SPECIFICATIONS FOR A 95' OR 100' TOWER LADDER
Sealed bids will be received by Village of Jordan for the furnishing of all necessary labor, equipment and material for the Fire Apparatus and other equipment as outlined in the following specifications.

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 cover the requirements as to the type of construction, finish, equipment and tests to which the fire apparatus shall conform. Minor details of construction and materials, which are not otherwise specified, are left to the discretion of the contractor.

Images and illustrative material in this specification are as accurate as known at the time of publication but are subject to change without notice. Images and illustrative material are for reference only and may include optional equipment and accessories and may not include all standard equipment.

INSTRUCTIONS TO BIDDERS
The purchaser's standards for bidding automotive fire apparatus must be strictly adhered to, and all bid forms and questions must be completed and submitted with the bid.

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. Furthermore, in order to insure fair, ethical, and legal competition, neither the original equipment manufacturer (O.E.M.) nor parent company of the O.E.M. shall have ever been fined or convicted of price fixing, bid rigging, or collusion in any domestic or international fire apparatus market (no exception).

If a bidder represents more than one fire apparatus company or brand of apparatus, they must only bid on the top of the line that meets specification.

Each bidder shall furnish satisfactory evidence of their ability to construct the apparatus specified.

Each bid shall be accompanied by a manufacturer's set of specifications consisting of a detailed description of the apparatus, construction methods, and equipment proposed to which the apparatus furnished under contract shall conform. These specifications shall indicate the size, type, model and make of all component's parts and equipment, providing proof of compliance with each and every item in the department's advertised specifications. A letter only, even though written on a company letterhead, shall not be sufficient. An exception to this requirement shall not be acceptable.

In accordance with the current edition of NFPA 1901 standards, the proposal shall specify whether the fire department or apparatus dealership shall provide required loose equipment.
The purchaser will utilize this advertised specification to compare all submitted bid proposals. To facilitate comparison, all bid proposal specifications shall be submitted in the same sequence as the advertised specification. Any bidder who fails to submit a set of bid proposal specifications, or who photocopies and submits these specifications as their own construction details will be considered non-responsive. This shall render such proposal ineligible for award.

THE PURCHASER HAS THE RIGHT TO REJECT ANY BIDS WHICH DOES NOT MEET THESE SPECIFICATIONS AND IS THE SOLE DECIDER TO DEEM WHICH BID IS IN THE BEST INTEREST OF THE PURCHASER.

EXCEPTIONS
These specifications are based upon design and performance criteria which have been developed by the fire department as a result of extensive research and careful analysis. Subsequently these specifications reflect the only type of fire apparatus that is acceptable at this time and all specifications herein contained are considered as minimum. Therefore, exceptions to the specifications may not be accepted.

Bidders shall indicate in the "yes/no" column if their bid complies on each item (paragraph) specified.

If a product brand name is specified and is commercially available to all bidders, an exception to such items is not acceptable and such bid may be rejected.

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. All deviations, no matter how slight, shall be clearly explained on a separate sheet, in the bid sequence, citing the page and paragraph number(s) of the specifications, how the proposal deviation is different, how the deviation meets or exceeds the specifications and why it is necessary, and entitled "EXCEPTIONS TO SPECIFICATIONS". The buyer reserves the right to require a bidder to provide proof in each case that a substituted item is equal to that specified. The buyer shall be the sole judge in determination of acceptable substitutes.

Proposals that are found to have deviations without listing them or bids taking total exceptions to these advertised specifications will be subject to rejection (no exception).

Bids not including all exceptions are a material breach and shall result in the bid being immediately rejected (no exception).

GENERAL DESIGN AND CONSTRUCTION
The cab, chassis, pump module, and body are to be entirely designed, assembled, and painted by the prime vehicle manufacturer, which minimizes third party involvement in engineering, design, service, and warranty issues.

All bidders shall provide a list of the company, manufacturing location, and engineering source for each individual major component, including but not limited to the welded cab assembly, the...
pump house module assembly, the chassis assembly, body, and electrical system. Apparatus using any subcontracted cab, chassis, pump module, electrical system or body will not be acceptable.

The apparatus shall be designed with consideration due 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.

The bidder shall make accurate statements as to the apparatus’ weight and dimensions.

**QUALITY AND WORKMANSHIP**
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 the 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.

The manufacturer shall also be certified to operate a Quality Management System under the requirements of ISO 9001. These standards sponsored by the International organization for Standardization (ISO) specify the quality systems that shall be established by the manufacturer for design, manufacture, installation, and service. A copy of the certificate of compliance shall be included with the bid.

To demonstrate the quality of the product and service, each bidder shall provide a list of at least twenty-five (25) fire departments/municipalities in the region that have bought a second time from the representing dealer. An exception to this requirement shall not be acceptable.

**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 representative shall deliver the apparatus and remain for a sufficient length of time to instruct personnel in proper operation, care and maintenance of the equipment delivered.

**MANUALS AND SERVICE INFORMATION**
The manufacturer shall supply at time of delivery, complete operation and maintenance manuals covering the complete apparatus as delivered. A permanent plate shall be mounted in the drivers compartment which specifies the quantity and type of fluid required including engine oil, engine coolant, transmission, pump transmission lubrication, pump primer and drive axle.
SAFETY VIDEO
Since video is much more effective than written documentation and can be replayed for new personnel and as a refresher for existing personnel, an apparatus safety video, in DVD format shall be provided at time of delivery. 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 on the video: vehicle pre trip inspection, chassis operation, pump 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 axle shall run quietly and be free from abnormal vibration or noise throughout the operating range of the apparatus. The vehicle shall adhere to the following parameters:

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

SERVICE AND WARRANTY SUPPORT (DEALERSHIP)
To insure full service after delivery, the selling bidder/dealership must be capable of providing service when required.
The bidder/dealership shall show that the company is in a position to render prompt service and to furnish replacement parts.

Each bidder/dealership must be able to display that they are actively in the fire apparatus service business by operating a factory authorized service center and parts repository capable of satisfying the warranty service requirements and parts requirements of the vehicle(s) being purchased.

The bidder/dealership must state the location of this authorized service center. This service center must have a staff of factory-trained mechanics, well versed in all aspects of service for all major components of the apparatus. The service center must be no more than seventy-five (75) miles of the Fire Department. If further, must specify.

