programs in place for training, proficiency testing and performance for any staff involved with certifications.

An official of the company shall designate, in writing, who is qualified to witness and certify test results.

NFPA COMPLIANCY

Apparatus proposed by the bidder shall meet the applicable requirements of the National Fire Protection Association (NFPA) as stated in current edition at time of contract execution. Fire department's specifications that differ from NFPA specifications shall be indicated in the proposal as "non-NFPA".

INSPECTION CERTIFICATE

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

The 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 crack 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 performed on aluminum surfaces (non-magnetic). A liquid penetrant test shall be performed on any suspected defective area. This test shall conform to ASTM E165 and be performed 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.

PUMP TEST

The pump shall be tested, approved, and certified by Underwriter's Laboratory at the manufacturer's expense. The test results and the pump manufacturer's certification of 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.

TOTAL VEHICLE ASSESSMENT CERTIFICATION

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

GENERATOR TEST

If the unit has a generator, the generator shall be tested, approved, and certified by Underwriters Laboratories at the manufacturer's expense. The test results shall be provided to the Fire Department at the time of delivery.

BREATHING AIR TEST

If the unit has breathing air, Underwriters Laboratories shall draw an air sample from the air system and certify that the air quality meets the requirements of NFPA 1989, *Standard on Breathing Air Quality for Fire and Emergency Services Respiratory Protection.*

INSPECTION TRIPS

Two (2) inspection trips shall be provided for three (3) representatives of the Fire Department to the manufacturer's facility. The trips shall take place at a time designated by mutual agreement between the customer and the manufacturer. All costs for travel, lodging, and

meals shall be the responsibility of the bidder.

CUSTOMER SERVICE WEBSITE

A Customer Service website shall be provided which offers the dealer and customer access to comprehensive information pertaining to the maintenance and service of the apparatus. The website shall consist of the following features:

- A USB jump drive with comprehensive information should be provided as well.

- Ability for the dealer to access to truck detail information on the major components of the vehicle, warranty information, available vehicle photographs, vehicle drawings, sales options, applicable vehicle software downloads, etc.

- Parts look-up capability for items sourced by the fire apparatus manufacturer

- Ability to allow the dealer to submit electronically a parts order and warranty claims

- Ability to information to allow the dealer to maintain communication with the customer on the status of orders, claims, and phone contacts

- Access to all currently published Operation and Maintenance Manuals, Service Publications, Service Bulletins and Work Instructions

- Ability to allow the dealer access to applicable on-line diagnostic software

- Access to upcoming training classes offered by the fire apparatus manufacturer

- Access to interactive electronic learning modules, covering the operation of major vehicle components

- Access to training manuals used in the fire apparatus manufacturers training classes

-Access to Customer Service Articles, Corporate News, Quarterly Newsletters, and Key Contacts within the Customer Service Department

APPROVAL DRAWING

A drawing of the proposed apparatus shall be provided for approval before construction begins. 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, major components, etc.

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.

WARRANTY

Each piece of new fire or rescue apparatus shall be warranted to be free from defects in materials 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.

WARRANTY 1 YEAR CUSTOM CHASSIS

Each piece of new fire or rescue apparatus shall be warranted to be free from defects in materials 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.

CROSSMEMBERS WARRANTY

A one (1) year parts and labor warranty shall be provided on all chassis frame crossmembers.

BID BOND

A bid bond shall not be included. If requested, the following shall apply:

All bidders shall provide a bid bond as security for the bid in the form of a 5% bid bond to accompany their bid. This bid bond shall be issued by a Surety Company who is listed on the U.S. Treasury Departments 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/principal shall give a bond or bonds as may be specified in the bidding or contract documents, with good and sufficient surety for the faithful performance of the contract, including the Basic One (1) Year Limited Warranty, and for the prompt payment of labor and material furnished in the prosecution of the contract.

Notwithstanding any document or assertion to the contrary, any surety bond related to the sale of a vehicle shall apply only to the Basic One (1) Year Limited Warranty for such vehicle. Any surety bond related to the sale of a vehicle shall not apply to any other warranties that are included within this bid (OEM or otherwise) or to the warranties (if any) of any third party of any part, component, attachment or accessory that is incorporated into or attached to the vehicle. In the event of any contradiction or inconsistency between this provision and any other document or assertion, this provision shall prevail.

PERFORMANCE BOND

The successful bidder shall furnish a 100% performance bond within thirty (30) days after award of the contract.

The performance bond shall be furnished by the company who shall build the apparatus being proposed. A performance bond issued by a sales representative, or agent, of the manufacturer shall not be acceptable. Any exception to this requirement shall not be tolerated.

CHASSIS

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, capacity for the intended load to be sustained, and the type of service required. The chassis shall be the manufacturer's heavy-duty line tilt cab.

SEATING CAPACITY

The seating capacity in the cab shall be six (6).

WHEELBASE

The wheelbase of the vehicle shall be no greater than 245.50".

GVW RATING

The gross vehicle weight rating shall be a minimum of 70,800#.

FRAME

The chassis frame shall be built with two (2) steel channels bolted to five (5) cross members or more, depending on other options of the apparatus. The side rails shall have a 13.38" tall web over the front and mid sections of the chassis, with a continuous smooth taper to 10.75" over the rear axle. Each rail shall have a section modulus of 25.992 cubic inches 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 cubic inches with an rbm of 2,275,200 inch-pounds over the rear axle. The frame rails shall be constructed of 120,000 psi yield strength heat-treated .38" thick steel, with 3.50" wide flanges.

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.

FRAME REINFORCEMENT

In addition, a mainframe inverted "L" liner shall be provided. It shall be heat-treated steel measuring 12.00" x 3.00" x .25". Each liner shall have a section modulus of 7.795 cu. in., yield strength of 110,000 psi, and rbm of 857,462 inch-pounds. Total rbm at wheelbase center shall be 3,976,502 pounds per rail.

The frame liner shall be mounted inside of the chassis frame rail and extend the full length of the frame.

FRONT NON DRIVE AXLE

The front axle shall be of the independent suspension design with a ground rating of 22,800 pounds.

Upper and lower control arms shall be used on each side of the axle. Upper control arm castings shall be made of 100,000-psi yield strength 8630 steel 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 out of 80,000-psi yield strength steel.

Each control arm shall be mounted to the center section using elastomer bushings. These rubber bushings shall rotate on low friction plain bearings and be lubricated for life. Each bushing shall also have a flange end to absorb longitudinal impact loads, 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 wheel end geometry provides positive camber when deflected below rated load and negative camber above rated load.

Camber at load shall be zero degrees for optimum tire life.

The kingpin bearing shall be of low friction design and be 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 must have little to no bump steer when the chassis encounters a hole or obstacle.

The steering linkage shall provide proper steering angles for the inside and outside wheel, based on the vehicle wheelbase.

The axle shall have a third party certified turning angle of 45 degrees. Front discharge, front suction, or aluminum wheels shall not infringe on this cramp angle.

WARRANTY, FRONT NON-DRIVE AXLE
The non-drive axle system shall have a **three (3) year** parts and labor warranty. This warranty applies to the suspension components only. All steering linkages, pumps etc., are covered under our standard chassis warranty (exception steer gears - see Steering for warranty).

OIL SEALS
Oil seals with viewing window shall be provided on the front axle.

SHOCK ABSORBERS
Heavy-duty telescoping shock absorbers (KONI) shall be provided on the front suspension.

REAR AXLE
The rear axle shall be a Meritor™, Model RT-46-160, tandem axle assembly with a capacity of 48,000 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 AXLE WARRANTY
The Meritor™ **two (2) year, unlimited mileage, parts and labor** warranty shall be provided with this axle.

TOP SPEED OF VEHICLE
NFPA 1901, 2016 edition requires limits on the top speed of vehicles. NFPA 4.15.2 requires that the maximum top speed of fire apparatus with a GVWR over 26,000 lbs shall not exceed either 68mph or the manufacturer's maximum fire service speed rating for the tires installed on the apparatus, whichever is lower. NFPA 4.15.3 requires that if the combined water tank and foam agent tank on the fire apparatus exceed 1250 gallons or the GVWR of the vehicle is over 50,000 lbs, the maximum top speed of the apparatus shall not exceed either 60 mph or the manufacturer's maximum fire service speed rating for the tires installed on the apparatus, whichever is lower. It is the intention of the standard to improve safety by limiting the speed of all apparatus to 68 mph, and tankers or heavy apparatus to 60 mph. By requesting an exception to this requirement, the purchasing authority is consciously choosing to operate their apparatus at speeds above the limits designated as safe speeds by the NFPA Technical Committee on Fire Department Apparatus.

The top speed of the apparatus as manufactured exceeds the NFPA requirements. Per fire department specification of a top speed that exceeds NFPA requirements, the apparatus shall

be non-compliant to NFPA 2016 standards at time of contract execution.

A rear axle ratio shall be furnished to allow the vehicle to reach an approximate top speed of 67 to 70 MPH.

OIL SEALS
Oil seals shall be provided on the rear axle.

FRONT SUSPENSION
Front independent suspension shall be provided with a minimum ground rating of 22,800 pounds.

The independent suspension 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 torsion bar type spring. In addition, each front wheel end shall also have energy absorbing jounce bumpers to prevent bottoming of the suspension.

The suspension design shall be such that there is at least 10.00" of total wheel travel and a minimum of 3.75" before suspension bottoms.

The torsion bar anchor lock system allows for simple lean adjustments, without the use of shims. One can adjust for a lean within 15 minutes per side. Anchor adjustment design is such that it allows for ride height adjustment on each side.

The independent suspension shall be put through a durability test that has simulated a minimum of 140,000 miles of inner city driving.

REAR SUSPENSION
Rear suspension shall be a Hendrickson Model FMX 480, air ride with a ground rating of 48,000 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

ANTI-LOCK BRAKE SYSTEM

The vehicle shall be equipped with a Wabco 4S4M, anti-lock braking system. The ABS shall provide a four (4) channel anti-lock braking control on both the front and rear wheels (rear tandem wheels). A digitally controlled system that utilizes microprocessor technology shall control the anti-lock braking system. Each wheel shall be monitored by the system. When any particular wheel begins to lockup, a signal shall be sent to the control unit. This control unit then shall 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 thus helping to prevent the apparatus from skidding out of control.

ANTI-LOCK BRAKE SYSTEM WARRANTY

The Wabco ABS system shall come with a **three (3) year or 300,000 mile parts and labor** warranty provided by Meritor Wabco Vehicle Control Systems.

BRAKES

The service brake system shall be full air type.

The front brakes shall be drum brakes with ventilated rotor for improved stopping distance.

The drum brakes should be installed on front and rear.

The brake system shall be certified, third party inspected, for improved stopping distance.

The rear brakes shall be Meritor™ 16.50" x 7.00" cam operated with automatic slack adjusters.

ENGINE BRAKE

A Jacobs Engine Brake is to be installed with the controls located on the instrument panel within easy reach of the driver.

The driver shall be able to turn the engine brake system on/off and have a high, medium and low setting.

The engine brake shall be installed in such a manner that when the engine brake is slowing the vehicle the brake lights are activated.

The ABS system shall automatically disengage the auxiliary braking device, when required.

AIR COMPRESSOR, BRAKE SYSTEM

The air compressor shall be a Bendix BA-921 with 15.8 cubic feet per minute output at 1250 RPM.

BRAKE SYSTEM

The brake system shall include:

- Bendix Westinghouse dual brake treadle valve with vinyl covered foot surface

- Heated automatic moisture ejector on air dryer

- Total air system capacity of 6,653 cubic inches

- Two (2) air pressure gauges with a red warning light and an audible alarm, that activates when air pressure falls below 60 psi

- MGM spring set parking brake system

- Parking brake operated by a Bendix-Westinghouse PP-1 control valve

- A parking "brake on" indicator light on instrument panel

- Bendix-Westinghouse SR-1 valve, in conjunction with a double check valve system, shall be provided with an automatic spring brake application at 40 psi

- Wabco System Saver 1200 air dryer

BRAKE LINES

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

AIR INLET/OUTLET

One (1) air inlet/outlet shall be installed with the female coupling located on the driver side pump panel. This system shall tie into the "wet" tank of the brake system and include a check valve in the inlet line and an 85 psi pressure protection valve in the outlet line. The air outlet shall be controlled by a needle valve.

A mating male fitting shall be provided with the loose equipment.

The air inlet shall allow a shoreline air hose to be connected to the vehicle. This shall allow station air to be supplied to the brake system of the vehicle to insure constant air pressure.

AIR TANK FOR TOOLS

An additional air tank with 1454 cubic inch displacement shall be provided for the use of powering air tools. An air tool outlet with a metering valve, located at the driver's side pump panel, shall be provided.

The output flow of the engine air compressor varies with engine RPM. Full compressor output is only achieved at governed engine speed. Engine speed may be limited by generators, pumps and other PTO driven options.

ALL WHEEL LOCK-UP

An additional all wheel lock-up system shall be installed which applies air to the front brakes only. The standard spring brake control valve system shall also be used for the rear.

ENGINE

The chassis shall be powered by a Detroit Diesel electronically controlled engine as described below:

- Model: Series 60, 14.0L (855 cubic inches)

- Maximum Horsepower: 515 bhp at 1800 rpm

- Peak Torque: 1650 lb-ft at 1200 rpm

- Governed Speed: 2000 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 on the supply and return line (precharged with coolant inhibitor)

ENGINE WARRANTY
The engine shall come with a **five (5) year or 100,000 mile** warranty provided by the Detroit Diesel Corporation.

CONTROLS AND INDICATOR LIGHTS
The following amber indicator lights shall be located on the driver's side of the cab to denote engine information:
- Diesel Particulate Filter (DPF)
- High Exhaust Temperature (HET)
- Malfunction Indicator Lamp (MIL)

A switch to initiate the diesel particulate filter regeneration cycle shall be located on the driver's side instrument panel.

ENGINE INSTALLATION CERTIFICATION
The fire apparatus manufacturer shall provide a certification, along with a letter from the engine manufacturer stating they approve of the engine installation in the bidder's chassis. The certification shall be provided at the time of bid.

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

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

EXHAUST SYSTEM
The exhaust system shall be stainless steel 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 exhaust shall terminate horizontally ahead of the passenger side rear wheels. A tailpipe diffuser shall be provided to reduce the temperature of the exhaust as it exits. An insulation wrap shall be provided on the exhaust pipe between the turbo and DPF inlet 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.

EXHAUST MODIFICATION
The exhaust pipe shall be brought straight out from under the body. The exhaust pipe shall extend a maximum of 2.00" past the body side. The diameter of the pipe shall be 7.00".
Exhaust Removal System
Vehicle will be equipped with an Onboard (vehicle mounted) diesel infiltration system used to remove toxic gaseous matter and improve emission standards for the

environment. The unit will be expected to operate automatically as the vehicle starts up and continue while the vehicle in running. The exhaust removal system will not alter or void any portion of the manufactures engine or apparatus warranty.

CLUTCH FAN

A Horton fan clutch shall be provided. The fan clutch shall be automatic when the pump transmission is in "Road" and "Pump" position.

HIGH IDLE

A high idle switch shall be provided, inside the cab, on the instrument panel, that shall automatically maintain a preset engine rpm. A switch shall be installed, at the cab instrument panel, for activation/deactivation.

The high idle shall be operational only when the parking brake is on and the truck transmission is in neutral. A green indicator light shall be provided adjacent to the switch. The light shall illuminate when the above conditions are met. The light shall be labeled "OK to Engage High Idle".

COOLANT LINES

Silicone hoses shall be used for all engine/heater coolant lines installed by the chassis manufacturer.

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

RADIATOR

Radiator and the complete cooling system shall meet or exceed NFPA cooling system standards. 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 nine (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. Cooling air shall be drawn in by a heavy-duty fan, shrouded by recirculation shields that permit only fresh cool air through the radiator.

Radiator shall be of the serpentine design and bonded together by the patented "beta-weld" process for increased strength, longer road life and solder-bloom corrosion protection. 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. Radiator core shall be

compatible with commercial antifreeze solutions. Cooling system shall exhibit rapid warm-up without use of radiator shutters.

FUEL TANK
A 65-gallon fuel tank shall be provided and mounted at rear of chassis. The tank shall be constructed of 12-gauge, hot rolled steel. It shall be equipped with swash partitions and a vent.

A .75" drain plug shall be provided in a low point of the tank for drainage.

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

A .50" diameter vent shall be provided running from top of tank to just below fuel fill inlet.

The tank shall meet all FHWA 393.67 requirements including a fill capacity of 95% of tank volume.

All fuel lines shall be provided as recommended by the engine manufacturer.

AUXILIARY FUEL PUMP
An auxiliary electric fuel pump shall be added to the fuel line for priming the engine. A switch located on the cab instrument panel shall be provided to operate the pump.

FUEL SHUTOFF
A shutoff valve shall be installed in the fuel line, on both sides of the fuel filters.

FUEL COOLER
An air to fuel cooler shall be installed, in the engine fuel return line.

TRANSMISSION
An Allison Gen IV, model EVS 4000P, electronic, torque converting, automatic transmission shall be provided.

Two (2) PTO openings shall be located on left side and top of converter housing (positions 8 o'clock and 1 o'clock).

A transmission temperature gauge with red light and buzzer shall be installed on the cab instrument panel.

TRANSMISSION SHIFTER
A six (6)-speed push button shift module shall be mounted to right of driver on console. Shift position indicator shall be indirectly lit for after dark operation.

The transmission ratio 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 - 0.75 to 1.00, 6th - 0.64 to 1.00, R - 4.80 to 1.00.

TRANSMISSION COOLER
A transmission oil cooler shall be provided in the lower tank of the radiator.

TRANSMISSION WARRANTY
The transmission shall have a **five (5) year/unlimited mileage** warranty covering 100% parts and labor. The warranty is to be provided by Allison Transmission and not the apparatus builder.

DRIVELINE
Drivelines shall be a heavy-duty metal tube and be equipped with Spicer 1810 universal joints.

The shafts shall be dynamically balanced before installation.

A splined slip joint shall be provided in each driveshaft, slip joint shall be coated with Glidecoat or equivalent.

STEERING
Dual Sheppard M110 steering gears, with integral heavy-duty power steering, shall be provided. For reduced system temperatures, the power steering shall incorporate a Vickers V20F three (3)-line hydraulic pump with integral pressure and flow control.

The steering wheel shall be 18.00" in diameter, and capable of tilting and telescoping to improve fit for a broader range of driver configurations.

A letter from the hydraulic pump manufacturer stating they approve of the hydraulic pump selection and its operating temperature and flow shall be furnished with the bidder's proposal.

STEERING WARRANTY
The steering gear shall have a three (3) year parts and labor warranty.

TIRES
Front tires shall be Michelin 425/65R22.50 radials, 20 ply "Hiway Rib" XFE tread. The tires shall be mounted on Alcoa 22.50" x 12.25" polished aluminum disc-type wheels with a ten (10) stud, 11.25" bolt circle.

The rear tires shall be eight (8) XZY-3 Michelin 12R22.50 radials, 16 ply "all position" tread. The tires shall be mounted on Alcoa 22.50" x 8.25" polished aluminum disc wheels with a ten (10)-stud 11.25" bolt circle.

LUG NUT COVERS
Chrome plated lug nut covers shall be installed on all lug nuts.

WHEEL CHOCKS
There shall be one (1) set(s) of folding Ziamatic SAC-44-E, aluminum alloy, Quick-Choc wheel blocks with easy-grip handle provided.

WHEEL CHOCK BRACKETS
There shall be one (1) set(s) of Ziamatic SQCH-44-H horizontal mounting wheel chock brackets provided for the SAC-44-E folding wheel chocks. The brackets shall be mounted on the TBD.

HUB COVERS (front)
Stainless steel hub covers shall be provided on the front axle. An oil level viewing window shall be provided.

HUB COVERS (Rear)
A pair of stainless steel, high hat, hub covers shall be provided on the rear axle hubs.

MUD FLAPS
Mud flaps shall be installed behind the front wheels of the apparatus.

MUD FLAPS
Mud flaps shall be installed behind the rear wheels of the apparatus.

TIRE PRESSURE MANAGEMENT
There shall be a VECSAFE LED tire alert pressure management system provided that shall monitor each tire's pressure. A chrome plated brass sensor shall be provided on the valve stem of each tire for a total of ten (10) tires.

The sensor shall calibrate to the tire pressure when installed on the valve stem for pressures between 20 and 120 psi. The sensor shall activate an integral battery operated LED when the pressure of that tire drops 8 psi.

Removing the cap from the sensor shall indicate the functionality of the sensor and battery. If the sensor and battery are in working condition, the LED shall immediately start blinking.

AERIAL APPARATUS STATION LOCATION MEASUREMENTS

Apparatus must be built to maximum height and width to fit into the Fire Station with maximum opening of 11' 2" high and 12' wide.

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

Construction of the cab shall consist of 5052-H32 .125" aluminum welded to extruded

aluminum framing.

The cab shall be built by the apparatus manufacturer in a facility located on the manufacturer's premises. (no exceptions)

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" 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 shall increase the overall height listed.

The floor to ceiling height inside the crew cab shall be 64.00" in the center and 69.75" in the outboard positions.

The crew cab floor shall measure 44.50” from rear wall to the back side of engine tunnel.

The engine tunnel, at the rearward highest point (knee level), shall measure 50.88" to the back wall.

The crew cab shall be of the totally enclosed design, with access doors constructed in the same manner as the driver and passenger doors.

The cab shall be a full tilt cab style. The engine shall be easily accessible and capable of being removed with the cab tilted. The cab shall be capable of tilting 45 degrees and 90 degrees with crane assist.

The cab shall have three (3)-point rubber mounting and shall be tilted by a hydraulic pump connected to two (2) cab lift cylinders. The cab shall then be locked down by a two (2)-point automatic locking mechanism that actuates after the cab has been lowered.

The cab access steps shall be 23.25" wide, crew cab shall be 21.50” wide x 8.00” minimum depth and shall be the half-height style door, blistered inward at the bottom.

The lower exposed step area at each door location shall be trimmed with aluminum treadplate and have a grip strut insert in the bottom step.

The inside cab steps shall not exceed 18.00" high.

The crew cab entrance shall be a one (1) step design to the cab floor, for easy access.

A 20.00", slip resistant, handrail shall be provided adjacent to all door openings to assist entrance into the cab.

A chrome handrail shall be provided inside each front cab door, for ease of entry.

The exterior handrail shall be provided with LED lighting.

The cab doors shall be 37.00" wide x 58.50" high.

The crew cab doors shall be 34.25" wide x 67.00" high for easy entry, and located on the side of the cab.

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

All cab and crew cab entry doors shall contain conventional power windows.

Flush mounted, chrome plated paddle type door handle shall be provided on the exterior of the cab doors.

All interior cab door handles shall also have flush paddle handles.

The cab doors shall be provided with both interior (power windows) 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.

The door hinge shall be a stainless steel piano type with a .25" pin.

There shall be double automotive type rubber seals around the perimeter of the door framing and door edges to ensure a weather tight fit.

Full height polished stainless steel scuffplates shall be installed on the inside of all cab doors.

Cab door panels shall be removable without disconnecting door and window mechanisms.

Engine hood side walls shall be constructed of .50" aluminum, top shall be constructed of .19” aluminum and shall be tapered at top to allow for more driver and passenger elbow room.

The engine hood shall be insulated for protection from heat and sound. The noise insulation keeps the DBA level within the limits stated in the current NFPA series 1900 pamphlet. There shall be access, 15.00" wide x 11.25" high, at the rear of the engine tunnel to access the engine fluid checks.

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

Bright aluminum treadplate shall be overlayed on the outside rear wall of the crew cab except for areas that are not typically visible when the cab is lowered.

A curved, safety glass windshield shall be provided, with over 2,754 square inches of clear viewing area.

The cab windshield shall have bright trim inserts in the rubber molding holding the glass in place.

All cab glass shall be tinted.

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

Two (2) smoked Lexan sunvisors, 8.75" x 31.00" long, shall be provided. The sunvisors shall be located above the windshield with one (1) mounted on each side of the cab.

Two (2) Electric windshield wipers with washer shall be provided that meet FMVSS and SAE requirements.

The washer reservoir shall be able to be filled without raising the cab.

A glove box with a drop-down door shall be installed in the front dash panel in front of the officer's position.

CAB INTEGRITY CERTIFICATION

The fire apparatus manufacturer shall provide a cab crash test certification with this proposal. The certification states that the cab must meet or exceed the requirements below:

- European Occupant Protection Standard ECE Regulation No.29

- SAE J2422 Cab Roof Strength Evaluation - Quasi-Static Loading Heavy Trucks

- SAE J2420 COE Frontal Strength Evaluation - Dynamic Loading Heavy Trucks

- Roof Crush

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 must be equivalent to the front axle rating up to a maximum of 10 metric tons.

- Side Impact

The cab shall be subjected to dynamic preload with a 13,275 lb moving barrier is 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 shall see in a rollover incident.

- Frontal Impact

The cab shall withstand a frontal force produced from 65,200 ft-lbs of energy using a swing-

bob type platen.

The same cab shall withstand all tests without any measurable intrusion into the survival space of the occupant area.

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

CAB DOOR DURABILITY CERTIFICATION

Robust cab doors help protect occupants. Cab doors shall survive a 200,000 cycle door slam test where the slamming force exceeds 20 G's of deceleration. The bidder shall certify that the sample doors similar to those provided on the apparatus have been tested and have met these criteria without structural damage, latch malfunction, or significant component wear.

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. The interior covering of the cab shall be a light colored gray.

NOTCHED ROOF (Crew Cab)

The raised roof section of the crew cab shall have a tapered notch in the center section of roof, allowing more head room in the outboard seating positions. This shall allow the aerial device to be bedded in the same location as a non-raised roof.

The notch shall be 56.00" wide x 10.00" high x full length of the crew cab roof.

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

CAB FLOOR

The cab and crew cab floor areas shall be covered with Polydamp™ acoustical floor mat consisting of a black pyramid rubber facing and closed cell foam decoupler.

The top surface of the material has a series of raised pyramid shapes evenly spaced, which offer a superior grip surface. Additionally, the material has a .25" thick closed cell foam (no water absorption) which offers a sound dampening material for reducing sound levels.

CREW CAB WINDOWS

On each side of the crew cab, a window with tinted glass shall be provided.

The rear wall of the crew cab shall have two (2) windows, each being 8.00" wide x 14.00" high.

WINDOW PROTECTOR BARS

Two (2) removable bars shall be provided on the inside of each crew cab door to protect the

windows from damage.

EMS COMPARTMENT

An EMS compartment, 48.00" high x 38.00" wide x 22.63" deep with one (1) Gortite roll up door, locking, with anodized finish shall be installed against the rear wall of the crew cab, centered.

The compartment shall have a minimum clear door opening of 38.00" high x 27.50" wide.

The compartment shall be constructed of aluminum and painted to match the cab interior.

COMPARTMENT LIGHT

One (1) compartment light shall be provided, mounted to ceiling. Light shall be controlled by automatic door switch.

This storage compartment shall be compliant per NFPA standard for automotive fire apparatus.

SHELVING

There shall be three (3) shelves provided in the EMS compartment. Each shelf shall be constructed of 0.090" aluminum with a 1.25" up-turned lip. Shelving shall be infinitely adjustable by means of a threaded tightener sliding in a track.

The location shall be in crew cab EMS compartment.

LOGO AND CUSTOMER DESIGNATION ON HORN BUTTON

The steering wheel shall have an emblem containing the fire apparatus manufacturer's logo and customer name. The emblem shall have three (3) rows of text for the customer's department name. There shall be a maximum of eight (8) characters in the first row, eleven (11) characters in the second row and eleven (11) characters in the third row.

The first row of text shall be: MACON

The second row of text shall be: BIBB

The third row of text shall be: FIRE DEPT

CAB AND CREW CAB FULL HEIGHT DOORS

The cab and crew cab doors shall be the full-height style door located on the side of the cab. The cab and crew cab doors shall be the standard width and standard height, to allow for concealing the lower steps. The lower steps shall include an open expanded metal as the stepping surface which shall allow for step drainage.

FENDER CROWNS

Stainless steel fender crowns shall be installed at the cab wheel openings. The fender crowns

shall have a radius outside corner that allows the fender crown to extend beyond the side wall of the front tires and also allow the crew cab doors to open fully.

DOOR JAM SCUFFPLATES
All cab door jambs shall be furnished with a polished stainless steel scuffplate, mounted on the striker side of the jam.

CAB DOOR INTERIOR PANELS
A full height stainless steel scuff plate shall be provided on the cab and crew cab interior doors. Also shall have reflective yellow and red chevron striping and printed (Macon-Bibb) in center.

RUBRAIL, CREW CAB
Aluminum extruded rubrail shall be installed along the bottom of the of the crew cab from the crew cab step to the back of the cab. The rubrail shall match the material used on the body.

MOLDING (on sides of cab)
Chrome molding shall be provided on both sides of cab.

MAP BOX
A map box with three bins, open from top, shall be installed on the engine doghouse closest to the officer's seating position. The map box shall be divided into 3 bins, each being 12.00" wide x 4.00" deep x 8.00" high. The map box shall be constructed of .125" aluminum and shall be painted to match the cab interior.

MAP POCKET
One (1) map pocket shall be installed on drivers side door. The pocket shall be constructed of a heavy grade vinyl and shall include a snap down cover flap.

RECORDS TRAY
Installed across from the officer's seat shall be a records tray. The tray shall be approximately 18.00" across and 10.00" high with a 1.00" retainer across the bottom.

The tray shall be mounted on a smooth aluminum plate 18.00" wide x 10.00" deep. The plate shall be mounted to the top surface of dash, directly in front of the officer seat. This mounting plate shall extend out approximately 2.00" past the edge of the dash to allow enough room to mount the records tray.

The tray and mounting plate shall be constructed of .090" aluminum and shall be painted to match the cab interior.

CAB LIFT
A hydraulic cab lift system shall be provided consisting of an electric powered hydraulic pump, dual lift cylinders, and necessary hoses and valves.

The hydraulic pump shall have a manual override for backup in the event of electrical failure.

Lift controls shall be on a panel located on the pump panel or front area of the body in a convenient location.

Cab shall be locked down by a two (2)-point automatic spring loaded hook mechanism that actuates after the cab has been lowered.

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

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

INTERLOCK, CAB LIFT TO PARKING BRAKE

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.

MIRRORS

Ramco, model #6001CCHR, polished aluminum 9.25" x 13.50" mirrors, with a convex section, shall be mounted on each side of the front cab corner.

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 be adjusted manually.

BUMPER

A one (1) piece, ten (10) gauge, 304-2B type polished stainless steel bumper, a minimum of 10.00" high, shall be attached to a bolted modular extension frame constructed of 50,000 psi tensile steel "C" channel mounted directly behind it to provide adequate support strength.

The bumper shall be extended 19.00" from front face of cab.

Documentation shall be provided, upon request to show that the options selected have been engineered for fit-up and approval for this modular bumper extension. A chart shall be provided to indicate the option locations and shall include, but not be limited to the following options: air horns, mechanical sirens, speakers, hose trays (with hose capacities), winches, lights, discharge, and suction connections.

LIFT AND TOW MOUNTS

Mounted to the frame extension shall be lift and tow mounts. The lift and tow mounts shall be designed and positioned to adapt to certain tow truck lift systems.

The lift and tow mounts with eyes shall be painted the same color as the frame.

HOSE TRAY
A hose tray, constructed of aluminum, shall be placed in the center of the bumper extension.

The tray shall have a capacity of 150' of 1.75" double jacket cotton-polyester hose.

Black rubber grating shall be provided at the bottom of the tray. Drain holes are also provided.

GRAVEL PAN
A gravel pan, constructed of bright aluminum treadplate, shall be furnished between the bumper and cab face.

The gravel pan shall be properly supported from the underside to prevent flexing and vibration of the aluminum treadplate.

COVER, HOSE TRAY
A bright aluminum treadplate cover shall be provided over the one (1) hose tray.

The cover shall be "notched" allowing the hose to be preconnected to hose connection.

The cover shall be attached with a stainless steel hinge.

A D-ring latch shall secure the cover in the closed position and a pneumatic stay arm shall hold the cover in the open position.

The area of the hose tray to be covered shall be the Cover will be over the center tray with the gas spring o the side opposite the discharge.

TRIM, HOSE TRAY
one (1)Stainless steel "L" shaped trim shall be installed over the front and both sides of the upper edge of bumper corner bumper hose tray to protect the hose in this box from the top edges of the box.

TOW HOOKS
No tow hooks are to be provided. This truck shall be equipped with a lift and tow package with integral tow eyes.

CAB INTERIOR
The cab dash fascias shall be a flat faced design to provide easy of maintenance and shall be constructed out of painted aluminum.

The engine tunnel shall be padded and covered with 46 ounce leather grain vinyl resistant to

oil, grease and mildew.

The headliner shall be installed in both forward and rear cab sections. Headliner material shall be vinyl. A sound barrier shall be part of its composition. Material shall be installed on aluminum sheet and securely fastened to interior cab ceiling.

Forward portion of cab headliner shall provide easy access for servicing electrical wiring or for other maintenance needs without removing the entire unit.

CAB INTERIOR UPHOLSTERY
The cab interior upholstery shall be dark silver gray.

INTERIOR PAINT (Cab)
The cab interior metal surfaces shall be painted light gray, vinyl texture paint.

GRAB HANDLE
A black rubber covered grab handle shall be mounted on the lower portion of the driver's side cab entrance to assist in entering the cab. The grab handle shall be securely mounted to the post area between the door and steering wheel column.

A long rubber grab handle shall be mounted on the dash board in front of the officer.

GRAB HANDLES (Interior Crew Cab Doors)
A black rubber covered grab handle shall be mounted on the door post of the driver's and passenger's side crew cab door to assist in entering the cab. The grab handle shall be securely mounted to the hinge side of the door frame.

CAB SEATING
A Seats Inc. #911 with a six way electric power adjustable suspension, high-back style seat shall be provided in the cab for the driver.

The seat shall be provided with a 7.75" electric fore/aft slide adjustment. The seat shall also provide a 1.50" vertical height adjustment.

The driver's seat shall be furnished with three (3)-point shoulder type seat belt. The seat belt shall be furnished with automatic retractor. Extension shall be provided with the seat belt so the male end can be easily grasped and the female end easily located while sitting in a normal position.

OFFICER SEAT
A Seats Incorporated 911 SCBA seat with high-back shall be provided in the cab for the officer. The SCBA cavity shall be adjustable front to rear in 0.50" increments to accommodate different size SCBA bottles.

Moving the SCBA cavity shall be accomplished by unbolting, relocating and rebolting in the

desired location.

The officer seat shall be furnished with three point shoulder type seat belts. The seat belts shall be furnished with automatic retractors. Extensions shall be provided with the seat belts so the male end can be easily grasped and the female end easily located while sitting in a normal position.

REAR FACING PASSENGER SIDE OUTBOARD SEAT

One (1) rear facing, Seats Incorporated 911 SCBA seat shall be provided in the passenger side outboard position in crew cab. The SCBA cavity shall be adjustable front to rear in .50" increments to accommodate different size SCBA bottles.

Moving the SCBA cavity shall be accomplished by unbolting, relocating and rebolting in the desired location.

Seat shall be furnished with three-point shoulder type seat belt. The seat belt shall be furnished with automatic retractors. Extension shall be provided with the seat belt so the male end can be easily grasped and the female end easily located while sitting in a normal position.

REAR FACING DRIVER SIDE OUTBOARD SEAT

One (1) rear facing, Seats Incorporated 911 SCBA seat shall be provided in the driver side outboard position in crew cab. The SCBA cavity shall be adjustable front to rear in .50" increments to accommodate different size SCBA bottles.

Moving the SCBA cavity shall be accomplished by unbolting, relocating and rebolting in the desired location.

Seat shall be furnished with three-point shoulder type seat belt. The seat belt shall be furnished with automatic retractors. Extension shall be provided with the seat belt so the male end can be easily grasped and the female end easily located while sitting in a normal position.

FORWARD FACING PASSENGER SIDE OUTBOARD SEAT

There shall be one (1) forward facing, Seats Incorporated 911 fold-up SCBA style seat provided at the passenger side outboard position in the crew cab. The SCBA cavity shall be adjustable front to rear in 0.50" increments to accommodate different size SCBA bottles.

Moving the SCBA cavity shall be accomplished by unbolting, relocating and rebolting in the desired location.

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

FORWARD FACING DRIVER SIDE OUTBOARD SEAT

There shall be one (1) forward facing, Seats Incorporated 911 fold-up SCBA style seat provided at the driver side outboard position in the crew cab. The SCBA cavity shall be adjustable front to rear in 0.50" increments to accommodate different size SCBA bottles.

Moving the SCBA cavity shall be accomplished by unbolting, relocating and rebolting in the desired location.

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

COMPARTMENT LIGHTING

Amdor LumaBar LED compartment light strips shall be provided in one (1) EMS cabinet(s).N/A and all other exterior compartments.

Two (2) strip lights shall be installed vertically, One (1) each side of the compartment door opening.

Opening the compartment door, shall automatically turn compartment lighting on.

RADIO COMPARTMENT

A radio compartment shall be provided under the officer's seat.

The inside compartment dimensions shall be 14.25" deep x 15.75" across x 8.75" high.

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.

SEAT UPHOLSTERY

All Seats Inc. 911 seat upholstery shall be gray woven with black Imperial 1200 material.

AIR BOTTLE HOLDERS

All SCBA type seats in the cab shall have a Ziamatic model ULLH SCBA holder bracket. This bracket shall be compliant with the current NFPA 1901 standards and shall include a backplate, two (2) seats, a footplate and the model LLS ("Load & Lock") strap to hold the bottle in the bracket. The bracket seats shall be a "one size fits all" style seat and shall accommodate SCBA cylinders from the high pressure 30-minute to the high pressure 60-minute. Seats shall be adjustable up and down by unbolting, relocating, and rebolting in the desired position.

SEAT BELTS

All seating positions in the cab and crew cab shall have red seat belts.

SEAT BELT ANCHOR STRENGTH

Seat belt attachment strength is regulated by Federal Motor Vehicle Safety Standards and should be validated through testing. Each seat belt anchor design shall withstand 3000 lbs of pull on both the lap and shoulder belt in accordance with FMVSS 571.210 Seat Belt Assembly Anchorages. The bidder shall certify that each anchor design was pull tested to the required force and met the appropriate criteria.

SEAT MOUNTING STRENGTH

Seat attachment strength is regulated by Federal Motor Vehicle Safety Standards and should be validated through testing. Each seat mounting design shall be tested to withstand 20 G's of force in accordance with FMVSS 571.207 Seating Systems. The bidder shall certify that each seat mount and cab structure design was pull tested to the required force and met the appropriate criteria.

SEAT BELT MONITORING SYSTEM

A seat belt monitoring system (SBMS) shall be provided. The SBMS shall be capable of monitoring up to ten (10) sensors indicating the status of each seating position in the cab with green and red LED indicators as follows:

Seat Occupied	Buckled	Green
Seat Occupied	Unbuckled	Red
No Occupant	Buckled	Red
No Occupant	Unbuckled	Not Illuminated

The SBMS shall include an audible alarm that shall be activated when a red illumination condition exists and the parking brake is released, or a red illumination condition exists and the transmission is not in park.