**SERVICE AND WARRANTY SUPPORT (MANUFACTURER)**
To provide an additional layer of service support, the successful manufacturer must also own at least two separate service facilities, one located in the northern portion of the US to service both Canada and the northern US states and one in the south to service the southern states.

The manufacturer shall stock 1 million parts equating to $5,000,000 of inventory dedicated to service and replacement parts to ensure quick response and minimize down time. Furthermore, the manufacturer shall house the inventory in a dedicated facility, with a dedicated shipping area that ensures service parts are given priority. The bidder shall provide detailed documentation of service and replacement part resources.

Parts identification shall be provided to both the dealer and the Fire Department through an online web-based application for the specific truck reflected in this specification. Access will be granted using the specific VIN number of the vehicle. The online web application will provide the ability to view complete bills of materials, digital photographs, parts drawings, assembly drawings, and access to all current operation, maintenance, and service publications.

The manufacturer must also maintain a 24 hour/7 day a week, toll free emergency hot line.

The manufacturer shall employ staff of adequate size specifically dedicated to providing customer support and parts for the fielded fleet of vehicles it has produced.

The manufacturer must be capable of providing both in-house and on-site service for the apparatus.

The manufacturer shall offer regional factory hands-on repair and maintenance training classes.

The manufacturer shall employ a minimum of four certified EVT technicians on staff, not only providing technical expertise in the repair of fire apparatus, but also demonstrating the commitment to service after the sale.
**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.

**INSURANCE PROVIDED BY BIDDER**

**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 $2,000,000

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 the 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 and coverage shall be written on a Commercial Automobile liability form:

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

**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: $3,000,000
- Each Occurrence: $3,000,000

The umbrella policy shall be written on an occurrence basis and at a minimum provide excess to the bidder’s General Liability and Automobile Liability policies.

The required limits can be provided by one (1) 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. Best.

All policies shall provide a 30-day notice of cancellation to the named insured. The Certificate of Insurance shall provide the following cancellation clause: Should any of the above-described policies be cancelled before the expiration date thereof, notice shall be delivered in accordance with the policy provisions.

The bidder agrees to furnish the owner with a current Certificate of Insurance with the coverages listed above along with the bid. The certificate shall show the purchaser as certificate holder.

INSURANCE PROVIDED BY MANUFACTURER

PRODUCT LIABILITY INSURANCE

The manufacturer 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 Product Liability insurance:

Each Occurrence $1,000,000

Products/Completed Operations Aggregate $1,000,000

Coverage shall be written on a Commercial General Liability form. The policy shall be written on an occurrence form. The manufacturer's policy shall include the owner as additional insured when required by written contract between the Owner and the authorized dealer.

UMBRELLA/EXCESS LIABILITY INSURANCE

The manufacturer 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:

Each Occurrence: $25,000,000

Aggregate: $25,000,000

The umbrella policy shall be written on an occurrence basis and provide excess to the manufacturer's General Liability/Products policies.

The required limits can be provided by one (1) 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. Best.

All policies shall provide a 30-day notice of cancellation to the named insured. The Certificate of Insurance shall provide the following cancellation clause: Should any of the
above-described policies be cancelled before the expiration date thereof, notice shall be delivered in accordance with the policy provisions.

The manufacturer agrees to furnish the owner with a current Certificate of Insurance with the coverages listed above along with the bid. The certificate shall show the purchaser as the certificate holder.

**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 weldment, cab, pump house (including the sheet metal enclosure, valve controls, piping, and operators panel) body and aerial device being designed, fabricated, and assembled on the bidder's premises. The electrical system (hardwire or multiplex) shall be both designed and integrated by the same apparatus manufacturer. The warranties relative to these major components (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, pump house, cab weldment, chassis and aerial). The bidder shall provide evidence that they comply with this requirement.

The bidder shall state the location of the factory where the apparatus is to be built.

**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.

All horizontal surfaces designated as a standing or walking surface that are greater than 48.00" above the ground must be defined by a 1.00" wide line along its outside perimeter. Perimeter markings and designated access paths to destination points shall be identified on the customer approval print and are shown as approximate. Actual location(s) shall be determined based on materials used and actual conditions at final build. Access paths may pass through hose storage areas and opening or removal of covers or restraints may be required. Access paths may require the operation of devices and equipment such as the aerial device or ladder rack.

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.

Visual structural inspections shall be performed on all welds on both aluminum and steel ladders.

On critical weld areas, or on any suspected defective area, the following tests shall be conducted:

- Magnetic particle inspection shall be conducted on steel aerials 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.
- A liquid penetrant test shall be conducted on aluminum aerials to assure the integrity of the weldments and to detect any flaws or weaknesses. This test shall conform to ASTM E165 and be performed prior to assembly of the aerial device.
- Ultrasonic inspection shall be conducted on all aerials to detect any flaws in pins, bolts, and other critical mounting components.

In addition to the tests above, functional tests, load tests, and stability tests shall be performed on all aerials. 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.

**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, the apparatus manufacturer 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.*

VEHICLE INSPECTION PROGRAM CERTIFICATION
To assure the vehicle is built to current NFPA 1901 standards, the apparatus, in its entirety, shall be third-party, independent, audit-certified through Underwriters Laboratory (UL) that it is built and complies to all applicable standards in the current edition. The certification includes: all design, production, operational, and performance testing of not only the apparatus, but those components that are installed on the apparatus (no exception).

A placard shall be affixed in the driver's side area stating the third-party agency, the date, the standard, and the certificate number of the whole vehicle audit.

SERVICE CENTER
The bidder shall have a Service Center located within the dealer's sales territory. The service centers shall offer 24 hours a day, 7 day a week emergency service. The service centers shall employ factory trained, EVT/ASE certified technicians, operate fully equipped mobile service units, access to a mobile pump test unit or have a pump test site, a dedicated collision/refurb facility with 50' paint booth, metal fabrication equipment, locking fenced lot and a fully stocked and staffed parts department. The service provider must be an integral part of the dealer operations and not a third-party provider hired by the dealership. The service center must also be an authorized repair and warranty facility for Hale, Waterous and Darley pumps.

Documentation must be provided with the bid package to verify compliance with the above requirements.