HELMET HOLDER

There shall be four (4) Zico UHH-1 helmet holder bracket(s) provided in the cab. The brackets shall provide quick access and secure storage of the helmet(s). The bracket location(s) shall be determined at time of final inspection.

SHOULDER HARNESS HEIGHT ADJUSTMENT

All seating positions furnished with three (3)-point shoulder type seat belts shall include a height adjustment. This adjustment shall optimize the belts effectiveness and comfort for the seated firefighter.

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. (no exception)

ENGINE COMPARTMENT LIGHTS
Two (2) engine compartment lights shall be installed under the engine hood, with an integral switch. The lights shall have a .125" diameter hole in its lens to prevent moisture retention.

CAB INTERIOR LIGHTING
Auxiliary lights shall be provided in the cab and consisting of:

- Two (2) Weldon, Model 8081, red/clear dome light located, one (1) on the officer side and one (1) on the driver side, controlled by the following:
  Clear forward light controlled by the door switch and the lens switch.
  Red rearward light controlled by the lens switch.

- Two (2) Adjustable Map Lights: With switches mounted on the cab ceiling.

CREW CAB INTERIOR LIGHTING
Auxiliary lights shall be provided in the crew cab and consist of:

- Two (2) Weldon, Model 8081, Red/Clear dome lights located one (1) each side, controlled by the following:
  Clear forward light controlled by the door switch and the lens switch.
  Red rearward light controlled by the lens switch.

- A courtesy light at each door opening, controlled by automatic door switches

STEP LIGHTS
For reduced overall maintenance costs compared to incandescent lighting, there shall be four (4) Ritar, Model M27HW2, LED, step lights provided. The lights shall be installed at each cab and crew cab door, 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.

CAB DEFROSTER
There shall be a 41,000 BTU/hr defroster in the cab located 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 shall have a three (3) speed blower, and temperature controls accessible to the driver and officer.

The defroster ducts shall be designed to provide maximum defrosting capabilities for the front cab windows.

CAB/CREW CAB HEATER

Two (2) auxiliary heaters with 32,000 BTU/hr each shall be provided in the cab. The heaters shall have a three (3) speed blower, and temperature controls accessible to the driver and officer. There shall also be louvers located below the rear facing seat riser and below the driver and officer positions for airflow.

The heaters shall be mounted, one (1) within each rear facing seat riser.

CAB DEFROSTER CERTIFICATION

Visibility during inclement weather is essential to safe apparatus performance. The defroster system shall clear the required windshield zones in accordance with SAE J381 *Windshield Defrosting Systems Test Procedure and Performance Requirements - Trucks, Buses, and Multipurpose Vehicles.* The bidder shall certify that the defrost system design has been tested in a cold chamber and passes the SAE J381 criteria.

CAB HEATER CERTIFICATION

Good cab heat performance and regulation provides a more effective working environment for personnel, whether in-transit, or at a scene. The cab heaters shall warm the cab 75 F from a cold-soak, within 30 minutes when tested using the coolant supply methods found in SAE J381. The bidder shall certify that a substantially similar cab has been tested and has met these criteria.

AIR CONDITIONING

A high performance air conditioning system shall be furnished inside the cab and crew cab.

The air conditioning system shall perform as follows:

In 100 degree Fahrenheit ambient temperature with 50 percent relative humidity and at maximum compressor speed, the cab and crew cab shall cool down to 75 degrees Fahrenheit within 30 minutes. Actual test results of the air conditioning system, verifying this performance requirement, shall be submitted at delivery.

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.

There shall be air flow outlets located in the following locations:

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

The evaporator units shall have an adequate BTU rating to meet the performance specifications.

The air conditioning system shall have adjustable air outlets incorporated into the cab ceiling at both the driver, officer, and crew cab positions.

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

INTERIOR CAB INSULATION

The cab and crew cab walls shall be insulated with 2.00" insulation where possible and the roof with 1.00" insulation to aid in cooling.

The insulation shall be covered with a vinyl liner or a metal panel painted to match the interior.

An additional red warning light shall be installed to the side of the exterior air conditioning housing. The light shall match the upper zone lighting package to meet NFPA requirements.

AIR CONDITIONING HOUSINGS

The housings protecting the air conditioning units on either side of the cab shall be fabricated from smooth aluminum, and painted to match the exterior of the cab roof, in place of the standard 4-way aluminum.

CAB INSTRUMENTATION

Instrument panel controls and switches shall be identified to function by imprinted word(s) adjacent to each item. Actuation of the headlight switch shall illuminate ("back-lit") wording for after dark operation. Turn signal and high beam headlight indicator lights shall also be provided.

To avoid confusion, warning indicators shall be (where possible) the "dead front" type, meaning the warning light and word identification of the same, does not show up unless it is 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 as such that the driver's 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

- Hourmeter 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): Audible alarm

- Fuel Gauge

- Low Fuel Indicator Light: Audible alarm

- Ignition Switch: Green indicator light

- Starter Control

- Heater Controls

- Headlight Switch

- Self Canceling Turn Signal Switch (arm): 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.

- High Air Restriction Warning Indicator Light (electronic).

WIPER CONTROL

Wiper control shall consist of a two (2)-speed individual windshield wiper control with

intermittent feature and windshield washer controls. The control shall also have a "return to park" provision, which allows the wipers to return to the stored position when the wipers are not in use.

WINDSHIELD WIPER DURABILITY CERTIFICATION
Visibility during inclement weather is essential to safe apparatus performance. Windshield wipers shall survive a 3 million cycle durability test in accordance with section 6.2 of SAE J198 *Windshield Wiper Systems - Trucks, Buses and Multipurpose Vehicles.* The bidder shall certify that the wiper system design has been tested and that the wiper system has met these criteria.

- Officer Speedometer, A Class I digital display speedometer shall be provided on the officer side overhead position.

HOURMETER - AERIAL DEVICE
A hourmeter for the aerial device shall be provided and located within the cab display or instrument panel.

AERIAL MASTER
There shall be a master switch for the aerial operating electrical system provided.

AERIAL PTO
A PTO switch for the aerial with indicator light shall be provided.

DIGITAL CLOCK
A Dakota Digital, Model ODY-16-1-B-T, digital clock shall be provided in the officer's side overhead switch panel. The clock shall be a 12 hour device that has an AM/PM indicator that is lit when in the AM hour mode. The display shall be teal in color and shall automatically dim when the parking lights are activated. The clock shall be provided with a black bezel.

RADIO ANTENNA MOUNT
An antenna-mounting base shall be supplied by the buyer/purchaser.

The mount shall be located on the cab roof just to the rear of the officer seat.

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

SWITCH PANELS
The built-in emergency light switch panel shall have a master switch plus individual switches for selective control. The switch panel shall be located in the "overhead" position above the windshield on the driver's side to allow for easy access. Switches shall be rocker type with an indicator light, of which is an integral part of the switch.

ELECTRICAL POWER CONTROL SYSTEM

A compartment shall be provided in or under the cab to house the vehicles electrical power and signal circuit protection and control components. The power and signal protection and control compartment shall contain circuit protection devices and power control devices. Power and 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.

Circuit protection devices, which conform to SAE standard, 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) 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 (dc) rating of 125 percent of the maximum current for which the circuit is protected.

Visual status indicators shall be supplied to identify control safety interlocks and vehicle status. In addition to visual status indicators, 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 monitor system shall provide visual and audio warning when the system voltage is above or below optimum levels.

POWER AND GROUND STUD

A 12-volt power stud and a grounding stud shall be provided in the electrical component compartment for 2-way radio equipment.

EMI/RFI PROTECTION

The electrical system proposed shall include means to control undesired electromagnetic and radio frequency emissions. State of the art electrical system design and components shall be used to insure radiated and conducted EMI (electromagnetic interference) and RFI (radio frequency interference) emissions are suppressed at their source.

The apparatus proposed 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 has been done on similar apparatus and certifies that the vehicle proposed 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 2-way radio communication systems. Harness and cable routing shall be given careful attention to minimize the potential for conducting and radiated EMI-RFI susceptibility.

VEHICLE DATA RECORDER

A vehicle data recorder (VDR) shall be provided. The VDR shall be capable of reading and storing vehicle information. The VDR shall be capable of operating in a voltage range from 8VDC to 16VDC. The VDR shall not interfere with, suspend, or delay any communications that may exist on the CAN data link during the power up, initialization, runtime, or power down sequence. The VDR shall continue operation upon termination of power or at voltages below 8VDC for a minimum of 10ms.

The vehicle data recorder shall be capable of recording the following data via hardwired and/or CAN inputs:

Vehicle Speed -	MPH
Acceleration -	MPH/sec
Deceleration -	MPH/sec
Engine Speed -	RPM
Engine Throttle Position -	% of Full Throttle
ABS Event-	On/Off
Seat Occupied Status -	Yes/No by Position (7-12 Seating Capacity)
Seat Belt Buckled Status -	Yes/No by Position (7-12 Seating Capacity)
Master Optical Warning Device Switch -	On/Off
Time -	24 Hour Time
Date - Year/Month/Day	

WIRELESS RADIO HEADSET

- Intercom mixer system 900
- Includes all cables for radio connectivity hook up
- 2 jump seat station intercom only positions.
- 1 jump seat station front officer
- 1 pump panel station
- 1 liberator wireless headset
- Headset hanger hooks
- 5 ft. power cable for wireless headsets and base
- 1 radio transmit only headset for officer
- 2 intercom headsets

BATTERY SYSTEM

Four (4) 12-volt, Exide Model 31A950X1W batteries that include the following features shall be provided:

- 950 CCA, cold cranking amps
- 190 amp reserve capacity
- High cycle
- Group 31
- Rating of 3800 CCA at 0 degrees Fahrenheit
- 760 minutes of reserve capacity
- SAE Posts

Each battery case shall be a black polypropylene material with a vertically ribbed container for increased vibration resistance. The cover shall be manifold vented with a central venting location to allow a 45 degree tilt capacity.

The inside of each battery shall consist of a "maintenance free" grid construction with poly wrapped separators and a flooded epoxy bottom anchoring for maximum vibration resistance.

ISOLATED BATTERY

One (1) 12 volt, Exide Model 31A950X1W battery shall be provided for voltage sensitive components. A battery isolator appropriately suited for the group 31 battery capacity shall be supplied.

BATTERY SYSTEM

A single starting system shall be provided.

An ignition switch and starter button shall be located on the instrument panel.

MASTER BATTERY SWITCH

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

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

BATTERY COMPARTMENTS

Batteries shall be placed on non-corrosive mats and be stored in well-ventilated compartments located under the cab. The battery hold-downs shall be of a non-corrosive material. All bolts and nuts shall be stainless steel.

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

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

There shall be a door in the crew cab floor to provide access to the battery terminals.

JUMPER STUDS

One (1) set of battery jumper studs with plastic color-coded covers shall be installed on the front side of battery box on the driver's side. This shall allow enough room for easy jumper cable access. A tag shall be provided for positive/negative terminals.

BATTERY CHARGER/ AIR COMPRESSOR

A Kussmaul Pump Plus 1200, model 091-9-1200 single output battery charger/air compressor system shall be provided. A display bar graph indicating the state of charge shall be included.

The automatic charger shall maintain one (1) set of batteries with a maximum output current of 40 amps.

The 12-volt air compressor shall be installed to maintain the air system pressure when the vehicle is not in use.

The battery charger shall be wired to the AC shoreline inlet through an AC receptacle adjacent to this battery charger.

Battery charger shall be located in the front left body compartment, mounted high on the front wall behind the door roller.

The battery charger indicator shall be located on the driver's seat riser.

DUAL ALTERNATORS

A pair of Leece-Neville 270 amp alternators shall be provided. They shall have a rated output current of 540 amps, as measured by SAE method J56. The alternators shall feature an integral, fail-safe regulator and rectifier. The alternators shall be connected to the power and ground distribution system with heavy-duty cables sized to carry the full rated alternator output.

THIRD SPARE CIRCUIT

There shall be one (1) pair of wires installed.

The above wires shall have the following features:

- Wires shall be connected directly to the battery switched power.
- Wires are protected to 15 amps.
- Power and ground shall end on officer side of dash for handheld spotlight connection.
- Termination is with 15 amp, power point plug with rubber cover.
- Wires shall be sized to 125% of the protection.

SPARE CIRCUIT

There shall be one (1) pair of wires installed.

The above wires shall have the following features:
Wires shall be connected directly to the battery power.
Wires shall be protected to 30 amps.
Power and ground shall end In the EMS compartment to be battery direct - high inside right hand wall back side with protective cover.
Termination shall be with six (6) position terminal strip.
This circuit shall be installed without instrument panel switch control.
Wires shall be sized to 125% of the protection.

SPARE CIRCUIT
There shall be one (1) pair of wires installed.

The above wires shall have the following features:
Wires shall be connected directly to the battery power.
Wires shall be protected to 10 amps.
Power and ground shall end in the cab dash or console.
Termination shall be with 3/8" studs and plastic covers.
Wires shall be sized to 125% of the protection.

SECOND SPARE CIRCUIT
There shall be two (2) pair of wires installed.

The above wires shall have the following features:
Wires shall be connected directly to the battery switched power.
Wires are protected to 15 amps.
Power and ground shall end centered under switch panel #6 per the instrument panel layout.
Termination is with 15 amp, power point plug with rubber cover.
Wires shall be sized to 125% of the protection.

CUSTOMER RADIO WIRING
There shall be one (1) 12 volt combination wiring leads of which each shall include, one (1) battery switched, one (1) ignition and one (1) negative, for use with radio equipment. Each lead shall be 18" long and be provided at or near upper switch panel # 10. The leads shall be clearly marked and in a coil. A breaker rated for 30 amps shall be provided for circuit protection of the battery switched lead with a minimum of 10 gauge wire. The ignition lead is for sensing purposes only.

The wires shall be colored coded as follows:
-red for battery switched
-yellow for ignition
-black for ground

ELECTRONIC LOAD MANAGEMENT

A Kussmaul electronic load management (ELM) system shall be provided that monitors the vehicles 12-volt electrical system, and automatically reduces the electrical load in the event of a low voltage condition and by doing so, ensures the integrity of the electrical system.

The ELM shall monitor the vehicle's voltage while at the scene (parking brake applied). It shall sequentially shut down individual electrical loads when the system voltage drops below a preset value. 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) also includes sequencer function for the five (5) managed loads and two (2) additional.

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 written load analysis, which shall include the following:
   A) The nameplate rating of the alternator.

   B) The alternator rating under the conditions specified per: Applicable NFPA 1901 or 1906 (Current Edition).

   C) The minimum continuous load of each component that is specified per: Applicable NFPA 1901 or 1906 (Current Edition).

   D) Additional loads that, when added to the minimum continuous load, determine the total connected load.

   E) Each individual intermittent load.

All of the above listed items shall be provided by the bidder per the applicable NFPA 1901 or 1906 (Current Edition).

EXTERIOR LIGHTING

Exterior lighting shall meet or exceed Federal Department of Transportation, Federal Motor Vehicle Safety Standards and National Fire Protection Association requirements in effect at time of proposal.

Front headlights shall be halogen, rectangular shape, one (1) pair mounted in each front trim housing.

The LED directional lights shall wrap-around on the outside corners of the trim housing. The

headlight and LED directional lights shall be in the same assembly.

Five (5) LED clearance and marker lights shall be installed across the leading edge of the cab.

WARNING LIGHTS (Cab Face)
Two (2) pair of Whelen model 60*00F*R LED lights shall be installed on the cab face, above the headlights, mounted in a common bezel.

The outer LEDS shall be required for NFPA and shall meet or exceed the NFPA required light output for the front lower zone.
The color of these LEDs shall be red Super LED/red lens.
The inner LEDs shall be additional lighting.
The color of these lights shall be two (2) clear Super LED one each side.

Both sets of lights shall be activated by the same switch in the cab.

DAYTIME RUNNING LIGHTS (HEADLIGHTS)
The headlights shall include a feature for daytime running lights which shall be automatically activated when the truck is running and parking brake is released. The daytime running light feature shall be deactivated when the primary headlight switch is turned on or when other headlight options are activated.

BACK-UP ALARM
An ECCO, Model SA917-PM2, solid-state electronic audible back-up alarm that actuates when the truck is shifted into reverse shall be provided. The device shall sound at 60 pulses per minute and automatically adjust its volume to maintain a minimum five (5) dBA above surrounding environmental noise levels.

MANUAL, FIRE APPARATUS PARTS
Two (2) custom parts manuals for the complete fire apparatus shall be provided in hard copy with the completed unit.

One (1) USB shall also be provided that shall include all of the information from the above manual.

The manual shall contain the following:

- Job number
- Part numbers with full descriptions
- Table of contents
- Parts section sorted in functional groups reflecting a major system, component, or assembly
- Parts section sorted in Alphabetical order
- Instructions on how to locate a parts

The 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 bodies.

SERVICE PARTS INTERNET SITE

The service parts information included in this manual is also available on the factory website. The website offers additional functions and features not contained in this manual, such as digital photographs and line drawings of select items. The website also features electronic search tools to assist in locating parts quickly.

MANUALS, CHASSIS SERVICE

Two (2) chassis service manuals containing parts and service information on major components shall be provided with the completed unit.

One (1) USB shall also be provided that shall include all of the information from the above manual.

The manuals shall contain the following sections:

- Job number
- Table of contents
- Troubleshooting
- Front Axle/Suspension
- Brakes
- Engine
- Tires
- Wheels
- Cab
- Electrical, DC
- Air Systems
- Plumbing
- Appendix

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

MANUALS, CHASSIS OPERATION

Two (2) chassis operation manuals shall be provided.

One (1) USB shall also be provided that shall include all of the information from the above manual.

ELECTRICAL WIRING DIAGRAMS

Two (2) electrical wiring diagrams, prepared for the model of chassis and body, shall be provided.

WATER TANK

It shall have a capacity of 500 gallons and shall be constructed of polypropylene plastic in a rectangular shape.

The joints and seams shall be nitrogen welded inside and out.

The tank shall be baffled in accordance with NFPA Bulletin 1901 requirements.

The baffles shall have vent openings at both the top and bottom of each baffle to permit movement of air and water between compartments.

The longitudinal partitions shall be constructed of .38" polypropylene plastic and extend from the bottom of the tank through the top cover to allow positive welding.

The transverse partitions extend from 4" off the bottom to the underside of the top cover.

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

The tank top shall be constructed of .50" polypropylene.

It shall be recessed .38" and shall be welded to the tank sides and the longitudinal partitions.

It shall be supported to keep it rigid during fast filling conditions.

Construction shall include 2.00" polypropylene dowels spaced no more than 30.00" apart and welded to the transverse partitions.

Two 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 tank outlet.

Tank shall be installed in a fabricated "cradle" assembly constructed of structural steel.

Sufficient crossmembers are provided to properly support bottom of tank.

Crossmembers are constructed of steel bar channel or rectangular tubing.

Tank "floats" in cradle to avoid torsional stress caused by chassis frame flexing.

Rubber cushions, .50" thick x 3.00" wide, shall be placed on all horizontal surfaces that the tank rests on.

Stops are provided to prevent an empty tank from bouncing excessively while moving

vehicle.

Tank mounting system is approved by the manufacturer.

Fill tower shall be constructed of .50" polypropylene and shall be a minimum of 8.00" wide x 14.00" long.

Fill tower shall be furnished with a .25" thick polypropylene screen and a hinged cover.

An overflow pipe, constructed of 4.00" schedule 40 polypropylene, shall be installed approximately halfway down the fill tower and extend through the water tank and exit to the rear of the rear axle.

WATER TANK WARRANTY
The tank shall have a **lifetime** warranty.

If the tank manufacturer determines that the tank problem has rendered the truck out-of-service, the tank manufacturer shall dispatch a service technician WITHIN 48 HOURS (2 DAYS) to repair the tank (This time period is for the United States and Canada only).

HOSE BED
The hose body shall be fabricated of .125"-5052 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 and partitioned off so hose can be stored the full width of the available hose bed.

Hose removal shall be via a "chute" at the passenger side of the body 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.

Flooring of the hose bed shall be removable aluminum grating with the top surface corrugated to aid in hose aeration.

The grating slats shall be .50" wide x 4.50" long with spacing between slats for hose ventilation.

Hose capacity shall be a minimum of 1000' of 4.0".

HOSE RESTRAINT
The hose in the hosebed shall be restrained by black nylon velcro straps at the top of the

hosebed. The straps shall be installed at the top of the hosebed sidesheets.

RUNNING BOARDS

The running boards shall be fabricated of .125" bright aluminum treadplate and supported by structural steel angle assemblies bolted to the chassis frame rails.

Running boards shall be 13.00" deep and are spaced away from the body .50".

A splash guard shall be provided to keep road dirt or water from splashing up onto the pump panels.

The running boards shall have a riser on the body to protect the painted surface from damage by stepping on the running boards.

The entire surface of the running boards shall be covered with bright aluminum treadplate.

TURNTABLE STEPS

Steps to access the turntable from the driver side and passenger side 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.

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 stepwell shall be lined with bright aluminum treadplate to act as scuffplates.

The steps shall be connected to the "Do Not Move Truck" indicator.

A handrail shall be provided on each side of the access steps.

TOW EYES

Two (2) rear painted "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 radiused.

COMPARTMENTATION

Compartmentation shall be fabricated of .125" 5052 aluminum with a tensile strength of 38,000 pounds per square inch. The side compartments are an integral assembly with the rear fenders. Fully enclosed rear wheel housings shall be provided to prevent rust pockets and for

ease of maintenance. Due to the severe loading requirements of this aerial, a method of compartment body support suitable for the intended load shall be provided.

The backbone of the support system shall be the chassis frame rail, which is the strongest component of the chassis and is designed for sustaining maximum loads.

A support system shall be used which shall incorporate a floating substructure by using Neoprene Elastomer isolators to allow the body to remain rigid while the chassis goes through its natural flex. The isolators shall have a broad range of proven viability in vehicular applications, be of a fail safe design, and allow for all necessary movement in three (3) transitional and rotational modes. This shall result in a 500 pound equipment rating for each lower compartment of the body.

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

A design with body compartments hanging off of the chassis frame in an unsupported fashion shall not be acceptable.

Compartment flooring shall be of the sweep out design with the floor higher than the compartment door lip. The compartment door openings are framed by flanging the edges in 1.75" and bending out again .75" to form an angle. Drip protection is provided over all door openings by means of bright aluminum extrusion or formed bright aluminum treadplate. Side compartment tops shall be covered with bright aluminum treadplate with a 1.00" rolled over edge on the front, rear and outward side. The covers are fabricated in one piece and have the corners "Tungsten Inert Gas" welded. A bright aluminum treadplate cover shall be provided on the front wall of each side compartment. All screws and bolts which protrude into a compartment shall have acorn nuts at the ends to prevent injury.

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

AGGRESSIVE WALKING SURFACE

All exterior surfaces designated as stepping, standing, and walking areas shall comply with the required average slip resistance of the current NFPA standards.

LOUVERS
All body compartments shall have a minimum of one (1) set of louvers stamped into a wall to provide the proper airflow inside the compartment and to prevent water from dripping into the compartment. These louvers shall be formed into the metal and not added to the compartment as a separate plate.

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

COMPARTMENTATION, DRIVERS SIDE
A full height roll-up door compartment, ahead of the rear wheels, 41.75" wide x 64.00" high x 24.25" deep inside with an clear door opening of 38.75"wide x 56.38" high.

One (1) roll-up door compartment, above the fender compartments and over the rear axles. The compartment shall be 72.13" wide x 33.25" high x 24.25" deep inside with a clear door opening of 63.75" wide x 25.50" high.

A compartment with a single pan stainless steel door shall be located above the front stabilizer. The compartment shall be 23.00" high x 18.00" wide x 24.25" deep with a door opening of 15.75" high x 12.00" wide.

A full height, roll-up door compartment shall be provided, located behind the rear wheels, 43.75" wide x 49.25" high x 21.25" deep. The clear door opening shall be 40.75" wide x 41.62" high.

There shall be one (1) compartment, below the turntable, with a roll-up door. The compartment shall be 39.38" wide x 18.38" high x 21.25" deep, with a door opening of 33.75" wide x 10.75" high.

COMPARTMENTATION, PASSENGERS SIDE
A full height roll-up door compartment, ahead of the rear wheels, 41.75" wide x 56.38" high x 24.25" deep inside the lower 29.75" and 12.00" deep inside the upper portion with a clear door opening of 38.75"wide x 56.38" high.

One (1) roll-up door compartment, above the fender compartments and over the rear axles. The compartment shall be 72.13" wide x 33.25" high x 12.00" deep inside with a clear door opening of 63.75" wide x 25.50" high.

A compartment with a single pan stainless steel door shall be located above the front stabilizer. The compartment shall be 23.00" high x 18.00" wide x 12.00" deep with a door opening of 15.75" high x 12.00" wide.

A full height, roll-up door compartment shall be provided, located behind the rear wheels, 43.75" wide x 49.25" high x 21.25" deep inside the lower 29.75", and 12.00" deep in the upper portion. The clear door opening shall be 40.75" wide x 41.62" high.

There shall be one (1) compartment, below the turntable, with a roll-up door. The compartment shall be 39.38" wide x 18.38" high x 12.00" deep, with a door opening of 33.75" wide x 10.75" high.

ROLL-UP DOOR

All roll-up doors shall be of an anodized satin finish, double faced, aluminum construction and manufactured by A&A Manufacturing (Gortite).

Lath sections shall be an interlocking rib design and shall be individually replaceable without complete disassembly of door.

Between each slat at the pivoting joint shall be a PVC inner seal to prevent metal to metal contact and prevent dirt or moisture from entering the compartments. Seals shall allow door to operate in extreme temperatures ranging from plus 180 to minus 40 degrees Fahrenheit. Side, top and bottom seals shall be provided to resist ingress of dirt and weather and be made of Santoprene.

All hinges, barrel clips and end pieces shall be nylon 66. All nylon components shall withstand temperatures from plus 300 to minus 40 degrees Fahrenheit. Hardened plastic shall not be acceptable.

A polished stainless steel lift bar shall be provided for opening door. Lift bar shall be located at the bottom of door and have latches on the outer extrusion of the doors frame. A ledge shall be supplied over lift bar for additional area to aid in closing the door.

Doors shall be constructed from an aluminum box section. The exterior surface of each slat shall be flat. The interior surfaces shall be concave to provide strength and prevent loose equipment from jamming the door from inside.

To conserve space in the compartments, the spring roller assembly shall not exceed 3.00" in diameter. A roll-up door that retracts below the compartment ceiling (garage door style) shall not acceptable.

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

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

All mechanical components of the door shall be warranted to be free from defects in materials and workmanship for the lifetime of the vehicle. All parts covered under this warranty shall be to the original owner.

BODY MODIFICATION FROM STANDARD

The compartment above the stabilizers (if applicable) shall be decreased due to deeper stabilizer depth. The height of the compartment shall decrease 4.00" and the compartment door shall move up 4.00" higher. The outrigger frame opening as well as the stabilizer pan shall be increased in height by 6.00".

REAR BUMPER

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

DOOR GUARD

Eight (8) compartment doors shall include a guard/drip pan designed to protect the roll-up door from damage when in the retracted position and contain any water spray. The guard shall be fabricated from stainless steel and installed all compartments with roll-up doors.

PULL-OUT TRAY

There shall be four (4) slide-out trays with 2.00" sides and a minimum capacity of 500 pounds provided. Capacity rating shall be in the extended position.

Slides shall be General Device ball bearing type for ease of operation and years of dependable service.

Automatic locks shall be provided for both the "in" and "out" positions. The trip mechanism for it shall be located at the front of the tray for ease of use with a gloved hand.

Tray location shall be TBD.

Heavy-duty steel angle iron assembly shall support the body under the compartment floor. It shall be attached to the chassis frame for load transfer and to reduce stress on body.

SLIDE-OUT/TILT-DOWN TRAY

There shall be one (1) slide-out tray provided.

The capacity rating (in the extended position) shall be 215 pounds minimum.

Approximately two-thirds of the tray shall slide-out from its stored position and shall tilt 30 degrees down from horizontal. The vertical position within the compartment shall be adjustable.

Construction shall consist of .188" thick aluminum for the tray bottom and end, and special aluminum extrusions for the tray sides, front and tracks.

The tray corners shall be welded for strength and rigidity.

The tray shall be equipped with ball bearing rollers for smooth operation.

Two spring loaded locks shall be provided at the front of the tray, one on each end.

Rubber padded stops shall be provided for both the in out tray position.

The tray(s) shall be located in TBD.

COMPARTMENT MATTING

There shall be black Turtle Tile matting provided in N/A compartments. The tile shall be installed on the floor and shelves. Locations are, TBD.

BACKBOARD STORAGE

A transverse area over the pump and rearward shall hold two (2) backboards.

A blister shall be supplied at each side to enclose the backboard due to its length.

The backboards shall be accessible from the either side of the vehicle through stainless steel doors.

The size of the backboards are 18" wide x 72" long x 2.0" thick.

ADJUSTABLE SHELVES

There shall be eight (8) shelves, with a minimum capacity of 215 pounds provided. The shelf construction shall consist of .125" pan-shaped aluminum with 2.00" sides. Each shelf shall be infinitely adjustable by means of a threaded fastener, which slides in a track.

The location shall be TBD.

MOUNTING TRACKS

There shall be five (5) sets of tracks for mounting shelf(s) in TBD. These tracks shall be installed vertically to support the adjustable shelf(s).

RUB RAIL

Bottom edge of the side compartments shall be trimmed with a bright aluminum extruded rub rail.

Trim shall be 2.12" high with 1.38" flanges turned outward for rigidity.

The rub rails shall not be an integral part of the body construction, which allows replacement in the event of damage.

BODY FENDER CROWNS

Stainless steel fender crowns shall be provided around the rear wheel openings.

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

HARD SUCTION HOSE

NFPA 1901, 2016 edition, section 9.7.2 requires a minimum of 20 ft of suction hose or 15 ft of supply hose.

Hose is not on the apparatus as manufactured. The fire department shall provide suction or supply hose.

There shall be One (1) length of 10' long hose provided. The brand shall be KoChek.

HANDRAILS

The handrails shall be 1.25" diameter anodized aluminum extrusion, with a ribbed design, to provide a positive gripping surface.

Chrome plated end stanchions shall support the handrail. Plastic gaskets shall be used between end stanchions and any painted surfaces.

Drain holes shall be provided in the bottom of all vertically mounted handrails.

- Four (4) handrails shall be provided, two above each side pump panel.
- One (1) vertical handrail shall be provided on the driver's side body, on the front bulkhead door frame.

AIR BOTTLE STORAGE (Single bottle)

A total of eight (8) air bottle compartments shall be provided and located rearward and forward of DS & PS rear wheel well. The air bottle compartment shall be in the form of a round tube (7.63" diameter minimum) and of adequate depth to accommodate different size air bottles. Flooring shall be rubber lined and have a drain hole. A stainless steel door with a chrome-plated latch shall be provided to contain the air bottle. A dielectric barrier shall be provided between the door hinge, hinge fasteners and the body sheet metal.

A stainless steel scuffplate shall be provided around each air bottle compartment opening.

The scuffplates shall not be visible when the air bottle compartment door is closed.

EXTENSION LADDER
There shall be one (1) 35', two (2) section, aluminum, Duo-Safety, Series 1200-A extension ladder(s) provided.

EXTENSION LADDERS, AERIAL
There shall be one (1) 24', two (2) section, aluminum, Series 900-A extension ladder(s) provided.

ROOF LADDER
There shall be two (2), 16' aluminum, Duo-Safety, Series 875-A roof ladders provided.

ATTIC EXTENSION LADDER, AERIAL
There shall be one (1) 14' Fresno, aluminum, Duo-Safety, Series 701 extension ladder(s) provided.

FOLDING LADDER, AERIAL
There shall be one (1) 10' aluminum, Duo-Safety, Series 585-A folding ladder(s) provided.

GROUND LADDER STORAGE
The ground ladders are stored within the torque box and are removable from the rear.

Ladders shall be enclosed to prevent road dirt and debris from fouling or damaging the ladders.

The ladders rest in full length stainless steel slides and are arranged in such a manner that any one ladder can be removed without having to move or remove any other ladder.

A Gortite roll-up door shall be provided at the rear, double faced, aluminum construction, an anodized satin finish and manufactured by A&A Manufacturing (Gortite). The latching mechanism shall consist of a full length lift bar lock with latches on the outer extrusion of the door frame.

A stainless plate with a two 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 can not 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.

A door guard shall be provided to prevent tools inside the torque box from damaging the roll-up door.

PIKE POLES
There shall be two (2) 12 foot pike pole(s) with fiberglass I-beam handles provided. The pike pole(s) shall be stored in tubular holders located in the ground ladder storage compartment.

PIKE POLE 8 FT
There shall be two (2) 8 foot pike pole(s) with fiberglass I beam handles provided. The pike pole(s) shall be stored in tubular holders located in the ground ladder storage compartment.

PIKE POLE 6 FT
There shall be two (2) 6 foot pike pole(s) with fiberglass I beam handles provided. The pike pole(s) shall be stored in tubular holders located in the ground ladder storage compartment.

PIKE POLE 3 FT
There shall be two (2) three (3) foot pike pole(s) with fiberglass shaft and "D" handles shipped loose.

NEW YORK HOOKS
There shall be (2) 6 foot New York hook tools.

PUMP
Pump shall be a Waterous CSU, 2000 gpm single (1) stage midship mounted centrifugal type.

Pump shall be the class "A" type.

Pump shall deliver the percentage of rated discharge at pressures indicated below:
- 100% of rated capacity at 150 psi net pump pressure.
- 70% of rated capacity at 200 psi net pump pressure.
- 50% of rated capacity at 250 psi net pump pressure.

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

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

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

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

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

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

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

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

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

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

PUMP TRANSMISSION

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

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

AIR PUMP SHIFT

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

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

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

"Warning: Do not open throttle unless light is on".

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

TRANSMISSION LOCK-UP

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

AUXILIARY COOLING SYSTEM

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

INTAKE RELIEF VALVE

An Elkhart relief valve shall be installed on the suction side of the pump preset at 125 psig.

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

Outlet shall terminate below the framerails with a 2.50" National Standard hose thread adapter and shall have a "do not cap" warning tag.

Control shall be located behind an access door at the right (passenger's) side pump panel.

PRESSURE GOVERNOR

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 be connected directly to the engine mounted Electronic Control Module (ECM) or may be an integral part of the engine ECM. A pressure transducer shall be installed in the water discharge manifold on the pump. The transducer continuously monitors pump pressure sending a signal to the pressure governor. The pressure governor then sends a signal to the engine ECM, which modulates fueling in order to maintain a set pressure or engine speed (within engine/pump operating capabilities). There shall be no user serviceable items or maintenance required on the PSG system. The PSG system shall not require a mechanical drive, oil, or air supply for a means of control.

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

The pressure sensor governor system shall have two (2) modes of operation: pressure mode or rpm mode.

When in the pressure mode, the PSG system shall automatically maintain the discharge pressure set by the operator regardless of flow (within engine/pump operating capabilities).

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

A pump cavitation protection feature shall be provided which shall return the engine to idle should the pump cavitate.

A USB describing the operation of the pressure governor, and troubleshooting procedures shall also be provided with the apparatus.

PRIMER

An electric pump priming system shall be furnished with the apparatus. It shall consist of a rotary vane priming pump, driven by a 12 volt electric motor.

All rotating parts of the pump shall be made of corrosion resistant aluminum, stainless steel, or laminated phenolic.

Pump cylinder shall be made of aluminum alloy, hard anodized and Teflon coated, for corrosion resistance and long life.

The primer shall be built by the manufacturer of the fire pump.

A control located at the pump control panel shall operate the primer.

When dry, the pump system shall be capable of taking suction through 20 feet of hard suction hose and discharging water in not more than the time allowed by current NFPA 1901 standard. Also, rated capacity of the pump shall be achieved at the lift stated in current NFPA 1901 standard table.

RECIRCULATING LINE

A .50" diameter recirculating line, from the pump to the water tank, shall be furnished with a control installed at the pump operator's control panel.

THERMAL RELIEF VALVE

A Waterous Overheat Protection Manager (OPM) shall be mounted on the water pump. The OPM shall consist of a valve that opens and discharges to the ground when the water in the pump reaches 140 F and a warning light that is triggered when the water in the pump reaches 180 F. The warning light shall act as an additional protection device if the temperature in the pump keeps rising after the valve opens. The warning light with a test switch shall be mounted on the pump operator panel.

PUMP WARRANTY

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

Bidder Complies	
Yes	No

PUMP MANUALS
Two (2) pump manuals from the pump manufacturer shall be furnished in compact disc format with the apparatus. Manuals shall cover pump operation, maintenance, and parts.

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

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

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

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

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

PUMP PLUMBING WARRANTY
The stainless steel plumbing components and ancillary brass fittings used in the construction of the water/foam plumbing system shall be warranted for a period of **ten (10) years or 100,000 miles**. This covers structural failures caused by defective design or workmanship, or perforation caused by corrosion, provided the apparatus is used in a normal and reasonable manner. This warranty is extended only to the original purchaser for a period of ten years from the date of delivery. A copy of the warranty shall be submitted with the bid. (no exception)

MAIN PUMP INLETS
A 6.00" pump manifold inlet shall be provided on each side of the vehicle. The suction inlets shall include removable die cast zinc screens that are designed to provide cathodic protection for the pump, thus reducing corrosion in the pump.

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

The cap shall be the VLH, which incorporates a Pierce exclusive thread design to automatically relieve stored pressure in the line when disconnected. (no exception)

VALVES
All ball valves shall be Akron Brass in-line valves. The Akron valves shall be the 8000 series heavy-duty style with a stainless steel ball and a simple two-seat design. No lubrication or regular maintenance is required on the valve.

Valves shall have a ten (10) year warranty.

INLET (Left side)
On the left side pump panel shall be one (1) 2.50" auxiliary suction, terminating in 2.50" Macon Thread Standard 3.00x 8. The auxiliary suction shall be provided with a strainer, chrome swivel and plug.

INLET (Right side)
On the right side pump panel shall be one (1) 2.50" auxiliary suction, terminating in 2.50" Macon Thread Standard 3.00x8. The auxiliary suction shall be provided with a strainer, chrome swivel and plug.

The location of the valve for the two (2) inlets shall be recessed behind the pump panel.

ADAPTER, INLET
Two (2) adapters for the inlets shall be furnished with a special thread adapter, converting the National Standard hose thread to 3.00 x 8. A plug shall be provided.

INLET CONTROL
Control for the side auxiliary inlet(s) shall be located at the inlet valve.

INLET BLEEDER VALVE
A .75" bleeder valve shall be provided for each side gated inlet. The valves shall be located behind the panel with a swing style handle control extended to the outside of the panel. The handles shall be chrome plated and provide a visual indication of valve position. The swing handle shall provide an ergonomic position for operating the valve without twisting the wrist and provides excellent leverage. The water discharged by the bleeders shall be routed below the chassis frame rails.