WEEKLY PROGRESS REPORTS
The successful bidder shall provide the following:

Weekly progress reports including photographs of the apparatus or the major components as they are being constructed. The reports shall commence at the beginning of the manufacturing process and shall continue until just prior to the final inspection. The reports shall show the progress of the apparatus through the course of each week. Special attention shall be given to show the unique features and aspects of the apparatus as construction progresses.

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.

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

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

**WHEELBASE**
The wheelbase of the vehicle shall be no greater than 272.

**GVW RATING**
The gross vehicle weight rating shall be a minimum of 77k.

**FRAME**
The chassis frame shall be built with two (2) steel channels bolted to five (5) cross members or more to create equivalent strength, 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 in-lb. over the critical regions of the frame assembly, with a section modulus of 18.96 cubic inches with a rbm of 2,275,200 in-lb. over the rear axle.

The frame rails shall be constructed of 120,000 psi yield strength heat-treated 0.38" thick steel with 3.50" wide flanges. Or of equivalent strength.

**FRAME REINFORCEMENT**
In addition, a mainframe internal liner shall be provided. The liner shall be an internal "C" design that steps to an internal "L" design over the rear axle. It shall be heat-treated steel measuring 12.50" x 3.00" x 0.25" through the front portion of the liner, stepping to 9.38" x 3.00" x 0.25" through the rear portion of the liner. Each liner shall have a section modulus of 13.58 cubic inches, yield strength of 110,000 psi, and rbm of 1,494,042 in-lb. Total rbm at wheelbase center shall be 4,391,869 in-lb. Or of equivalent strength.

The frame liner shall be mounted inside of the chassis frame rail and extend the full length of the frame.
FRONT AXLE
The front axle shall be a reverse "I" beam type with inclined kingpins. It shall be a Dana®, Model D2200, with a rated capacity of 23,000 lb. Or equivalent.

A viewing window shall be provided on each side of the axle for checking the oil level.

FRONT SUSPENSION
The front springs shall be a Standens, three (3)-leaf, taper leaf design, 54.00" long x 4.00" wide, with a ground rating of 23,000 lb. Or equivalent.

The two (2) top leaves shall wrap the forward spring hanger pin. The top leaf shall also wrap the rear spring hanger pin. Both the front and rear eyes shall be Berlin style wraps that shall place the eyes in the horizontal plane within the main leaf. This shall reduce bending stress from acceleration and braking.

A steel encased rubber bushing shall be used in the spring eye. The steel encased rubber bushing shall be maintenance free and require no lubrication.

SHOCK ABSORBERS
Heavy-duty telescoping shock absorbers shall be provided on the front axle.

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

FRONT TIRES
Front tires shall be Michelin 445/65R22.50 radials, 20 ply all-position XZY3 wide base tread, rated for 25,600 lb. maximum axle load and 65 mph maximum speed. Or equivalent.

The tires shall be mounted on Alcoa 22.50” x 13.00” polished aluminum disc type wheels with a ten (10) stud, 11.25” bolt circle.

REAR AXLE
The rear axle shall be a Meritor™, Model RT-52-185, tandem axle assembly with a capacity of 54,000 lb. Or equivalent.

An inter-axle differential, which divides torque evenly between axles, shall be provided on the rear axle with an indicator light mounted on the cab instrument panel.

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 lb. shall not exceed either 68 mph 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 lb., 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 1901 standards at time of contract execution.

A rear axle ratio shall be furnished to allow the vehicle to reach an approximate top speed of 64 MPH.

**REAR SUSPENSION**
Rear suspension shall be a Hendrickson Model FMX 542 EX, air ride with a ground rating of 54,000 lb. The suspension shall have the following features or equivalent:

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

**REAR OIL SEALS**
Oil seals shall be provided on the rear axle(s).

**REAR TIRES**
Rear tires shall be eight (8) Michelin 12R22.50 radials, 16 ply XDN2 all season tread, rated for 54,240 lb maximum axle load and 75 mph maximum speed. Or equivalent.

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.

**TIRE BALANCE**
All tires shall be balanced with Counteract balancing beads. The beads shall be inserted into the tire and eliminate the need for wheel weights.

**TIRE PRESSURE MANAGEMENT**
There shall be a Real Wheels LED AirSecure™ tire alert pressure management system or equivalent provided, that shall monitor each tire’s pressure. A sensor shall be provided on the valve stem of each tire for a total of 10 tires.
The sensor shall calibrate the tire pressure when installed on the valve stem for pressures between 10 and 200 psi. The sensor shall activate an integral battery-operated LED when the pressure of that tire drops 5 to 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 to flash.

**CHROME LUG NUT COVERS**
Chrome lug nut covers shall be supplied on front and rear wheels.

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

**REAR HUB COVERS**
Stainless steel, high hat, hub covers shall be provided on the rear axle hubs.

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

**WHEEL CHOCKS**
There shall be one (1) pair of Worden Safety Products, Model HWG-SB, wheel chocks or equivalent provided.

Heavy Duty, large, molded aluminum wheel chock with solid bottom, natural cast aluminum finish.

**WHEEL CHOCK BRACKETS**
There shall be one (1) pair of Worden Safety model U815T mounting wheel chock brackets or equivalent provided. The brackets shall be mounted forward of the rear wheels.

**ELECTRONIC STABILITY CONTROL**
A vehicle control system shall be provided as an integral part of the ABS brake system from Meritor Wabco.

The system shall monitor and update the lateral acceleration of the vehicle and compare it to a critical threshold where a side roll event may occur. If the critical threshold is met, the vehicle control system shall automatically reduce engine RPM, engage the engine retarder (if equipped), and selectively apply brakes to the individual wheel ends of the front and rear axles to reduce the possibility of a side roll event.

The system shall monitor directional stability through a lateral accelerometer, steer angle sensor and yaw rate sensor. If spinout or drift out is detected, the vehicle control system shall selectively apply brakes to the individual wheel ends of the front and rear axles to bring the vehicle back to its intended direction.
**ANTI-LOCK BRAKE SYSTEM**
The vehicle shall be equipped with a Wabco 6S6M anti-lock braking system. The ABS shall provide a six (6) channel anti-lock braking control on both the front and rear wheels. A digitally controlled system that utilizes microprocessor technology shall control the anti-lock braking system. Each wheel shall be monitored by the system. When any wheel begins to lock up, a signal shall be sent to the control unit. This control unit shall then reduce the braking of that wheel for a fraction of a second and then reapply the brake. This anti-lock brake system shall eliminate the lockup of any wheel thus helping to prevent the apparatus from skidding out of control.