TANK TO PUMP
The booster tank shall be connected to the intake side of the pump with heavy duty piping and a quarter turn 3.00" full flow line valve with the control remotely located at the operator's panel. Tank to pump line shall run straight (no elbows) from the pump into the front face of the water tank and angle down into the tank sump. A rubber coupling shall be included in this line to prevent damage from vibration or chassis flexing.

A check valve shall be provided in the tank to pump supply line to prevent the possibility of "back filling" the water tank.

TANK REFILL
A 1.50" combination tank refill and pump re-circulation line shall be provided, using a quarter-turn full flow ball valve controlled from the pump operator's panel.

DISCHARGE OUTLETS (Left Side)

There shall be two (2) discharge outlets with a 2.50" valve on the left side of the apparatus, terminating with a male 2.50" National Standard hose thread adapter.

DISCHARGE OUTLETS (Right Side)
There shall be one (1) discharge outlet 2.50" valve on the right side of the apparatus, terminating with a male 2.50" National Standard hose thread adapter.

DISCHARGE OUTLET, 4.00"
There shall be a 4.00" discharge outlet with a 3.50" Akron Slo-Cloz valve with a 3.00" ball, installed on the right side of the apparatus, terminating with male a 4.00" National Standard hose thread adapter. This discharge outlet shall be actuated with a handwheel control with position indicator at the pump operator's control panel.

DISCHARGE OUTLET (Front)
There shall be one (1) 1.50" gated discharge outlet/s, with a swivel, piped to the passenger's side on top of the front bumper extension.

Plumbing shall consist of 2.00" piping and flexible hose according to the design requirements of the chassis. A fabricated weldment made of black iron pipe shall be used in the plumbing where appropriate. A 2.00" full flow ball valve controlled at the pump operator's panel shall be used in the outlet plumbing. Automatic drains shall be provided at all low points of piping.

DISCHARGE CAPS
Chrome plated, rocker lug, caps with chains shall be furnished for all side discharge outlets.

The caps shall be the VLH, which incorporates an exclusive thread design to automatically relieve stored pressure in the line when disconnected. (no exception)

OUTLET BLEEDER VALVE
A .75" bleeder valve shall be provided for each outlet 1.50" or larger. Automatic drain valves are acceptable with some outlets if deemed appropriate with the application.

The valves shall be located behind the panel with a swing style handle control extended to the outside of the side pump panel. The handles shall be chrome plated and provide a visual indication of valve position. The swing handle shall provide an ergonomic position for operating the valve without twisting the wrist and provides excellent leverage. Bleeders shall be located at the bottom of the pump panel. They shall be properly labeled identifying the discharge they are plumbed in to. The water discharged by the bleeders shall be routed below the chassis frame rails.

ELBOWS, LEFT SIDE OUTLETS
The 2.50" discharge outlets, located on the left side pump panel, shall be furnished with a 2.50"(F) National Standard hose thread x 2.50"(M) National Standard hose thread, chrome plated, 45 degree elbow.

The elbow shall be the VLH, which incorporates an exclusive thread design to automatically relieve stored pressure in the line when disconnected. (no exception)

ELBOWS, RIGHT SIDE OUTLETS

The 2.50" discharge outlets, located on the right side pump panel, shall be furnished with a 2.50"(F) National Standard hose thread x 2.50"(M) National Standard hose thread, chrome plated, 45 degree elbow.

The elbow shall be the VLH, which incorporates an exclusive thread design to automatically relieve stored pressure in the line when disconnected. (no exception)

ELBOW, 4.00" OUTLET

The 4.00" outlet shall be furnished with a 4.00"(F) National Standard hose thread x 5.00" Storz elbow adapter with Storz cap.

DISCHARGE OUTLET CONTROLS

The discharge outlets shall incorporate a quarter-turn ball valve with the control located at the pump operator's panel. The valve operating mechanism shall indicate the position of the valve.

If a handwheel control valve is used, the control shall be a minimum of a 3.9" diameter chrome plated handwheel with a dial position indicator built in to the center of the handwheel.

AERIAL OUTLET

The aerial waterway shall be plumbed from the pump to the water tower line with 5.00" pipe and a 3.50" Waterous valve. The control for the waterway valve shall be located at the pump operator's panel.

An indicator shall be provided to show when the valve is in the open or closed position.

CROSSLAY HOSE BEDS

Two (2) crosslays with 1.50" outlets shall be provided. Each bed to be capable of carrying 200 feet of 1.75" double jacketed hose and shall be plumbed with 2.00" i.d. pipe and gated with a 2.00" quarter turn ball valve.

Outlets to be equipped with a 1.50" National Standard hose thread 90 degree swivel located in the hose bed so that hose may be removed from either side of apparatus.

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

The center crosslay dividers shall be fabricated of .25" aluminum and shall provide adjustment from side to side. The divider shall be unpainted with a brushed finish. The remainder of the crosslay bed shall be painted job color.

Vertical scuffplates, constructed of stainless steel, shall be provided at the front and rear ends

of the bed on each side of vehicle.

Crosslay bed flooring shall consist of removable perforated brushed aluminum.

CROSSLAY HOSE RESTRAINT
A 1.00" nylon webbing design restraint shall be provided across the ends of two (2) crosslay(s) to secure the hose during travel. The webbing assembly is to be attached at the bottom of the crosslays with footman loops and is to loop throught the upper footman loops at the top of the crosslays. The 1.00" web straps are to come down outboard and lock into a cam lock style buckle located down approx 2/3 of the height dimension, one each leg.

CROSSLAY COVER
A bi-fold aluminum treadplate cover shall be installed over the crosslay hose beds. It shall include a latch at each end of the cover to hold it securely in place, a chrome grab handle at each end for opening and closing the cover and a foam rubber gasket where the cover comes into contact to a painted surface.

FOAM SYSTEM
The foam system shall be externally mounted.

FOAM OUTLET AT PUMP PANEL
A foam outlet shall be provided for the foam tank. The outlet shall be plumbed directly to the foam tank. The plumbing shall include a 1.00" ball valve and a 1.00" quick disconnect fitting at the panel.

A mating quick disconnect fitting shall be shipped loose for connection with the customers foam eductor.

FOAM TANK
The foam tank shall be securely mounted ahead of the hose bed and shall have a capacity of 30 gallons with the intended use of Class "A" foam. The brand of foam stored in this tank shall be Ansul. The tank construction shall be of .50" polypropylene plastic with joints and seams nitrogen welded inside and outside. The fill tower shall be 8.00" square and contain a screen and non-foaming 4.00" diameter bottom fill tube.

FOAM TANK DRAIN
The foam tank drain shall be a 3/4" 1/4 turn ball type drain valve located inside the pump compartment accessible through a door on the passenger's side pump panel.

PUMP COMPARTMENT
The pump compartment shall be separate from the hose body and compartments so that each may flex independently of the other. It shall be a fabricated assembly of steel tubing, angles and channels which supports both the fire pump and the side running boards.

The pump compartment shall be mounted on the chassis frame rails with rubber biscuits in a

four point pattern to allow for chassis frame twist.

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

PUMP MOUNTING

Pump shall be mounted to a substructure which 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.

PUMP CONTROL PANELS (Left Side Control)

All pump controls and gauges shall be located at the left (driver's) side of the apparatus and properly identified.

Layout of the pump control panel shall be ergonomically efficient and systematically organized.

The pump operator's control panel shall be removable in two (2) main sections for ease of maintenance:

The upper section shall contain sub panels for the mounting of the pump pressure control device, engine monitoring gauges, electrical switches, and foam controls (if applicable). Sub panels shall be removable from the face of the pump panel for ease of maintenance. Below the sub panels shall be located all valve controls and line pressure gauges.

The lower section of the panel shall contain all inlets, outlets, and drains.

All push/pull valve controls shall have 1/4 turn locking control rods with polished chrome plated zinc tee handles. Guides for the push/pull control rods shall be chrome plated zinc castings securely mounted to the pump panel. Push/pull valve controls shall be capable of locking in any position. The control rods shall pull straight out of the panel and shall be equipped with universal joints to eliminate binding.

IDENTIFICATION TAGS

The identification tag for each valve control shall be recessed in the face of the tee handle.
All discharge outlets shall have color coded identification tags, with each discharge having its own unique color. Color coding shall include the labeling of the outlet and the drain for each corresponding discharge.

All line pressure gauges shall be mounted directly above the corresponding discharge control tee handles and recessed within the same chrome plated casting as the rod guide for quick identification. The gauge and rod guide casting shall be removable from the face of the pump panel for ease of maintenance. The casting shall be color coded to correspond with the discharge identification tag.

All remaining identification tags shall be mounted on the pump panel in chrome plated bezels.

The pump panel on the right (passenger's) side shall be removable with lift and turn type fasteners.

Trim rings shall be installed around all inlets and outlets.

The trim rings for the side discharge outlets shall be color coded and labeled to correspond with the discharge identification tag.

PUMP PANEL CONFIGURATION

The pump panel configuration shall be arranged and installed in an organized manner that shall provide user-friendly operation.

PUMP OPERATOR'S PLATFORM

A pull out platform shall be provided at the pump operator's control panel.

The front edge and the top surface of the platform shall be made of bright aluminum treadplate with a Morton Cass insert.

The platform shall be 22.00" deep and 35.00" wide. The platform shall lock in the retracted and the extended position.

The platform shall be wired to the "step not stowed" indicator in the cab.

PUMP AND GAUGE PANEL

The pump and gauge panels shall be constructed of stainless steel with a brushed finish. A polished aluminum trim molding shall be provided on both sides of the pump panel.

The passenger's side pump panel shall be removable and fastened with swell type fasteners.

On the front of the pump house structure, provisions shall be provided for access to the pump.

PUMP PANEL GAUGES AND CONTROLS

The following shall be provided on the pump and gauge panels in a neat and orderly fashion:

- Engine Oil Pressure Gauge: With visual and audible warning

- Engine Water Temperature Gauge: With visual and audible warning

- Tachometer: Electric

- Master Pump Drain Control

- Voltmeter

- Check Transmission Warning Indicator Light

- Stop Engine Warning Indicator Light

- Check Engine Warning Indicator Light.

- Pump Hourmeter

COMPARTMENT, CAB LIFT CONTROL PANEL
A compartment shall be provided at the pump panel, driver's and passenger's side. This compartment shall be large enough to house the control panel for the cab lift. A stainless steel door shall be provided.

AIR HORN BUTTON
An air horn control button shall be provided at the pump operator's control panel. This button shall be properly labeled and put within easy reach of the operator.

GAUGES, VACUUM and PRESSURE
The pump vacuum and pressure gauges shall be silicone filled and manufactured by Class 1, Inc.

The gauges shall be a minimum of 4.00" in diameter and shall have white faces with black lettering, with a pressure range of 30.00"-0-600#.

Gauge construction shall include a Zytel nylon case with adhesive mounting gasket and threaded retaining nut.

The pump pressure and vacuum gauges shall be installed adjacent to each other at the pump operator's control panel.

Test port connections shall be provided at the pump operator's panel. One shall be connected to the intake side of the pump, and the other to the discharge manifold of the pump. They shall have 0.25 in. standard pipe thread connections and non-corrosive polished stainless steel or brass plugs. They shall be marked with a label.

This gauge shall include a 10 year warranty against leakage, pointer defect, and defective bourdon tube.

PRESSURE GAUGES
The individual "line" pressure gauges for the discharges shall be interlube filled and manufactured by Class 1.

They shall be a minimum of 2.00" in diameter and shall have white faces with black lettering.

Gauge construction shall include a Zytel nylon case with adhesive mounting gasket and threaded retaining nut.

Gauges shall have a pressure range of 30"-0-400#.

The individual pressure gauge shall be installed as close to the outlet control as practical.

This gauge shall include a 10 year warranty against leakage, pointer defect, and defective bourdon tube.

WATER LEVEL GAUGE

An Innovative Controls electric water level indicator shall be provided on the gauge panel. The gauge shall register by means of 14 high intensity LED lights in an inverted "v" pattern. This level monitor shall indicate the following:

- Full
- 3/4
- 1/2
- 1/4
- Refill

The water level indicator shall utilize a chemical resistant PVC probe.

WATER LEVEL GAUGE, CAB SIDES

A water level gauge system shall be provided at each side of crew cab. Each system shall be provided with four (4) Whelen, vertical mounted LED lights with flanges. The total quantity of the water level gauge systems to be provided shall be one (1).

The following lights shall be mounted and indicate the following:

Model 50G00FGR top light with green LED light with green lens.
water tank level full.
Model 50B00FBR second light with blue LED lights with blue lens.
water tank level 3/4 full.
Model 50A00FAR third light with amber LED lights with amber lens.
water tank level 1/2 full.
Model 50R00FRR bottom light with red LED lights with red lens.
water tank level 1/4 full when on solid and shall flash when empty.

The above system shall function similar to the standard five (5) light at the pump panel. The system shall activate parking brake is set.

FOAM LEVEL GAUGE

An Innovative Controls electric foam level indicator shall be provided on the gauge panel that registers by means of fourteen high intensity LED lights in an inverted "v" pattern. This level monitor shall indicate the following:

- Full

- 3/4
- 1/2
- 1/4
- Refill

The water level indicator shall utilize a chemical resistant PVC probe.

LIGHT SHIELD

The pump panel controls and gauges shall be illuminated by incandescent lights installed under an aluminum diamond plate combination step/light shield. The stepping surface shall be a minimum of 8.00" deep and properly reinforced to support a man's weight.

Illumination shall be provided for controls, switches, essential instructions, gauges, and instruments necessary for the operation of the apparatus and the equipment provided on it. External illumination shall be a minimum of five (5) foot-candles on the face of the device. Internal illumination shall be a minimum of four (4) footlamberts.

One (1) pump panel light shall come on when the pump is shifted into gear from inside the cab. This shall afford the operator some illumination when first approaching the control panel. The remaining lights shall be actuated from a switch located on the pump panel.

One (1) Weldon, Model 9186-23882-30, step light shall be provided. The step light shall be installed as to illuminate the top of the step for night time vision. The step light shall be activated by the pump panel light switch.

An additional step/light shield shall be provided above passenger's side pump panel. The pump panel shall be illuminated by incandescent lights installed under a bright aluminum treadplate step.

The step shall have a minimum of an 8.00" stepping surface and it shall be properly reinforced to support a man's weight.

The lights shall be operated from a switch on the pump panel.

One (1) Weldon, Model 9186-23882-30, step light shall be provided. The step light shall be installed as to illuminate the top of the step for night time vision. The step light shall be activated by the pump panel light switch.

ELECTRICAL

All 12-volt electrical equipment installed by the apparatus manufacturer shall conform to modern automotive practices. All wiring shall be high temperature type. Wiring shall be run in loom, where exposed, and have grommets where wire passes through sheet metal. Automatic reset circuit breakers shall be provided which conform to SAE Standards. 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, rope caulk is not acceptable. 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 that have their 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.

All lights and reflectors, required to comply with Federal Motor Vehicle Safety Standard #108, shall be furnished. Rear identification lights shall be recessed mounted for protection. Lights and wiring mounted in the rear bulkheads shall be protected from damage by installing a false bulkhead inside the rear compartments.

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.

STEP LIGHTS

Six (6) Ri-Tar, Model M27HW2 LED step lights shall be provided on the aerial body. Two (2) of the lights shall be provided one (1) each side at the front of body and two (2) at each set of the steps leading to the aerial turntable.

The two (2) lights on the front of the body shall be actuated with the pump panel light switch. The rear step lights shall be actuated by the aerial master switch in the cab.

REAR FMVSS LIGHTING

A pair of Weldon, Model 3884, three (3) lamp modules shall be provided. Each module shall include a stop-tail light, arrow directional light and backup light mounted in a polished aluminum housing.

The lights shall be mounted on the face of the rear body compartments.

Four (4) red reflectors shall be provided.

A Weldon, Model 23882-2600-00 license plate bracket shall be mounted on the driver's side above the warning lights. A Weldon, Model 9186-23882-30, step lamp shall illuminate the license plate.

REAR ID/MARKER DOT LIGHTING

The three (3) identification lights located at the rear shall be installed per the following:

Ri-Tar, Model M27, LED
As close as practical to the vertical centerline.
Centers spaced not less than six (6) inches or more than twelve (12) inches apart.
Red in color.
All at the same height.

The four (4) clearance lights located at the rear shall be installed per the following:

Ri-Tar, Model M27, LED
To indicate the overall width of the vehicle.
One (1) each side of the vertical centerline.
All at the same height.
As near the top as practical.
To be visible from the rear and the side.
One (1) each side, facing the side.
One (1) each side, facing the rear.

Per FMVSS 108 and CMVSS 108 requirements.

MAP LIGHT

One (1) map light with goose neck shall be provided. Each map light shall be a Southern Vehicle Products, model ML-5, with clear lens and be located on right side of cab dash. Each map light shall be provided with an 21.00" long flexible neck.

LIGHT, INTERMEDIATE
There shall be one (1) pair, of Truck-Lite, Model: 60115Y, amber, LED, turn signal, marker lights furnished, one (1) each side, horizontally in the rear fender panel.

A stainless steel trim shall be included with this installation.

MARKER LIGHTS
There shall be one (1) pair of amber and red LED marker lights with rubber arm, located back corners of apparatus. 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 of the vehicle.

"DO NOT MOVE APPARATUS" INDICATOR
A flashing red indicator light, located in the driving compartment, shall be illuminated automatically per the current NFPA requirements. The light shall be labeled "Do Not Move Apparatus If Light Is On".

The same circuit that activates the Do Not Move Apparatus indicator shall not activate any alarm when the parking brake is released.

OPEN DOOR INDICATOR LIGHT
Two (2) red indicator lights shall be provided and located in clear view of the driver, warning of an open passenger or equipment compartment door.

One (1) light shall indicate status of doors on the driver's side of the vehicle and the other light shall indicate the status of the passenger side and rear compartment doors.

COMPARTMENT LIGHTING
LED strip lighting shall be provided in each enclosed compartment.

Opening the compartment door shall automatically turn compartment lighting on.

PUMP COMPARTMENT LIGHT
A pump compartment light shall be provided inside the right side pump enclosure and accessible through a door on the pump panel.

A .125" weep hole shall be provided in each light lens, preventing moisture retention.

PERIMETER SCENE LIGHTS, CAB
There shall be a Truck-Lite, model 60, grommet mount weatherproof light provided for each cab door. Lighting shall be designed to provide illumination on areas under the driver, officer, and crew cab riding area exits, which shall be activated automatically when the exit doors are opened and by the same means as the body perimeter lights.

The lighting shall be capable of providing illumination at a minimum level of two (2) foot-candles on ground areas within 30.00" of the edge of the apparatus in areas which personnel climb in or out of the apparatus or descend from the apparatus to the ground level.

PERIMETER SCENE LIGHTS, BODY

There shall be a total of four (4) Truck-Lite, model 60, grommet mount, weatherproof lights provided on the apparatus. Two (2) lights shall be provided under the rear step area and two (2) lights shall be provided under the pump panel running boards. The lights shall be spaced one (1) each side of apparatus and have a clear lens. The perimeter scene lights shall be activated by a cab and crew cab door switch and a switch on the instrument panel.

The lighting shall be capable of providing illumination at a minimum level of two (2) foot-candles on ground areas within 30.00" of the edge of the apparatus in areas designed for personnel to climb onto the apparatus or descend from the apparatus to the ground level.

WORK LIGHTS

Two (2)-6.00" Unity AG deck lights shall be provided at the rear of the apparatus. The lights shall be furnished with a halogen flood bulb.