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

**BRAKES**
The service brake system shall be full air type by Bendix®.

Front brakes shall be Model ADB22X™ or equivalent, disc type with automatic pad wear adjustment and 17.00" rotors for improved stopping distance.

The rear brakes shall be Meritor™ 16.50" x 7.00" cam operated with automatic slack adjusters or equivalent. Dust shields shall be provided.

**BRAKE SYSTEM AIR COMPRESSOR**
The air compressor shall be a Cummins/WABCO or equivalent with 18.7 cubic feet per minute output.

**BRAKE SYSTEM**
The brake system shall include:

- Brake treadle valve
- Heated automatic moisture ejector on air dryer
- Total air system capacity of 6,408 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
- Spring set parking brake system
- Parking brake operated by a push-pull style control valve
• A parking "brake on" indicator light on instrument panel
• Park brake relay/inversion and anti-compounding valve, in conjunction with a double check valve system, shall be provided with an automatic spring brake application at 40 psi
• A pressure protection valve to prevent all air operated accessories from drawing air from the air system when the system pressure drops below 80 psi (550 kPa)
• 1/4 turn drain valves on each air tank

The air tank shall be primed and painted to meet a minimum 750-hour salt spray test.

To reduce the effects of corrosion, the air tank shall be mounted with stainless steel brackets (no exception).

**BRAKE SYSTEM AIR DRYER**
The air dryer shall be a WABCO System Saver 1200 or equivalent, with spin-on coalescing filter cartridge and 100-watt heater.

**BRAKE LINES**
Wire braided reinforced rubber brake lines shall be provided for the chassis air brake system. This also includes the brake lines between the frame and brake chambers. The brake lines shall not be painted.

Coupler fittings for chassis brake lines shall be installed forward of the front axle. They shall be a separation point for those airlines going to the cab. The air lines going into the cab shall be nylon wrapped in loom.

**AIR INLET**
One (1) air inlet with 3D series male coupling shall be provided. It shall allow station air to be supplied to the apparatus brake system through a shoreline hose. The inlet shall be located forward in the driver side lower step well of cab. A check valve shall be provided to prevent reverse flow of air. The inlet shall discharge into the "wet" tank of the brake system. A mating female fitting shall also be provided with the loose equipment.

**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 be used for the rear.

**AUTOMATIC MOISTURE EJECTOR(S)**
Three (3) automatic moisture ejectors, Bendix®, Model DV-2 or equivalent, shall be installed in the brake system.

Each moisture ejector shall be equipped with a 12-volt heater, controlled by a thermostat and ignition switch.
The moisture ejector(s) shall be provided on the wet tank, primary and secondary tank reservoirs(s).

**ENGINE**

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

<table>
<thead>
<tr>
<th>Make:</th>
<th>Cummins® or equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model:</td>
<td>X15</td>
</tr>
<tr>
<td>Power:</td>
<td>565 hp at 1700 rpm (A minimum of 525 hp)</td>
</tr>
<tr>
<td>Torque:</td>
<td>1850 lb.-ft at 1150 rpm</td>
</tr>
<tr>
<td>Governed Speed:</td>
<td>2100 rpm</td>
</tr>
<tr>
<td>Emissions Level:</td>
<td>EPA 2027</td>
</tr>
<tr>
<td>Fuel:</td>
<td>Diesel</td>
</tr>
<tr>
<td>Cylinders:</td>
<td>Six (6)</td>
</tr>
<tr>
<td>Displacement:</td>
<td>912 cubic inches (14.9L)</td>
</tr>
<tr>
<td>Starter:</td>
<td>Delco 39MT+™</td>
</tr>
</tbody>
</table>

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

The engine shall be filled with FA-4 10W30 oil as required by Cummins.

**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."

**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 activate when the system is on, and the throttle is released.

The high setting of the brake application shall activate and work simultaneously with the variable geometry turbo (VGT) provided on the engine.

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.

**CLUTCH FAN**
A Horton fan clutch or equivalent shall be provided. The fan clutch shall be automatic when the pump transmission is in "Road" position, and fully engaged in "Pump" position.

One (1) indicator light shall be provided on the cab instrument panel to indicate clutch fan engagement.

**ENGINE AIR INTAKE**
The engine air intake shall be located above the engine cooling package. It shall draw fresh air from the front of the apparatus through the radiator grille.

The ember separator is designed to prevent road dirt and recirculating hot air from entering the engine.

The ember separator shall be easily accessible by tilting the cab.

**EXHAUST SYSTEM**
The exhaust system shall include a Single Module™ aftertreatment device to meet current EPA standards. The exhaust system shall be stainless steel from the turbo to the inlet of the aftertreatment device and shall be 5.00" in diameter. An insulation wrap shall be provided on all exhaust pipes between the turbo and aftertreatment device to minimize the heat loss to the aftertreatment device. The exhaust shall terminate horizontally ahead of the right-side rear wheels. A tailpipe diffuser shall be provided to reduce the temperature of the exhaust as it exits. Heat deflector shields shall be provided to isolate chassis and body components from the heat of the tailpipe diffuser.

**EXHAUST MODIFICATION**
The exhaust pipe shall be brought out from under the body at a 90-degree angle from the truck. The tail pipe shall extend a minimum of 2.00" past the body, adaptable for the Magne-Grip system. The diameter of the pipe shall be 5.00". There shall be a clearance of 4.00" completely around the pipe once past the side of the body. A stop shall be provided on the tail pipe that shall prevent the nozzle from sliding too far on.
### RADIATOR
The radiator and the complete cooling system shall meet or exceed NFPA and engine manufacturer cooling system standards.

For maximum corrosion resistance and cooling performance, the entire radiator core shall be constructed using long life aluminum alloy. The radiator core shall consist of aluminum fins, having a serpentine design, brazed to aluminum tubes. No solder joints or lead material of any kind shall be acceptable in the core assembly.