HANDHELD LIGHT

There shall be two (4) lights provided, Streamlight LiteBox, mounted TBD at dealer location.

The LiteBox shall be orange in color.

EYEBROW EXTERIOR LIGHT

LED light mounted over the front cab of windshield.

AIR HORN SYSTEM

Two (2) Hadley round air horns with 6.00" bell shall be provided and located, in the front bumper, recessed each side. The horn system shall be piped to the air brake system wet tank utilizing .38" tubing. A pressure protection valve shall be installed in-line to prevent loss of air, in the air brake system.

AIR HORN CONTROL

The air horns shall be actuated by a push button located on officer side instrument panel and by the horn button in the steering wheel. The driver shall have the option to control the air horns or the chassis horns from the horn button by means of a selector switch located on the instrument panel.

ELECTRONIC SIREN

A Whelen, Model: 295SLSA1, electronic siren with noise canceling microphone shall be provided.

Siren head shall be located on a swivel bracket mounted on the headliner so that it is accessible to both the driver and officer. The swivel bracket shall be capable of rotating a minimum of 180 degrees.

The electronic siren shall be actuated by a push button located on the officer's side instrument panel and by the horn button in the steering wheel.

The driver shall have the option to control the siren or the chassis horns from the horn button by means of a selector switch located on the instrument panel.

The siren will also include Rumbler low tone siren.

SPEAKER

There shall be one (1) speaker provided. Each speaker shall be a Whelen, Model SA122FMP, cast aluminum, 100-watt, flange mount with polished aluminum finish. Each speaker shall be connected to the siren amplifier.

The speaker(s) shall be recessed in the front bumper on the driver's side.

MECHANICAL SIREN, (Auxiliary)

A Federal Q2B siren shall be furnished. A siren brake button shall be installed on the switch panel.

The mechanical siren shall be mounted on the bumper deckplate. It shall be mounted on the left side. The siren mounting shall include a reinforcement plate.

The mechanical siren shall be actuated by a push button located on the officer's side instrument panel and by the horn button in the steering wheel.

The driver shall have the option to control the siren or the chassis horns from the horn button by means of a selector switch located on the instrument panel.

A second siren brake switch shall be installed on the passenger side.

Custom LED flag cut out.

Custom grill with Macon-Bibb cut out.

WARNING LIGHT (Cab Roof)

Two (2) 24" Whelen model FNMINI LED lightbars shall be mounted on the cab roof, one (1) on each side, above the driver's and passenger's door. The lights shall be mounted at 30 degrees.

Each lightbar shall include the following:

One (1) forward facing red LED flashing light.
One (1) side facing red LED flashing light.
Two (2) corner red LED flashing lights.

One (1) switch located in the cab on the switch panel shall control these lights.

WARNING LIGHTS (CAB ROOF SIDES)

Two (2) 24" Whelen, Model: Freedom Mini LED lightbars shall be mounted on the roof, one (1) on each side, over the crew cab doors.

Each lightbar shall include the following:
Two (2) red flashing corner LED modules.
Two (2) red flashing LED light.

These lightbars shall be controlled by the roof light switch.

Each lightbar shall be furnished with a clear lens.

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.

The flashing shall automatically cancel when the headlight switch is activated or when the parking brake is set.

SIDE ZONE LOWER LIGHTING

Six (6) flashing super LED lights shall be located at the following positions:
Two (2) lights, one (1) each side on the bumper extension - red Super LED/red lens each side.
Two (2) lights, midway - amber Super LED/amber lens each side.
Two (2) lights, N/A - red Super LED/red lens each side.

The lights shall be controlled by a lighted switch on the cab instrument panel.

These lights shall be installed N/A.

LIGHT, SIDE ZONE UPPER

There shall be four (4), Whelen model 70*02F**, Super LED flashing lights provided, two (2) each side of the air conditioner housings in place of the standard 700 series LED lights. The lights shall be located one (1) pair to the front and one (1) pair to the rear on the air condition each side. The lights color location shall be Evenly spaced on the AC condenser covers (2) two each side.

Each light shall be mounted with a chrome plated flange.

The color of these lights shall be DS red Super LED/red, clear Super LED/Clear, PS red Super LED/red, clear Super LED/Clear.

The lights shall be activated by the "NFPA Roof Light" switch.

WARNING LIGHTS (Side)
one (1) pair of Whelen, Model 60*02F*R, LED flashing lights shall be provided.

The lights shall be located on side of cab low rear of crew door.

The color of the lights shall be red Super LED/red lens.

The light shall be with a flange.

The light shall be activated with the emergency master.

REAR ZONE LOWER LIGHTING
Two (2) Whelen model 60*02F*R flashing "Super" LED warning lights shall be located at the rear of the apparatus, required to meet or exceed the lower level optical warning and optical power requirements of NFPA.

The color of these lights shall be red Super LED/red lens.

One (1) switch in the cab on the switch panel shall control these lights.

These lights shall be installed with a flange.

LIGHT, REAR UPPER ZONE, BLOCKING
Two (2) Whelen Model 60*02F*R, super LED lights shall be provided at the rear of apparatus at a level of 62.00" or higher, one (1) each side of rear bulkhead near top DS / PS - under clearance lights and above series 700 red warning lights lights.

The color of these lights shall be blue Super LED/blue lens.

The lights shall be activated by a separate switch in the cab and when the parking break is applied.

These lights shall be installed with a flange.

WARNING LIGHTS (Rear of Hose Bed)
There shall be one (1) Whelen Model L31HRFN LED warning beacon and one (1) Whelen Model L31HAFN LED warning beacon provided at the rear of the truck.

The red beacon shall be on the driver's side and the amber beacon shall be on the passenger's side. The amber beacon shall be programmed with the NFPA flash pattern.

An additional amber Whelen Super 500 shall be installed on the side of the body that the Amber beacon is located. This is to meet NFPA.

These lights shall be activated by a lighted switch on the instrument panel.

LIGHT, REAR UPPER ZONE, BLOCKING

There shall be two (2) Whelen, Model: 70R00FRR, red LED lights provided at the rear of apparatus at a level of 62.00" or higher, One (1) each side of upper rear bulkheads DS & PS just below blue lights 600 series.From top of bulkhead should have clearance light, blue light and this light..

The lights shall be activated whenever the rear upper zone switch is on.

These lights shall be installed with a flange.

TRAFFIC DIRECTING LIGHT

There shall be one (1) Whelen model TAM85, 46.00" long x 2.84" high x 2.24" deep, amber LED traffic directing light installed at the rear of the apparatus.

The Whelen model TACTLD1 control head shall be included with this installation.
The auxillary warning mode shall be activated with the control head only.

This traffic directing light shall be surface mounted over the rear door, inside a treadplate box at the rear of the apparatus as high as practical.

The traffic directing light control head shall be located in the driver side overhead switch panel in the right panel position.

ELECTRICAL SYSTEM GENERAL DESIGN for ALTERNATING CURRENT

The following guidelines shall apply to the 120/240 VAC system installation:

General

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 1901, all components, equipment and installation procedures shall conform to NFPA 70, National Electrical Code (herein referred to as the NEC).

Line voltage electrical system equipment and materials included on the apparatus shall be listed and installed in accordance with the manufacturer's instructions. All products shall

be used only in the manner for which they have been listed.

Grounding
Grounding shall be in accordance with Section 250-6 "Portable and Vehicle Mounted Generators" of the NEC. Ungrounded systems shall not be used. Only stranded or braided copper conductors shall be used for grounding and bonding.

An equipment grounding means shall be provided in accordance with Section 250-91 (Grounding Conductor Material) of the NEC.

The grounded current carrying conductor (neutral) shall be insulated from the equipment grounding conductors and from the equipment enclosures and other grounded parts. The neutral conductor shall be colored white or gray in accordance with Section 200-6 (Means of Identifying Grounding Conductors) of the NEC.

In addition to the bonding required for the low voltage return current, each body and driving or crew compartment enclosure shall be bonded to the vehicle frame by a copper conductor. This conductor shall have a minimum amperage rating of 115 percent of the nameplate current rating of the power source specification label as defined in Section 310-15 (amp capacities) of the NEC. A single conductor properly sized to meet the low voltage and line voltage requirements shall be permitted to be used.

All power source system mechanical and electrical components shall be sized to support the continuous duty nameplate rating of the power source.

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.

Overcurrent protection
The conductors used in the power supply assembly between the output terminals of the power source and the main over current protection device shall not exceed 144 inches. (3658 mm) in

length.

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

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

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 inches (305 mm), or properly shielded, from exhaust piping

- Separated from fuel lines by a minimum of six (6) inches (152 mm) distance.

Electrical cord or conduit shall be supported within six (6) inches (152 mm) of any junction box and at a minimum of every 24 inches (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 function 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 inches (610 mm) from the ground. Receptacles on off-road vehicles shall be a minimum of 30 inches (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 inches (762 mm) above the interior floor height.

All receptacles shall be marked with the type of line voltage (120-volts or 240-volts) 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 UL 498, Standard for Safety Attachment Plugs and Receptacles, or other appropriate performance standards. Receptacles used for direct current voltages shall be rated for the appropriate service.

Electrical System Testing

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

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

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

Operational Test per Current NFPA 1901 Standard

The apparatus manufacturer shall perform the following operation test and ensure that the power source and any devices that are attached to the line voltage electrical system are properly connected and in working order. The test shall be witnessed and the results certified by Underwriters Laboratories.

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

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

1901 standard.

Where the line voltage power is derived from the vehicle's low voltage system, the minimum continuous electrical load as defined in the current NFPA 1901 standard shall be applied to the low voltage electrical system during the operational test.

GENERATOR

The apparatus shall be equipped with a complete electrical power system. The generator shall be a Harrison Model MCR Stealth 10.0 kW Hydraulic unit. The wiring and generator installation shall conform to the present National Electrical Codes Standards of the National Fire Protection Association. The installation shall be designed for continuous operation without overheating and undue stress on components.

Generator Performance

- Continuous Duty Rating: 10,000 watts
- Nominal Volts: 120/240
- Amperage: 80 @ 120 volts, 40 @ 240 volts
- Phase: Single
- Cycles: 60 hertz
- Engine Speed at Engagement: Idle
- RPM range: 900 to 3,000 (hydraulic pump)

The output of the generator shall be controlled by an internal hydraulic system. An electrical instrument gauge panel shall be provided for the operator to monitor and control all electrical operations and output.

The generator shall be driven by a transmission power take off unit, through a hydraulic pump and motor.

The generator shall include an electrical control inside the cab. The hydraulic engagement supply shall be operational at any time (no interlocks).

An electric/hydraulic valve shall supply hydraulic fluid to the clutch engagement unit provided on the chassis PTO drive.

Generator Instruments and Controls

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

- Voltage

- Amperage for both lines

- Frequency

- Generator run hours

- Over current indication

- Over temperature indication

- "Power On" indication

- Two (2) fuse holders with two (2) amp fuses (for indicator light protection)

The meter and indicators shall be installed near eye level in the compartment. Instruments shall be flush mounted in an appropriate sized weatherproof electrical enclosure. All instruments used shall be accurate within +/- two (2) percent.

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

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

Load Center:
The main load center shall be a Cutler Hammer with circuit breakers rated to load demand.

Circuit Breakers:
Individual breakers shall be provided for all on-line equipment to isolate a tripped breaker from affecting any other on-line equipment.

GENERATOR LOCATION
The generator shall be mounted in the DS in cargo bed above pump. The flooring in this area shall be either reinforced or constructed, in such a manner, that it shall handle the additional

weight of the generator.

GENERATOR START
A switch shall be located on the cab instrument panel to engage the generator.

CIRCUIT BREAKER PANEL
The circuit breaker panel shall be located DS compartment above the front stabilizer.

CUP HOLDER
A cup holder shall be provided for the Two (2) to securely hold the push-up pole in place while in the lower position.

120 VOLT LIGHTING
A Fire Research Model #FC700-S75 quartz tube flood light shall be provided.

The light shall be a portable style with quick release truck mounting brackets.

The light fixture shall be a single 750 watt, 120 volt Focus light that draws 6.3 amps.

The lamp head shall swivel 360 degrees left or right and tilt up and down with on/off switch on the lamp head.

A receptacle shall be provided near the base of the light.

A 20 amp, 120 volt, twist-lock plug with protective boot shall be provided.

A total of Two (2) shall be provided One (1) each side rear turntable catwalk DS & PS.

240 VOLT LIGHTING
A Fire Research model #OPA530-HR90 side mount, bottom raise HIR flood light shall be provided.

The telescoping pole shall be as long as is practical to fit in the location it is mounted.

The light shall be connected to the "Do Not Move Truck" indicator in the cab.

The light fixture shall be a single 900 watt, 240 volt HIR Optimum lamphead that draws 3.8 amps. The light shall provide a minimum of 32,000 lumens.

The lamp head shall swivel 360 degrees left or right and tilt up and down. All wiring used up to the junction box shall be a minimum of 14 gauge 3 wire cable that is properly supported and protected from damage.

A total of two (2) shall be provided One (1) each side of rear of cab DS/PS with rubber

bumper to protect cab wall.

LIGHT POLE GUARD

A polished stainless steel guard shall be provided at the rear of the cab to cover the light pole for a telescoping floodlight. This guard shall provide protection for the pole from any damage that may be caused by the hose couplings during removal of hose from the crosslay hose beds.

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

20 AMP RECEPTACLE

Wired to the power supply shall be six (6) receptacles that are a 120 volt 20 amp three wire twist-lock NEMA L5-20 type with weather resisting cover located One each - DS/PS front of forward catwalk, One each - DS/PS rear fender panel, over forward tamdem, One each - DS/PS rear inside tail lights.

KUSSMAUL AUTO EJECT FOR SHORELINE

two (2) shoreline receptacles shall be provided to operate the dedicated 120-volt circuits on the truck without the use of the generator.

The shoreline receptacle (s) shall be provided with a NEMA 5-20, 120 volt, 20 amp, straight blade Kussmaul Super auto eject plug with a black weatherproof cover. The cover is spring loaded to close, preventing water from entering when the shoreline is not connected.

The unit is completely sealed to prevent road dirt contamination.

A solenoid wired to the vehicle's starter is energized when the engine is started. This instantaneously drives the plug from the receptacle.

An internal switch arrangement shall be provided to disconnect the load prior to ejection to eliminate arcing of the connector contacts.

The shoreline shall be connected to battery charger and EMS compartment strip.

A mating connector body shall also be supplied with the loose equipment.

The shoreline receptacle shall be located on the driver and passenger side of cab, above wheel.

FOUR (4)-SECTION 105 FOOT AERIAL LADDER

CONSTRUCTION STANDARDS

The ladder shall be constructed to meet all of the requirements as described in the current NFPA 1901 standards.

The aerial device shall be a true ladder type device; therefore ladders attached to booms shall not be considered.

These capabilities shall be established in an unsupported configuration.

All structural load supporting elements of the aerial device that are made of a ductile material shall have a design stress of not more than 50% of the minimum yield strength of the material based on the combination of the live load and the dead load. This 2:1 structural safety factor meets the current NFPA 1901 standard.

All structural load supporting elements of the aerial device that are made of non-ductile material shall have a design stress of not more than 20% of the minimum ultimate strength of the material, based on the combination of the rated capacity and the dead load. This 5:1 safety factor meets the current 1901 NFPA standard.

Wire ropes and attaching systems used to extend and retract the fly sections shall have a 5:1 safety factor based on the ultimate strength under all operating conditions. The factor of safety for the wire rope shall remain above 2:1 during any extension or retraction stall. The minimum ratio of the diameter of wire rope used to the diameter of the sheave used shall be 1:12. Wire ropes shall be constructed of seven (7) strands over an inner wire core for increased flexibility. The wire rope shall be galvanized to reduce corrosion.

The aerial device shall be capable of sustaining a static load one and one-half times its rated tip load capacity (live load) in every position in which the aerial device can be placed when the vehicle is on a firm level surface.

The aerial device shall be capable of sustaining a static load one and one-third times its rated tip load capacity (live load) in every position the aerial device can be placed when the vehicle is on a slope of five degrees downward in the direction most likely to cause overturning.

With the aerial device out of the cradle and in the fully extended position at zero degrees elevation, a test load shall be applied in a horizontal direction normal to the centerline of the ladder. The turntable shall not rotate and the ladder shall not deflect beyond what the product specification allows.

All welding of aerial components, including the aerial ladder sections, turntable, pedestal, and outriggers, shall be in compliance with the American Welding Society standards. All welding personnel shall be certified, as qualified under AWS welding codes.

All material and welds shall have a fatigue life structural safety factor of 2:1. This shall be derived from taking into account structure weight, payload, wind load, ice load, nozzle reactions, and dynamics.

The aerial device shall be capable of operating with the maximum rated tip load in either of the two (2) following conditions:

- Conditions of high wind up to 50 mph

- Conditions of icing, up to a coating of .25" over the entire aerial structure

All of the design criteria must be supported by the following test data: (no exception)

- Strain gage testing of the complete aerial device

- Analysis of deflection data taken while the aerial device was under test load

The following standards for materials are to be used in the design of the aerial device:

- Materials are to be certified by the mill that manufactured the material

- Materials that are certified or recertified by vendors other than the mill shall not be acceptable

- Material testing that is performed after the mill test shall be for verification only and not with the intent of changing the classification

- All welded structural components for the ladder shall be traceable to their mill lots

LADDER CONSTRUCTION

The ladder shall be comprised of four sections and shall extend to a minimum height of 105 feet above the ground at 75 degrees.

The aerial device shall have a horizontal reach of no less than 100 feet. (no exception)

Tri-Color LED lighting shall be provided to show the height extension of the ladder.

The ladder shall have the capability to support a minimum of 750 pounds at the tip in the unsupported configuration, based upon 360 degree rotation, up to full extension and from -5 degrees to +75 degrees.

The ladder (handrails, baserails, trusses, K-braces and rungs) shall be constructed of high strength low alloy steel, minimum 70,000 pounds per square inch yield, with full traceability on all structural members.

Each section shall be trussed diagonally, vertically and horizontally using welded steel tubing.

All critical points shall be reinforced for extra rigidity and to provide a high strength-to-weight ratio.

All ladder rungs shall be round and welded to each section utilizing "K" bracing for torsional

rigidity.

The inside width dimensions of the ladder shall be:

- Base Section 39.00"
- Inner-Mid Section 32.25"
- Outer-Mid Section 26.62"
- Fly Section 21.38"

The height of the handrails above the centerline of the rungs shall be:

- Base Section 26.75"
- Inner-Mid Section 22.87"
- Outer-Mid Section 20.25"
- Fly Section 17.50"

The ladder shall be designed to provide continuous egress for firefighters and civilians from an elevated position to the ground. The end of the fly section shall be constructed in a manner that aids personnel in climbing off the ladder.

The egress section shall be designed to maintain the rated load of the aerial device. It shall be bolted on for easy replacement.

Each rung shall be covered with a secure, heavy-duty, fiberglass pultrusion that incorporates an aggressive, no-slip coating.

The rung covers shall be glued to each rung, and shall be easily replaceable should the rung cover become damaged.

Each rung cover edge shall have 2.00" of photo-luminescent, aggressive, no-slip coating to assist in providing a light source for each rung during low light conditions.

The photo-luminescent coating shall remain visible for up to 20 hours after exposure to light.

Rungs should be illuminated via LED strip lighting.

Under no circumstances shall the rung covers be fastened to the rungs using screws or rivets. (no exception)

The rung covers shall have a 10-year, limited warranty.

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.

The turntable shall be a 1.00" thick steel deck, coated with a non-skid, chemical resistant material in the walking areas. The stepping surfaces shall meet the skid-resistance requirements of the current NFPA 1901 standard.

The turntable platform shall be 1.00" thick steel deck that is rectangular-shaped, 95.00" wide x 84.50" long.

The turntable shall be lighted by a minimum of two (2) work lights activated by the aerial master switch.

The turntable handrails shall be a minimum 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.

ELEVATION SYSTEM

Two (2) double acting lift cylinders shall be utilized to provide smooth precise elevation from 5 degrees below horizontal to 75 degrees above horizontal.

The lift cylinders shall have a 6.00" internal diameter (bore), .50" wall thickness, 4.50" diameter cylinder rod and a 33.38" stroke.

The lift cylinders shall be equipped with integral holding valves located on the cylinder to prevent the unit from falling should the charged lines be severed at any point within the hydraulic system.

They also have spherical bushings at each end to reduce pin wear.

Both raising and lowering functions are influenced by flow compensation, which maintains ladder tip speed within approximately 10% regardless of load, angle or extension.

Ladder tip speed is automatically decelerated when the angle is above 60 degrees, reducing "tip-lash".

The pivot pins shall be stainless steel with greaseless bushings and shall be 2.25" in diameter. All elevation pins shall be stainless steel.

EXTENSION/RETRACTION SYSTEM

Bidder Complies	
Yes	No

A full hydraulic powered extension and retraction system shall be provided using two (2) hydraulic cylinders and wire ropes.

Each cylinder is capable of operating the ladder in the event of a failure to the other.

The extension cylinder shall have a 3.00" internal diameter (bore), 1.75" diameter rod and a 134.00" stroke.

Extension and retraction shall be internally limited within the cylinders, eliminating excess strain on wire ropes, sheaves and the ladder structure.

Each of the cylinders, wire ropes and sheave assemblies shall be completely independent of the other, so as to provide a safety factor wherein a failure of one assembly shall not affect the function and operation of the other.

The extension cylinders shall be equipped with integral holding valves to prevent the unit from retracting should the charged lines be severed at any point within the hydraulic system.

The cylinders shall also have internal deceleration valves to cushion the movement of the cylinder when approaching full extension or retraction.

The reeling of the wire rope shall be such as to provide synchronized, simultaneous movement of all sections to full extension.

The extension/retraction cables shall be 7-flex galvanized wire rope with stainless steel threaded ends and shall possess the following characteristics:

- Inner Section .50" diameter with 26,200# nominal design strength

- Mid Section .38" diameter with 14,880# nominal design strength

- Fly Section .31" diameter with 10,380# nominal design strength

Wear pads made of polymer material shall be used between the telescoping sections for maximum weight distribution, strength and smoothness of operation.

Adjustment screws shall be provided on the wear pads to permit proper side alignment.

All sheaves shall be plastic and greaseless and all sheave pins and pivot pins shall be polished stainless steel. (no exception)

ROTATION SYSTEM

A 46.00" diameter, external tooth, monorace, slewing ring bearing shall be used for the rotation system. The gear teeth shall be stub tooth form.

The bearing race shall have sealed 1.00" ball bearings.

The bearing shall provide 360 degree continuous rotation.

The turntable shall be bolted to the bearing using 36 SAE Grade 8, .875" diameter bolts.

To secure the bearing to the torque box, 36 Grade 8, .875" diameter bolts shall be used.

The turntable base and the torque box bearing plate shall be machined flat, within .007" thereby providing even distribution of forces.

A hydraulically driven, planetary gear box with a drive speed reducer shall be used to provide infinite and minute rotation control throughout the entire rotational travel.

The planetary gearbox shall have a torque rating of 100,000 pounds per inch.

A spring applied, hydraulically released disc type swing brake shall be furnished to provide positive braking of the turntable assembly.

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 the side in which the stabilizers have not been fully deployed or are short-jacked.

The mechanism shall allow full and unrestricted use of the aerial in the 180 degree area on the side(s) where the stabilizers have been fully deployed.

The system shall also have a manual override to comply with NFPA 1901.

This shall consist of a switch located in the lower control station so that activation shall require two (2) persons (one at an aerial device control location and one at the lower control station).

SYSTEMS THAT PERMIT THE AERIAL TO ROTATE TO THE "SHORT JACK" SIDE WITHOUT AUTOMATICALLY STOPPING THE ROTATION AND/OR WITHOUT ACTUATION OF THE "MANUAL OVERRIDE" SHALL NOT BE ACCEPTED. SYSTEMS THAT ONLY INCLUDE AN ALARM ARE NOT CONSIDERED AN INTERLOCK AND SHALL NOT BE ACCEPTED.

TORQUE BOX

A "torsion box" subframe shall be installed between the two (2) sets of stabilizers.

The torque box shall be constructed of .312" steel plate (50,000 pounds per square inch yield) with steel tubing reinforcement on each side of the box in the turntable area.

The dimensions of the torque box shall be 41.00" wide x 29.00" high x 256.00" long.

The torque box subframe assembly is capable of withstanding all torsional and horizontal loads when the unit is on the stabilizers.

The torque box shall be bolted to the chassis frame rails using 20 SAE Grade 8, .750" bolts with nuts.

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)

50 MPH WIND CONDITIONS/WATERWAY DRY

Degrees of Elevation	-5 to 9	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 75
Egress	750	750	750	750	750	750	750	750
Fly	-	-	-	-	-	-	250	750
Upper Mid	-	-	-	-	250	250	500	750
Lower Mid	-	-	-	250	250	500	1000	1000
Base	-	-	250	250	250	750	1000	1000

50 MPH WIND CONDITIONS/WATERWAY CHARGED

Degrees of Elevation	-5 to 9	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 75
Egress	500	500	500	500	500	500	500	500
Fly	-	-	-	-	-	250	500	750
Upper Mid	-	-	-	-	250	500	750	1000
Lower Mid	-	-	-	250	500	750	1000	1000
Base	-	-	250	500	750	1000	1000	1000

Reduced loads at the tip can be redistributed in 250 lb. increments to the fly, mid, or base sections as needed.

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 scuffplate shall be provided where the

ladder comes into contact with the boom support.

The boom support shall be located just to the rear of the chassis cab.

EXTENSION INDICATOR

Extension markings and corresponding numerical indicators shall be provided along each inside and outside top rail of the base section of the aerial every ten (10) feet. They shall indicate various positions of extension up to full. Markings and indicators shall be clearly visible to the console operator. To aid in visibility during hours of darkness, the markings and numerical indicators shall be of a red reflective material.

FOLDING STEPS

One (1) set of folding steps shall be provided at the tip of the ladder. An additional set of folding steps shall be provided at the base of the fly section. The steps shall be bright finished, non-skid luminescent folding type. The luminescent coating is rechargeable from any light source and can hold a charge for up to 24 hours.

SPOTLIGHTS

Four (4) Unity AG-S-4007 12 volt spot/flood lights shall be furnished.

The two (2) "tracking lights" shall be mounted on the base section of the ladder, one (1) on each side.

The two (2) "tip lights" shall be mounted on the tip of the ladder, one (1) on each side.

The lights shall be mounted below the handrail height so as not to increase the overall height of the unit.

An individual master switch with appropriate identification labels shall be provided for the "tracking lights" and "tip lights" in addition to the on/off switch located on the light itself.

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.

- 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 interlocks and control switches

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 console 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 control console.

MASTER OVERRIDE CONTROLS
An emergency power switch shall be located at the rear of the apparatus. The switch shall activate the emergency power unit and allow control of the aerial or stabilizers based on the direction the switch is toggled.

A work light shall be provided to illuminate the master override controls when the battery switch is active and the master override door is open.

BOOM SUPPORT
A Turck 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 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 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 the lifting of the aerial from the nested position until 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 once the aerial has been elevated from the nested position.

STABILIZER ALARM
An electronic warning device shall be provided at each stabilizer to warn personnel that the stabilizers are being deployed. Each alarm shall produce a fast pulsing 90 DBA signal and shall cancel only when the stabilizer is put into a load bearing configuration.

STABILIZER SCENE LIGHTS
A 4.00" clear floodlight shall be provided on each stabilizer to illuminate the surrounding area. The light shall be actuated 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. They are capable of being operated independently or simultaneously.

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 and light
- Operator's load chart
- Stabilizer Not Fully Extended indicator light
- 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

STABILIZERS

The vehicle shall come equipped with a stabilization system consisting of four (4) hydraulically operated out and down style stabilizers. This system shall meet or exceed all requirements of the NFPA specifications related to stabilization and setup on sloped surfaces.

The stabilizer/leveling jacks shall have a maximum spread of 16' measured from the centerline of the jack footpads when the beams are fully extended. The beams shall be 6.88" wide x 9.00" high with 3/4" thick top and bottom plates and 3/4" thick sides of 100,000-PSI minimum yield strength steel. The cylinders shall have pilot-operated check valves with thermal relief designed to insure that the beams shall not drift out of the stowed position during travel. Wear pads shall guide the stabilizers.

The horizontal extension cylinders shall be totally enclosed within the beams and shall incorporate telescoping hydraulic tubing to supply the jack cylinder hydraulic power. Stabilizer hydraulic hoses shall remain stationary during operation of the stabilizers to prevent hose wear and potential failure. The cylinders shall be equipped with decelerators to reduce the speed of extension and retraction when the beams are near the fully retracted and extended positions. The stabilizer extension hydraulic cylinders shall have the following dimensions: 2.25" bore, 1.38" rod, and 51.25" stroke.

The vertical jack cylinders shall be capable of 18.00" ground penetration. The cylinders shall be supplied with pilot operated check valves on each jack cylinder to hold the cylinder in the stowed or working position, should a charged line be severed at any point in the hydraulic system. For safety, the integral holding valves shall be located in the cylinder base end, NOT in the transfer tube. Vertical jack cylinder rods shall be fully enclosed by a telescoping inner box to protect the cylinder rods from damage. The stabilizer jack hydraulic cylinders shall have the following dimensions: 4.50" bore, 3.00" rod, and 34.88" stroke.

Each stabilizer jack shall have a polished stainless steel shield. The stainless steel shield shall be a maximum of 14.00" wide so as to allow the extension of the stabilizer between parked cars or other obstacles. This plate shall serve as a protective guard and a mounting surface for warning lights. The top, forward, and rear edges shall be flanged back 90 degrees for added strength. Each stabilizer shall be supplied with a red LED warning light on each side of the beam. A reflective stripe shall be provided on the horizontal and vertical beams of each stabilizer. A 4.00" diameter clear work light shall be provided to illuminate the stabilizer and the ground. Lighting shall automatically activate with the aerial master switch.
Stabilizer pads should be pre-attached to the outriggers

STABILIZER PADS

The stabilizer footpad shall be 12.00" in diameter. The footpad shall be attached to the jack cylinder rod by means of a machined ball at the end of the jack cylinder rod which mates to a socket machined into the footpad. The footpad shall have the ability to pivot 20 degrees from horizontal in any direction to allow setup on uneven terrain.

AUXILIARY STABILIZER PADS

An auxiliary ground pad shall be supplied for each stabilizer to provide additional load distribution on soft surfaces. The pads shall be 24.00" square and made from a lightweight composite material. The ground pressure shall not exceed 75 pounds per square inch when the ground pads are used, and the apparatus is fully loaded, and the aerial device is carrying its rated capacity in any position. They shall also be attached to outrigger stabilizers.

STABILIZER CONTROLS

An electrically controlled hydraulic valve shall power stabilizer movement. The valve can also be manually controlled in the event of electrical malfunction. Hydraulic power override controls shall be incorporated into the valve. The manual override mechanism shall be completely sealed within the valve assembly to prevent any possibility of corrosion.

The stabilizer controls shall be located to provide the operator with a full view of each stabilizer being positioned. Each stabilizer control panel shall include the following:

-In/out stabilizer beam control toggle switch
-Up/down stabilizer jack control toggle switch
-Emergency hydraulic power unit (EPU) control toggle switch
-High idle control toggle switch
-Stabilizer fully extended LED indicator lights
-Stabilizer planted LED indicator lights

As a safety device, an electrically actuated diverter valve shall be provided. The hydraulic power shall be diverted to the aerial ladder controls automatically the instant all stabilizer jacks are firmly planted on the ground. Once the aerial ladder is raised from the bedded position, the stabilizer hydraulic power is cut off so the stabilizers shall not accidentally be moved while the aerial is being operated.

To aid in leveling the unit, two bubble type angle indicators shall be located near the stabilizer controls. One indicator shall show the angle of the truck from the front to rear and the other shall show the side to side angle of the truck. The indicators shall be color coded green to show when the truck has been properly leveled allowing the aerial device to be operated at full capacity.

A stabilizer deployment audible warning alarm shall be provided at each side of the body, activated by the stabilizer movement.

A "Stabilizers Not Stowed" indicator light shall be provided in the cab within view of the driver. It shall illuminate automatically whenever the stabilizers are not fully stowed to prevent damage to the vehicle if it is moved. The stabilizer system shall also be wired to the "Do Not Move Truck" indicator light. This light shall flash whenever the apparatus parking brake is not engaged and the stabilizers are not fully stowed.

STABILIZER PINS

The stabilizer jacks shall have holes for the stabilizer pins.

STAINLESS STEEL DOORS, STABILIZER CONTROL BOX
Vertically hinged stainless steel doors shall be provided over each stabilizer control box. The doors shall be hinged inboard.

STABILIZER WARNING LIGHTS
Four (4) Whelen model 60*02F*R, flashing Super LED warning light shall be mounted on the stabilizer cover panel, one (1) for each panel.

Front stabilizer LEDs to be red Super LED/red lens each side.
Rear stabilizer LEDs to be red Super LED/red lens each side.

These warning lights shall be activated by the NFPA side zone switch.

These lights shall be provided with a flange.

STABILIZER BEAM WARNING LIGHTS
Two (2) 4.00" diameter red LED flashing lights shall be mounted on each stabilizer, one (1) facing forward and one (1) facing rearward.

The lights shall be Grote Supernova 40 series LED lights.

The lights shall be recessed in the horizontal beam of the stabilizer.

These warning lights shall be activated with the aerial master switch.

HYDRAULIC SYSTEM
All hose assemblies shall be assembled and crimped by the hose manufactures certified technician. An assembly cell shall be located on the premises where the technician can perform audits of the final aerial assembly for proper fitting torque and hose routing.

All manufacturing employees responsible for the installation of hydraulic components shall be properly trained. Training shall include: proper handling, installation, torque requirements, cleanliness and quality control procedures for hydraulic components.

Hoses used in the aerial hydraulic system shall be of a premium quality hose with a high abrasion resistant cover. All pressure hoses shall have a working pressure of 4000 psi. and a burst pressure rating of 16,000 psi.

The hydraulic oil shall be a premium Multi-Vis product that shall have a leading edge additive

package, provide oxidation stability, be extremely shear stable, and have maximum anti-wear properties. All oil delivered to the manufacturing site shall have a minimum ISO cleanliness level of 18/15/13.

Each aerial shall be evaluated as to the region and climate where it shall be used to determine the optimum viscosity and proper oil grade. Oil viscosity shall be based on an optimum range of 80 to 1000 SUS during normal aerial use. Before shipment of the unit, an oil sample shall be taken and analyzed to confirm the oil is within the allowable ISO grade tolerance.

The aerial hydraulic system shall have a minimum oil cleanliness level of ISO 18/15/13 based on the ISO 4406:1999 cleanliness standard. Each customer shall receive a certificate of actual cleanliness test results and an explanation of the rating system.

Each aerial shall include an oil sample port, identified with a yellow dust cap and a label, for subsequent customer testing.

Ball valves shall be provided in the hydraulic suction and return lines to permit component servicing without draining the oil reservoir.

The system hydraulic pressure shall be displayed on a 2.5" liquid filled gauge, located on the control console.

The hydraulic system shall be additionally protected from excessive pressure by a secondary pressure relief valve set at 3150 psi. In the event the main hydraulic pump compensator malfunctions, the secondary relief shall prevent system damage.

HYDRAULIC CYLINDERS

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

Each cylinder shall include integral safety holding cartridges. No manifold or transfer tube mounted cartridges shall be acceptable.

Each cylinder shall be designed to a minimum safety factor of 4:1 to failure.

All safety holding cartridges shall be installed at the cylinder manufacturer, in a controlled clean environment to avoid possible contamination and or failure.

HYDRAULIC PUMP

The hydraulic system shall be supplied by a variable displacement, load and pressure compensating piston pump. The pump shall meet the demands of all three (3) simultaneous aerial functions. The pump shall provide proper flow for a single aerial function with the engine at idle speed. A switch shall be provided on the control console to increase the engine speed for multiple function operation.

EMERGENCY PUMP

The aerial shall be equipped with an emergency hydraulic pump, electrically driven from the truck batteries. The pump shall be capable of running for 30 minutes for limited aerial functions to stow the unit in case of a main pump or truck system failure. A momentary switch shall be located at the stabilizer and aerial control locations to activate the emergency pump.

AERIAL CONTROL VALVE

The aerial hydraulic control valve shall be designed with special spool flows, limiting the oil flow for the designed function speed. The valve shall be manually controlled and be located in the control console with the handles protruding through the operating surface for operation. The activation handles shall be spaced a minimum of 3.5" for ease of operation.

OIL RESERVOIR

The oil reservoir shall have a minimum capacity of 38 gallons. The oil fill location shall be easily accessible and be labeled "Hydraulic Oil Only" and also indicate the grade of oil that is installed in the reservoir. The fill shall have a desiccant breather filter with a water capacity of 4 fluid ounces and a 5 micron rating. A drain hose shall be included and shall terminate with a quarter turn ball valve. Two suction ports shall be provided, one for the main hydraulic pump and one for the emergency pump. The main suction shall be slightly elevated off the bottom of the reservoir and include a 100 mesh suction strainer. The emergency suction port shall be closer to the bottom of the reservoir to provide some reserve oil for emergency operation. A six (6) disc type magnetic drain shall also be provided to collect any ferrous contaminants. A float type sending unit in the reservoir shall provide an indication of oil level on an electric gauge mounted adjacent to the fill location.

HIGH PRESSURE FILTER

The pressure filter shall be rated for 6,000 psi working pressure and generously sized for efficiency and capacity. A 90 psi bypass spring shall be included to protect the element and hydraulic system during lower than normal system operating temperatures.

The 5Q filter element shall be constructed of a micro glass medium, which has the highest capture efficiency, dirt holding capacity and life expectancy over other media such as cellulose and synthetic. The nominal rating shall be 5 micron and have an efficiency rating of 99.3 % for 5 micron sized particles. The element shall have a dirt holding capacity of not less than 35 grams.

RETURN FILTER

The return filter shall be rated for 800 psi working pressure and generously sized for efficiency and capacity. A 25 psi bypass spring shall be included to protect the element and hydraulic system during lower than normal system operating temperatures. The 5Q filter element shall be constructed of a micro glass medium, which has the highest capture efficiency, dirt holding capacity and life expectancy over other media such as cellulose and synthetic. The nominal rating shall be 5 microns and have an efficiency rating of 99.6% for 5

micron sized particles. The element shall have a dirt holding capacity of not less than 40 grams.

HYDRAULIC SWIVEL

The aerial ladder shall be equipped with a three (3) port, 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 degrees rotation of the aerial while connecting all electrical circuits through the rotation point. A minimum of 32 collector rings shall be provided that are capable of supplying 20 amp continuous service. All collector rings shall be enclosed and protected with desiccant plugs against condensation and corrosion. No oil or silicone shall be used.

12-BIT ABSOLUTE ENCODER

The aerial ladder shall be equipped with a 12-Bit Absolute Encoder which provides 4096 counts per shaft turn for position and direction reference.