The radiator core shall have a minimum front area of 1060 square inches.

The supply tank shall be made of heavy-duty glass-reinforced nylon and the return tank shall be made of aluminum. Both tanks shall be crimped onto the core assembly using header tabs and a compression gasket to complete the radiator core assembly. There shall be a full steel frame around the inserts to enhance cooling system durability and reliability.

The radiator shall be compatible with commercial antifreeze solutions.

The radiator assembly shall be isolated from the chassis frame rails with rubber isolators to prevent the development of leaks caused by twisting or straining when the apparatus operates over uneven terrain.

The radiator shall include a de-aeration/expansion tank. For visual coolant level inspection, the radiator shall have a built-in sight glass. The radiator shall be equipped with a 15-psi pressure relief cap.

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

Shields or baffles shall be provided to prevent recirculation of hot air to the inlet side of the radiator.

### COOLANT LINES
Gates, or Goodyear, rubber hose shall be used for all engine 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.

### FUEL TANK
A 65-gallon fuel tank shall be provided and mounted at the rear of the chassis. The tank shall be constructed of aluminum with the exterior painted to match the chassis frame. It shall be equipped with swash partitions and a vent. To eliminate the effects of corrosion, the fuel tank shall be mounted with stainless steel straps. (No exception).
A .75" drain plug shall be provided in a low point of the tank for drainage.

A fill inlet shall be located on the left-hand side of the body and be covered with a hinged, spring-loaded, stainless-steel door that is marked "Ultra Low Sulfur - Diesel Fuel Only."

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

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

All fuel lines shall be of the wire braided type. Reusable fittings shall be provided.

**DIESEL EXHAUST FLUID TANK**

A minimum of a 4.5-gallon diesel exhaust fluid (DEF) tank shall be provided and mounted in the driver's side body forward of the rear axle.

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

A fill inlet shall be provided and marked "Diesel Exhaust Fluid Only". The fill inlet shall be located below the air bottle storage behind a common door on the driver's side of the vehicle.

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

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

**FUEL PRIMING PUMP**

A Cummins automatic electronic fuel priming pump shall be integrated as part of the engine.

**FUEL SHUTOFF**

A fuel line shutoff valve shall be installed on both the inlet and outlet of the primary fuel filter.

**FUEL SEPARATOR**

The engine shall be equipped with a Racor in-line spin-on fuel and water separator in addition to the engine fuel filters.

**TRANSMISSION**

An Allison 6th generation, Model EVS 4500P, electronic, torque converting, automatic transmission shall be provided.

The transmission shall be equipped with prognostics to monitor oil life, filter life, and transmission health. A wrench icon on the shift selector's digital display shall indicate when service is due.
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 amber 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 - 4.70 to 1.00, 2nd - 2.21 to 1.00, 3rd - 1.53 to 1.00, 4th - 1.00 to 1.00, 5th - 0.76 to 1.00, 6th - 0.67 to 1.00, R - 5.55 to 1.00.

**TRANSMISSION COOLER**
A Modine plate and fin transmission oil cooler shall be provided using engine coolant to control the transmission oil temperature.

**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 where the driveline design requires it. The slip joint shall be coated with Glidecoat® or equivalent.

**DRIVELINE SAFETY LOOP(S)**
There shall be one (1) driveline safety loop(s) provided to help retain the drive shaft in the event of a drive shaft or cardan joint failure.

**DRIVELINE SAFETY LOOP(S)**
There shall be one (1) driveline safety loop(s) provided to help retain the water pump drive shaft in the event of a drive shaft or joint failure.

**STEERING**
Dual steering gear, with integral heavy-duty power steering, shall be provided. For reduced system temperatures, the power steering shall incorporate an air to oil cooler and Vickers® V20NF hydraulic pump or equivalent with integral pressure and flow control. All power steering lines shall have wire braded lines with crimped fittings.

A tilt and telescopic steering column shall be provided to improve fit for a broader range of driver configurations.

**STEERING WHEEL**
The steering wheel shall be 18.00” in diameter, have tilting and telescoping capabilities, and a four (4)-spoke design.
There shall be a switch pod provided on the left side of the steering wheel between the spokes. The switch pods shall be an integral part of the steering wheel. The following switches shall be provided:

- Windshield wash
- Wiper intermittent speed increase
- Wiper intermittent speed decrease
- Hi/Lo wiper speed
- Wiper off

**BUMPER**
A one (1) piece aluminum bumper minimum of 10.00" high and 45-degree corners containing a 3/8" bend radius and 1.50" top and bottom flange shall be attached to the modular frame extension. The bumper shall be extended 21.00" from the front face of the cab. The first 11.00" of extension shall be provided for the aerial stabilizers (If required, based on manufacturer). The remaining 10.00" extension shall be provided forward of the front stabilizers.

It shall have fully covered stabilizer cylinders (If required, based on manufacturer) that tip within a pocket inside the covers allowing the bumper to be a single wrap around piece.

The bumper shall be metal finished and painted job color.

Should be room for a front suction line (If possible).

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

**Hose Tray**
The hose tray shall be placed (Left side or center, based on the manufacturer) of the extended bumper.

The tray shall have a capacity of 150ft 1 3/4

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

**Hose Tray Restraint**
There shall be one (1) pair of hose tray restraint straps located over the tray.

The restraints shall be a pair of 2.00" wide black nylon straps with Velcro® fasteners provided. The strap(s) shall be used to secure the hose in the tray.

**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.

**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**

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

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

For reasons of structural integrity and enhanced occupant protection, the cab shall be a heavy-duty design, constructed to the following minimal standards.

The cab shall have 12 main vertical structural members located in the A-pillar (front cab corner posts), B-pillar (side center posts), C-pillar (rear corner posts), and rear wall areas. The A-pillar shall be constructed of solid A356-T5 aluminum castings. The B-pillar and C-pillar shall be constructed from 0.13” wall extrusions. The rear wall shall be constructed of two (2) 2.00” x 2.00” outer aluminum extrusions and two (2) 2.00” x 1.00” inner aluminum extrusions. All main vertical structural members shall run from the floor to 4.625” x 3.864” x 0.090” thick roof extrusions to provide a cage-like structure with the A-pillar and roof extrusions being welded into a 0.25” thick corner casting at each of the front corners of the roof assembly. Or based on manufacturers’ standard.

The front of the cab shall be constructed of a 0.13” firewall plate, covered with a 0.090” front skin (for a total thickness of 0.22”), and reinforced with a full width x 0.50” thick cross-cab support located just below the windshield and fully welded to the engine tunnel. The cross-cab support shall run the full width of the cab and weld to each A-pillar, the 0.13” firewall plate, and the front skin. Or based on manufacturers’ standard.

The cab floors shall be constructed of 0.125” thick aluminum plate and reinforced at the firewall with an additional 0.25” thick cross-floor support providing a total thickness of 0.375” of structural material at the front floor area. The front floor area shall also be supported with two (2) triangular 0.30” wall extrusions that also provide the mounting point for the cab lift. This tubing shall run from the floor wireway of the cab to the engine tunnel side plates, creating the structure to support the forces created when lifting the cab. Or based on manufacturers’ standard.

The cab shall be no more than 98.00” wide (outside door skin to outside door skin) to maintain maximum maneuverability.

The overall height (from the cab roof to the ground) of approximately 99.00” (or based on manufacturers’ standard). The overall height listed shall be calculated based on a truck
configuration with the lowest suspension weight rating, 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 54.50" (or based on manufacturers’ standard) in the center and outboard positions.

The crew cab floor shall measure 46.00" (or based on Manufacturers’ standard) from the rear wall to the back side of the rear facing seat risers.

The medium block engine tunnel, at the rearward highest point (knee level), shall measure 61.50" (or based on manufacturers’ standard) to the rear wall. The big block engine tunnel shall measure 51.50" (or based on manufacturers’ standard) to the rear wall.

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

The cab shall be a full tilt cab style.

A 3-point (or 4-point) cab mount system with rubber isolators shall improve ride quality by isolating chassis vibrations from the cab.

**CAB ROOF DRIP RAIL**
For enhanced protection from inclement weather, a drip rail shall be furnished on the sides of the cab. The drip rail shall be painted to match the cab roof and bonded to the sides of the cab. The drip rail shall extend the full length of the cab roof.

**INTERIOR CAB INSULATION**
The cab shall include 1.00" insulation in the ceiling, 1.50" insulation in the side walls, and 2.00" insulation in the rear wall to maximize acoustic absorption and thermal insulation. Or equivalent.

**FENDER LINERS**
Full circular inner fender liners in the wheel wells shall be provided.

**WINDSHIELD**
A one (1)-piece (Or two (2)-piece) safety glass windshield shall be provided with clear viewing area. The windshield shall be full width and shall provide the occupants with a clear view. The windshield shall consist of three (3) layers: outer light, middle safety laminate, and inner light. The outer light layer shall provide superior chip resistance. The middle safety laminate layer shall prevent the windshield glass pieces from detaching in the event of breakage. The inner light shall provide yet another chip resistant layer. The cab windshield shall be bonded to the aluminum windshield frame using a urethane adhesive.
## WINDSHIELD WIPERS

Two (2) electric windshield wipers with washer shall be provided that meet FMVSS and SAE. The washer reservoir shall be able to be filled without raising the cab.

## ENGINE TUNNEL

Engine hood side walls shall be constructed of 0.375" aluminum. The top shall be constructed of 0.125" aluminum and shall be tapered at the top to allow for more driver and passenger elbow room. Or equivalent.

The engine tunnel shall be insulated for protection from heat and sound. Perforated foil faced insulation shall be over a 1.00" thick closed cell foam affixed with pressure sensitive adhesive and further secured with mechanical fasteners. Thermal rating for this insulation shall be -40 degrees Fahrenheit to 300 degrees Fahrenheit. The noise insulation keeps the dBA level within the limits stated in the current NFPA 1901 standards.

The engine tunnel shall be no higher than 18.00" off the crew cab floor (Or within manufacturer standards).

## INTERIOR CREW CAB REAR WALL SEATING

The seats shall be non-adjustable with seat arrangement being the following:

- 2- Rear facing (1 behind the officer, 1 behind the driver)
- 1- Forward facing (Center of back wall)

## CAB REAR WALL EXTERIOR COVERING

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

## 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.

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

The cab shall be capable of tilting 43 degrees to accommodate engine maintenance and removal.

The cab shall be locked down by a 2-point normally closed spring-loaded hook type latch that fully engages after the cab has been lowered. The system shall be hydraulically actuated to release the normally closed locks when the cab lift control is in the raised position and cab lift system is under pressure. When the cab is completely lowered and system pressure has been relieved, the spring-loaded latch mechanisms shall return to the normally closed and locked position.
The hydraulic cylinders shall be equipped with a velocity fuse that protects the cab from accidentally descending when the control is located in the tilt position.

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

**Cab Lift Interlock**
The cab lift system shall be interlocked to the parking brake. The cab tilt mechanism shall be active only when the parking brake is set, and the ignition switch is in the on position. If the parking brake is released, the cab tilt mechanism shall be disabled.

The cab lift safety system shall also be interlocked to the front stabilizers in the bumper (Based on the manufacturer). The cab tilt mechanism shall be active only when the front stabilizers (Based on the manufacturer) are fully stowed, and fully tilted outboard. The cab tilt mechanism shall not allow the front stabilizers to be tilted inboard until the cab has been fully lowered and locked into position (Based on the manufacturer).

**GRILLE**
A bright finished aluminum mesh grille screen, inserted behind a bright finished grille surround, shall be provided on the front center of the cab.

**DOOR JAMB SCUFFPLATES**
All cab door jambs shall be furnished with a 1.00" polished stainless steel scuff plate, mounted on the striker side of the jamb.

**SIDE OF CAB MOLDING**
Chrome molding shall be provided on both sides of the cab.

**MIRRORS**
A Retrac, Model 613423 or equivalent, dual vision, motorized, west coast style mirror, with chrome finish, shall be mounted on each side of the front cab door with spring loaded retractable arms. The flat glass and convex glass shall be heated and adjustable with remote control within reach of the driver.

**DOORS**
To enhance entry and egress to the cab, the forward cab door openings shall be a minimum of 37.50" wide x 63.37" high. The crew cab doors shall be located on the sides of the cab and shall be constructed in the same manner as the forward cab doors. The crew cab door openings shall be a minimum of 34.30" wide x 63.37" high. Or based off manufacturer standards.