The 12-Bit Absolute Encoder shall provide a unique binary word to reference each position and direction for all 360 degrees of rotation.

If the power is interrupted for any reason, the 12-Bit Absolute Encoder shall allow power to be returned to the system without having to re-zero the settings.

The 12-Bit Absolute Encoder shall be an integral part of a micro-processor based control system.

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 fire apparatus manufacturer's warranty shall be included with the bid.

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.

The supplier's obligation under this warranty shall be limited to the replacement or repair of any failed components. The buyer understands that the seller shall not be liable for any other costs or damages.

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

Each component supplier's obligation under this warranty shall be limited to the replacement or repair of any failed components. The buyer understands that the seller shall not be liable for any other costs or damages.

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

120-VOLT RECEPTACLE AT TIP
A 120-volt, 20 amp, three (3)-prong twist lock receptacle, with weatherproof cover shall be provided at the tip of the aerial device.

COMMUNICATION SYSTEM
An Atkinson communication system shall be furnished between the aerial tip and the turntable operator's position. The communication system shall be a two (2)-way system with the communication speaker at the tip requiring no operator attention to transmit or receive. The transmitting and receiving volume controls shall be located at the turntable operator's position.

BREATHING AIR TO TIP
Breathing air shall be supplied to the tip of the aerial device. The air system shall incorporate a 444 cubic foot, 4500 pounds per square inch cylinder with regulator and two (2) gauges, 50' refill hose, 400-pound system alarm, and one (1) Hansen fitting.

BREATHING AIR LEVEL AND WARNING SYSTEM
The breathing air system shall be equipped with a Fire Research Corporation (FRC) breathing air monitoring system to give the operator a visible indication of the air remaining in the system and to warn the operator when the air volume becomes low.

A remote display with an audible warning device shall be provided at each operating position. Each display shall consist of a five (5) digit LED readout, show pressure and percent of air in

the bottle, display air pressure in PSI, kPA or Bar, and automatically adjust LED brightness for day/night viewing. When the air remaining falls to 20 percent of total volume, an audible alarm shall activate. When the air further depletes to 10 percent of total volume, a second, louder alarm shall activate.

RAISED AERIAL PEDESTAL

The aerial pedestal shall be raised to accommodate the height of the cab.

COLLISION AVOIDANCE

The Aerial device shall be supplied with a collision avoidance control system. The collision avoidance control system shall be calibrated so that the Aerial device does not make contact with any part of the fire apparatus during normal operation. The collision avoidance control system shall consist of the following sensors:

- Single axis sensor to determine Aerial device elevation.
- Angle sensors to determine turntable angle with reference to Aerial device position.
- 12 bit absolute encoder integral to the swivel to determine Aerial device rotation.

The Aerial ladder shall be equipped with a 12-Bit Absolute Encoder, which provides 4096 counts per shaft turn for position and direction reference.

The 12-Bit Absolute Encoder shall provide a unique binary word to reference each position and direction for all 360 degrees of rotation.

If the power is interrupted for any reason, the 12-Bit Absolute Encoder shall allow power to be returned to the system without having to re-zero the settings.

The 12-Bit Absolute Encoder shall be an integral part of a microprocessor-based control system

The collision avoidance control system shall be divided up to a maximum of 9 control zones. Each zone shall have its own independent rotation and elevation parameters.

The collision avoidance control system shall be equipped with a warning system that alerts the operator when the Aerial device has reached the limits of each control zone. The warning system shall sound when either the rotation or elevation movements reach the limits of the control zone.

The warning system alarm and light shall be active whenever the ladder is in a restricted area and shall then prevent Aerial device movement.

COMMAND ZONE WARRANTY

The Command Zone components shall be warranted against defective materials or workmanship for a period of **five (5) years** from the date of delivery to the original

purchaser. The warranty shall also include a standard repair time for covered components.

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

LIFTING EYE - ROPE RESCUE ATTACHMENT

Two (2) eyes shall be welded, one (1) to each ladder beam, at the ladder egress with a spreader bar to mounted between the eyes. This design shall distribute a load evenly across the ladder beams because of a single lifting eye on the spreader bar. The bar is retained by two (2) locking pins, one (1) at each end outboard of each eye. Leveling is maintained by the bar rotating in the eyes.

MANSAVER™ BARS, AERIAL TURNTABLE

ManSaver™ bars shall be installed at the aerial turntable.

WATER SYSTEM

A waterway system shall be provided consisting of the following components and features:

A 5.00" pipe connected to the water supply on one end and to a water swivel at the rotation point of the turntable. The water swivel shall allow the ladder to rotate 360 degrees continuously while flowing water.

A 4.00" waterway swivel is to be routed through the rotation point swivel up to the heel pin swivel. The heel pin swivel shall allow the water to flow to the ladder pipe while elevating the aerial ladder from -5 degrees to 75 degrees. The heel pivot pin is not integral with the waterway swivel at any point. The design of the waterway shall allow complete servicing of the waterway swivel without disturbing the heel pivot pin.

The integral telescopic water system shall consist of a 4.50" diameter tube in the base section, a 4.00" diameter tube in the inner mid-section, 3.50" diameter tube in the outer mid-section and a 3.00" diameter tube in the fly section. The telescopic water pipes shall be anodized aluminum.

The rotational torque shall have adequate power to rotate the ladder into a full 1000 gallon per minute water stream directed at 90 degrees to the side while maintaining the fully rated tip load.

The aerial shall be capable of discharging up to 1000 gallons per minute at 100 pounds per square inch parallel to the ladder and 90 degrees to each side of center while maintaining the fully rated tip load.

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

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

AERIAL MONITOR

An Akron, model 3578 monitor with stow and deploy shall be provided at the tip with a Akron 2000 gpm model 5178.

The monitor's functions shall be controlled electrically from two (2) separate locations. One (1) control shall be located at the control console and the other at the ladder tip.

There shall be a courtesy light at the tip of the aerial to illuminate the controls.

FLOW METERS

A Fire Research Corporation (FRC) Model FP530, combination digital pressure and flow indicator with four (4) digit LED display shall be provided for the aerial waterway at the turntable control station.

The display shall have a flow totalizer, programmable high and low flow warnings, and automatically adjust LED brighness for day/night viewing.

REAR INLET

A 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" chrome plated adapter and a 5.00" chrome plated, long handle cap.

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 location shall be changeable by the use of a single handle, located at 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 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 connecting or disconnecting electrical lines.

TOOLS

The following tools shall be provided for retorquing of all specified bolts as recommended by the manufacturer:

- Torque Wrench

- All Required Extensions, Sockets and Adapters

- 4-to-1 Multiplier

MANUALS

Two (2) operator maintenance manuals and two (2) wiring diagrams pertaining to the aerial device shall be provided with the apparatus at time of pick-up.

INITIAL INSTRUCTION

On initial delivery of the fire apparatus, the contractor shall supply a qualified representative to demonstrate the apparatus and provide initial instruction to the fire department regarding the operation, care, and maintenance of the apparatus for a period of not less than three (3) days.

LOOSE EQUIPMENT

The following equipment shall be furnished with the completed unit:

- One (1) bag of chrome, stainless steel, or cadmium plated screws, nuts, bolts and washers, as used in the construction of the unit

NFPA REQUIRED LOOSE EQUIPMENT, PROVIDED BY FIRE DEPARTMENT

The following loose equipment as outlined in NFPA 1901, 2016 edition, section 9.8.2 and 9.8.3 shall be provided by the fire department. All loose equipment shall be installed on the apparatus before placed in emergency service unless the fire department waives NFPA section 4.21.

- 800 ft (240 m) of 2½". (65 mm) or larger fire hose, in any combination.

- 400 ft (120 m) of 1½" (38 mm), 1¾" (45 mm), or 2" (52 mm) fire hose, in any combination.

- One (1) handline nozzle, 200 gpm (750 L/min) minimum.

- Two (2) handline nozzles, 95 gpm (360 L/min) minimum.

- One (1) playpipe with shutoff and 1" (25 mm), 1 1/8" (29 mm), and 1¼" (32 mm) tips.

- One (1) SCBA complying with NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire and Emergency Services*, for each assigned seating position, but not fewer than four (4), mounted in brackets fastened to the apparatus or stored in containers supplied by the SCBA manufacturer.

- One (1) spare SCBA cylinder for each SCBA carried, each mounted in a bracket fastened to the apparatus or stored in a specially designed storage space(s).

- One (1) first aid kit.

- Four (4) salvage covers, each a minimum size of 12 ft × 14 ft (3.6 m × 5.5 m).

- Four (4) combination spanner wrenches mounted in brackets fastened to the apparatus.

- Two (2) hydrant wrenches mounted in brackets fastened to the apparatus.

- One (1) double female 2½" (65 mm) adapter with National Hose threads, mounted in a bracket fastened to the apparatus.

- One (1) double male 2½" (65 mm) adapter with National Hose threads, mounted in a bracket fastened to the apparatus.

- One (1) rubber mallet, for use on suction hose connections, mounted in a bracket fastened to the apparatus.

- Four (4) ladder belts meeting the requirements of NFPA 1983, *Standard on Fire Service Life Safety Rope and System Components*.

- One (1) 150 ft (45 m) light-use life safety rope meeting the requirements of NFPA 1983, *Standard on Fire Service Life Safety Rope and System Components.*

- One (1) 150 ft (45 m) general-use life safety rope meeting the requirements of NFPA 1983, *Standard on Fire Service Life Safety Rope and System Components.*

- One (1) traffic vest for each seating position, each vest to comply with ANSI/ISEA 207, *Standard for High Visibility Public Safety Vests*, and have a five-point breakaway feature that includes two at the shoulders, two at the sides, and one at the front.

- Five (5) fluorescent orange traffic cones not less than 28" (711 mm) in height, each equipped with a 6" (152 mm) retro-reflective white band no more than 4" (152 mm) from the top of the cone, and an additional 4" (102 mm) retro-reflective white band 2"

(51 mm) below the 6" (152 mm) band.

- Five (5) illuminated warning devices such as highway flares, unless the five (5) fluorescent orange traffic cones have illuminating capabilities.

- One automatic external defibrillator (AED).

- If the supply hose carried does not use sexless couplings, an additional double female adapter and double male adapter, sized to fit the supply hose carried, shall be carried mounted in brackets fastened to the apparatus.

- If none of the pump intakes are valved, a hose appliance that is equipped with one or more gated intakes with female swivel connection(s) compatible with the supply hose used on one side and a swivel connection with pump intake threads on the other side shall be carried. Any intake connection larger than 3 in. (75 mm) shall include a pressure relief device that meets the requirements of 16.6.6.

- If the apparatus does not have a 2½" National Hose (NH) intake, an adapter from 2½" NH female to a pump intake shall be carried, mounted in a bracket fastened to the apparatus if not already mounted directly to the intake.

- If the supply hose carried has other than 2½" National Hose (NH) threads, adapters shall be carried to allow feeding the supply hose from a 2½" NH thread male discharge and to allow the hose to connect to a 2½" NH female intake, mounted in brackets fastened to the apparatus if not already mounted directly to the discharge or intake.

SOFT SUCTION HOSE
There shall be no soft suction hose provided.

STRAINER, PROVIDED BY FIRE DEPARTMENT
NFPA 1901, 2009 edition, section 9.7.2.1.1 requires a suction strainer when suction hose is provided.

The strainer is not on the apparatus as manufactured. The fire department shall provide the suction strainer.

DRY CHEMICAL EXTINGUISHER PROVIDED BY FIRE DEPARTMENT
NFPA 1901, 2009 edition, section 9.8.3 requires one (1) approved dry chemical portable fire extinguisher with a minimum 80-B:C rating mounted in a bracket fastened to the apparatus.

The extinguisher is not on the apparatus as manufactured. The fire department shall provide and mount the extinguisher.

WATER EXTINGUISHER PROVIDED BY FIRE DEPARTMENT

NFPA 1901, 2009 edition, section 9.8.3 requires one (1) 2.5 gallon or larger water extinguisher mounted in a bracket fastened to the apparatus.

The extinguisher is not on the apparatus as manufactured. The fire department shall provide and mount the extinguisher.

AXE, FLATHEAD, PROVIDED BY FIRE DEPARTMENT

NFPA 1901, 2009 edition, Section 9.8.3 requires one (1) flathead axe mounted in a bracket fastened to the apparatus.

The axe is not on the apparatus as manufactured. The fire department shall provide and mount the axe.

AXE, PICKHEAD, PROVIDED BY FIRE DEPARTMENT

NFPA 1901, 2009 edition, Section 9.8.3 requires one (1) pickhead axe mounted in a bracket fastened to the apparatus.

The axe is not on the apparatus as manufactured. The fire department shall provide and mount the axe.

PAINT

The exterior custom cab and body painting procedure shall consist of a six (6) step finishing process as follows:

1. Manual Surface Preparation - All exposed metal surfaces on the custom cab and body shall be thoroughly cleaned and prepared for painting. Surfaces that shall not be painted include all chrome plated, 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 are chemically cleaned to remove all dirt, oil, grease and metal oxides to ensure the subsequent coatings bond well. An ultra pure water final rinse shall be applied to all metal surfaces, excluding undercarriage components, at the conclusion of the metal treatment process.

3. Primer/Surfacer Coats - A two (2) 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 (2) component sealer primer coat shall be applied over the sanded primer.

6. Topcoat Paint - Two (2) coats of an automotive grade, two (2) component acrylic urethane paint, shall also be applied.

All removable items such as brackets, compartment doors, door hinges, trim, etc. shall be removed and painted separately to insure paint behind all mounted items. Body assemblies that cannot be finish painted after assembly shall be finish painted before assembly.

The cab shall be two-tone, with the upper section painted White # 20 upper with special shield per LP print to match preivous units 19606 and 18400 along with a shield design on the cab face and lower section of the cab and body painted Red # 100 lower cab and body.

PAINT - ENVIRONMENTAL IMPACT

Contractor shall meet or exceed all current State (his) regulations concerning paint operations. Pollution control shall include measures to protect the atmosphere, water and soil. Controls shall include the following conditions:

- Topcoats and primers shall be chrome and lead free.

- Metal treatment chemicals shall be chrome free. The wastewater generated in the metal treatment process shall be treated on-site to remove any other heavy metals.

- Particulate emission collection from sanding operations shall have a 99.99% efficiency factor.

- Particulate emissions from painting operations shall be collected by a dry filter or water wash process. If the dry filter means is used, it shall have an efficiency rating of 98.00%. Water wash systems shall be 99.97% efficient.

- Water from water wash booths shall be reused. Solids shall be removed mechanically on a continual basis to keep the water clean.

- Paint wastes are disposed of in an environmentally safe manner. They are used as fuel in kilns used in the cement manufacturing process - thereby extracting energy from a waste material.

- Empty metal paint containers shall be cleaned, crushed, and recycled to recover the metal.

- Solvents used in cleanup operations shall be collected, sent off-site for distillation and returned for reuse. Residue from the distillation operation shall be used as fuel in off-site cement kilns.

Additionally, the finished apparatus shall not be manufactured with or contain products that have ozone depleting substances. Contractor shall, upon demand, present evidence that his manufacturing facility meets the above conditions and that it is in compliance with his State

EPA rules and regulations.

PAINT CHASSIS FRAME ASSEMBLY

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

WARRANTY - PAINT AND CORROSION

The cab and 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 **ten (10) years**.

The cab and body 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.

PAINT, COMPARTMENT INTERIOR

Interior of compartmentation shall be painted with a gray spatter type paint.

AERIAL DEVICE PAINT COLOR

All aerial device components above the rotation point that are not chrome plated, bright aluminum treadplate or stainless steel shall be painted.

All buy out components, such as monitor, nozzle, gauges, etc. shall be supplied as received from the vendor.

All areas to be painted shall be sanded to remove any metal flakes and smooth any rough surfaces.

All ladder surfaces to be painted shall be phosphatized to remove metal impurities, aid paint adhesion and inhibit rust.

The components shall be prime painted with an epoxy primer and finished painted with a durable, high quality white paint (manufacturer's standard brand).

The support structure, components below the rotation point, and the stabilizers shall be painted high gloss black.

The tip of the ladder shall be painted a contrasting color for high visibility.

REFLECTIVE STRIPES

Three (3) reflective stripes shall be provided along the sides of the cab and body. The

reflective band shall consist of a 1.00"-6.00"-1.00" white stripe on the cab and body, with a 1.00"-6.00"-1.00" ruby red stripe on the roll-up doors. All striping shall include a 1.00" gap between stripes.

The reflective band provided on the cab face shall be at the headlight level.

CHEVRON STRIPING, REAR

There shall be alternating chevron striping located on the rear-facing vertical surface of the apparatus. Covered surfaces shall include the rear wall, aluminum doors, and rear bumper. Rear compartment doors and stainless-steel access doors shall not be covered.

The colors shall be red and fluorescent yellow diamond grade.

Each stripe shall be 6.00" in width.

This shall meet the requirements of NFPA 1901, 2016 edition, which states that 50% of the rear surface shall be covered with chevron striping.

JOG(S) IN REFLECTIVE BAND

The reflective band located on each side of the apparatus body shall contain two (2) jog(s) and shall be angled at approximately a 45 degree "s" when installed.

OUTLINE, REFLECTIVE STRIPE

A Gold Metallic outline shall be applied on the top and the bottom of the reflective band. There shall be one (1) set of outline stripes required.

REAR BULKHEAD REFLECTIVE STRIPE

The reflective stripe shall continue from the sides, wrap around the rear body corners, and continue on the rear compartment bulkheads.

REFLECTIVE STRIPE, CAB DOORS

A 6.00" x 16.00" white reflective stripe shall be provided across the interior of each cab door. The stripe shall be located approximately 1.00" up from the bottom, on the door panel.

This stripe shall meet the NFPA 1901 requirement.

LETTERING ON AERIAL BOOM

There shall be 6.00" to 7.00" high black reflective vinyl lettering provided on a separate panel on each side of the base ladder section. The lettering shall include a red outline. The panels shall be painted # 10 White to match aerial device.

STRIPE, LOW ON CAB SIDE

A non-reflective gold vinyl stripe, with black outline, shall be provided on each side of the cab and low on the doors.

LETTERING
The lettering shall be 22 karat gold vinyl.

WARRANTY
The manufacturer shall provide a **twelve (12) year** warranty against defects in material and workmanship with the graphics process.

LETTERING
One (1) to twenty (20) Sign Gold lettering, 6.00" high, shall be provided. Each letter shall be imitation gold leaf totally encapsulated between two (2) layers of clear vinyl with an outline and shade.

LETTERING
Twenty One (21) to forty (40) Sign Gold lettering, 3.00" high, with outline and shade shall be provided. Each letter shall be imitation gold leaf totally encapsulated between two (2) layers of clear vinyl.

Lettering shall be installed TBD.

REFLECTIVE LETTERING
three (3) letters, 8.00" high ruby red reflective shall be installed on TBD.

REFLECTIVE LETTERING
six (6) letters, 6.00" high white reflective shall be installed on front cab corner - wrap around corner numbers TBD.

REFLECTIVE LETTERING ON ROLL-UP DOORS
There shall be one (1) set/s of reflective lettering, "KEEP BACK 500 FEET", supplied and installed on the rear compartment roll-up door/s. The lettering shall be ruby red in color.

REFLECTIVE LETTERING
nine (9) letters, 4.00" high ruby red reflective letter(s) with highlight and shading shall be installed on Ladder number TBD on front bumper.

DECAL INSTALLATION
There shall be one (1) pair of decals furnished by the fire department and applied by the apparatus manufacturer.

EMBLEM
There shall be two (2) pair of "Macon-Bibb" emblems installed on the inside of the cab and crew cab doors in place of the NFPA required striping. The required striping shall include yellow and red chevron striping.