The forward cab and crew cab doors shall be constructed of extruded aluminum with a nominal material thickness of 0.093". The exterior door skins shall be constructed from 0.090" aluminum. Or based off manufacturer standards. A customized, vertical/ horizontal, pull type door handle
shall be provided on the exterior of each cab door. The finish of the door handle shall be chrome/black. The exterior handle shall be designed specifically for the fire service to prevent accidental activation and shall provide 4.00" wide x 2.00" deep hand clearance for ease of use with heavy gloved hands. Or equivalent. Each door shall also be provided with an interior flush, open style paddle handle that shall be readily operable from fore and aft positions and be designed to prevent accidental activation. The interior handles shall provide 4.00" wide x 1.25" deep hand clearance for ease of use with heavy gloved hands. The cab doors shall be provided with both interior (rotary knob) and exterior (keyed) locks exceeding FMVSS standards. The keys shall be Model 751 or equivalent. The locks shall be capable of activating when the doors are open or closed. The doors shall remain locked if locks are activated when the doors are opened, then closed. A full length, heavy duty, stainless steel, piano-type hinge with a 0.38" pin and 11-gauge leaf shall be provided on all cab doors. There shall be double automotive-type rubber seals around the perimeter of the door framing and door edges to ensure a weather-tight fit. A chrome handle shall be provided on the inside of each cab door for ease of entry. A red webbed grab handle shall be installed on the crew cab door stop strap. The grab handles shall be securely mounted. The bottom cab step at each cab door location shall be located below the cab doors and shall be exposed to the exterior of the cab.

**Door Panels**

The inner cab door panels shall be constructed out of brushed stainless steel or equivalent.

**MANUAL CAB DOOR WINDOWS**

All cab entry doors shall contain a conventional roll down window.

**CAB STEPS**

The forward cab and crew cab access steps shall be a full size two (2) step design to provide largest possible stepping surfaces for safe ingress and egress. The bottom steps shall be designed with a grip pattern punched into bright aluminum treadplate material to provide support, slip resistance, and drainage. The bottom steps shall be a bolt-in design to minimize repair costs should they need to be replaced. The forward cab steps shall be a minimum 25.00" wide, and the crew cab steps shall be 21.65" wide with a 10.00" minimum depth. The inside cab steps shall not exceed 16.50" in height. Or equivalent.

The vertical surfaces of the step well shall be aluminum treadplate.

**CAB EXTERIOR HANDRAILS**

A 1.25" diameter slip-resistant, knurled aluminum handrail shall be provided adjacent to each cab and crew cab door opening to assist during cab ingress and egress.

**STEP LIGHTS**

There shall be six (6) white LED step lights with chrome housing installed for the cab and crew cab access steps.

- One (1) light for the left-side access steps.
- Two (2) lights for the left-side crew cab access steps.
- Two (2) lights for the right-side crew cab access steps.
- One (1) light for the right-side access step.

To ensure exceptional illumination, each light shall provide a minimum of 25 foot-candles (fc) covering an entire 15" x 15" square placed ten (10) inches below the light and a minimum of 1.5 fc covering an entire 30" x 30" square at the same ten (10) inch distance below the light.

The lights shall be activated when the battery switch is on, and the adjacent door is opened.

**FENDER CROWNS**
Stainless steel fender crowns shall be installed at the cab wheel openings.

**CAB DASH**
The driver side dash, switch panel located to the right of the driver, and center console shall be constructed of aluminum and painted fire smoke gray (Or based off the manufacturer standard).

The officer side dash shall be a flat top design with an upper beveled edge to provide easy maintenance and shall be constructed out of aluminum and painted to match the cab interior. Or based off the manufacturer standards.

The instrument gauge cluster shall be surrounded with a high impact ABS plastic contoured to the same shape of the instrument gauge cluster.

**MOUNTING SYSTEM**
There shall be two (2) section(s) of Pac Trac equipment mounting systems located rear wall of cab one each side.

Pac Trac mounts shall be certified by Pac Trac to meet the latest NFPA requirements for mounting equipment inside the cab.

**MOUNTING PLATE ON ENGINE TUNNEL**
Equipment installation provisions shall be installed on the engine tunnel.

A .25" smooth aluminum plate shall be bolted to the top surface of the engine tunnel. The plate shall follow the contour of the engine tunnel and shall run the entire length of the engine tunnel. The plate shall be spaced off the engine tunnel 1.00" to allow for wire routing below the plate. The mounting surface shall be painted to match the cab interior. Or equivalent.

**CAB INTERIOR**
The cab interior shall be constructed of primarily metal (painted aluminum) to withstand the severe duty cycles of the fire service.

The engine tunnel shall be painted aluminum to match the cab interior. Or based off the manufacturer standards.
For durability and ease of maintenance, the cab interior side walls shall be painted aluminum. The rear wall shall be painted aluminum. Or based off the manufacturer standards.

Headliners shall be installed in both the forward and rear cab sections. The 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. Or based off the manufacturer standards.

The forward portion of cab headliner shall permit easy access for service of electrical wiring or other maintenance needs.

All wiring shall be placed within metal raceways. Routing through holes in tubing shall not be accepted due to chaffing that installation shall cause.

**CAB INTERIOR UPHOLSTERY**
The cab interior upholstery shall be 36 oz dark silver gray vinyl or equivalent.

**CAB INTERIOR PAINT**
The cab interior metal surfaces, excluding the rear heater panels, shall be painted fire smoke gray, vinyl texture paint. Or equivalent.

The rear heater panels shall be painted black, vinyl textured paint. Or equivalent.

**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. Or Equivalent.

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 0.25” thick closed cell foam (no water absorption) which offers a sound dampening material for reducing sound levels.

**DEFROST/AIR CONDITIONING SYSTEM**
A ceiling or engine tunnel mounted combination heater, defroster and air conditioning system shall be installed in the cab above the engine tunnel area. Or based off the manufacturer standards.

**Cab Defroster**
A 54,000 BTU heater-defroster unit with 690 SCFM of air flow shall be provided inside the cab. The heater-defrost shall be installed in the forward portion of the cab ceiling. Air outlets shall be strategically located in the cab header extrusion per the following:

- One (1) adjustable shall be directed towards the left-side cab window
- One (1) adjustable shall be directed towards the right-side cab window
- Six (6) fixed outlets shall be directed at the windshield
The defroster shall be capable of clearing 98 percent of the windshield and side glass when tested under conditions where the cab has been cold soaked at 0 degrees Fahrenheit for 10 hours, and a 2-ounce per square inch layer of frost/ice has been able to build up on the exterior windshield. The defroster system shall meet or exceed SAE J382 requirements. Or based off the manufacturer standards.

**Cab/Crew Auxiliary Heater**

There shall be one (1) 31,000 BTU auxiliary heater with 560 SCFM of air flow provided in each outboard rear facing seat risers with a dual scroll blower. An aluminum plenum incorporated into the cab structure is used to transfer heat to the forward positions. Or equivalent.

**Air Conditioning**

A 19.10 cubic inch compressor shall be installed on the engine.

A roof-mounted condenser with a 78,000 BTU output at 2,400 SCFM that meets and exceeds the performance specification shall be installed on the cab roof. Mounting the condenser below the cab or body would reduce the performance of the system and shall not be acceptable. The condenser cover must be painted to match the cab roof.

The air conditioning system shall be capable of cooling the average cab temperature from 100 degrees Fahrenheit to 75 degrees Fahrenheit at 50 percent relative humidity within 30 minutes. The cooling performance test shall be run only after the cab has been heat soaked at 100 degrees Fahrenheit for a minimum of 4 hours.

The evaporator unit shall be installed in the rear portion of the cab ceiling over the engine tunnel. The evaporator shall include one (1) high performance heating core, one (1) high performance cooling core with (1) plenum directed to the front and one (1) plenum directed to the rear of the cab. The rear plenum shall be covered with a metal cover painted to match the cab interior.

The evaporator unit shall have a 52,000 BTU at 690 SCFM rating that meets and exceeds the performance specifications.

Adjustable air outlets shall be strategically located on the forward plenum cover per the following:

- Four (4) shall be directed towards the seating position on the left side of the cab
- Four (4) shall be directed towards the seating position on the right side of the cab

Adjustable air outlets shall be strategically located on the rear plenum cover per the following:

- Minimum of five (5) shall be directed towards crew cab area

A high efficiency particulate air (HEPA) filter shall be included for the system. Access to the filter cover shall be secured with four (4) screws.
The air conditioner refrigerant shall be R-134A and shall be installed by a certified technician. All items in this section should be based off manufacturer.

**Climate Control**

An automotive style controller shall be provided to control the heat and air conditioning system within the cab. The controller shall have three (3) functional knobs for fan speed, temperature, and air flow distribution (front to rear) control.

The system shall control the temperature of the cab and crew cab automatically by pushing the center of the fan speed control knob. Rotate the center temperature control knob to set the cab and crew cab temperature.

The AC system shall be manually activated by pushing the center of the temperature control knob. Pushing the center of the air flow distribution knob shall engage the AC for max defrost, setting the fan speeds to 100 percent and directing all air flow to the overhead forward position.

The system controller shall be located within reach of the Driver and the officer.

**Gravity Drain Tubes**

Two (2) condensate drain tubes shall be provided for the air conditioning evaporator. The drip pan shall have two (2) drain tubes plumbed separately to allow for the condensate to exit the drip pan. No pumps shall be provided.

**SUN VISORS**

Two (2) smoked Lexan™ sun visors shall be provided. The sun visors shall be located above the windshield with one (1) mounted on each side of the cab.

There shall be no retention bracket provided to help secure each sun visor in the stowed position.

**GRAB HANDLES**

A black rubber covered grab handle shall be mounted on the door post of the driver and officer’s side cab door to assist in entering the cab. The grab handles shall be securely mounted to the post area between the door and windshield.

**ENGINE COMPARTMENT LIGHTS**

There shall be one (1) Whelen, Model 3SC0CDCR or equivalent, 12-volt DC, 3.00" white LED light(s) with Whelen, Model 3FLANGEC, chrome flange kit(s) installed under the cab to be used as engine compartment illumination. These light(s) shall be activated automatically when the cab is raised.

**ACCESS TO ENGINE DIPSTICKS**

The engine oil and transmission dipsticks shall be located under the cab tunnel, on the rear wall of the tunnel, on the vertical surface. The engine oil dipstick shall allow for checking only. The transmission dipstick shall allow for both checking and filling.
The door shall have a rubber seal for thermal and acoustic insulation. One (1) flush lift and turn latch shall be provided on the access door. Not required, unless by NFPA.

**SEATING CAPACITY**
The seating capacity of the vehicle (including tiller cab and belted seat positions in the rescue body) shall be five (5).

**DRIVER SEAT**
A seat shall be provided in the cab for the driver. The seat design shall be a cam action type, with air suspension. For increased convenience, the seat shall include a manual control to adjust the horizontal position (6.00" travel). The manual horizontal control shall be a towel-bar style located below the forward part of the seat cushion. To provide flexibility for multiple driver configurations, the seat shall have an adjustable reclining back. The seat back shall be a high back style with side bolster pads for maximum support. For optimal comfort, the seat shall be provided with 17.00" deep foam cushions designed with EVC (elastomeric vibration control).

The seat shall be furnished with a 3-point, shoulder type seat belt.

**OFFICER SEAT**
A seat shall be provided in the cab for the passenger. The seat shall be a fixed type with no suspension. For optimal comfort, the seat shall be provided with 17.00" deep foam cushions designed with EVC (elastomeric vibration control).

The seat back shall be an SCBA back style with 5 degrees fixed recline angle. The SCBA cavity shall be adjustable from front to rear in 1.00" increments, to accommodate different sized SCBA cylinders. Moving the SCBA cavity shall be accomplished by unbolting, relocating, and re-bolting it in the desired location. Or equivalent.

The seat shall be furnished with a 3-point, shoulder type seat belt.

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

The inside compartment dimensions shall be 16.00" wide x 7.50" high x 15.00" deep, with the back of the compartment angled up to match the cab structure.

A drop-down door with one (1) lift and turn latch shall be provided for access.

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

**FORWARD FACING CENTER SEATS**
There shall be one (1) forward facing seats provided at the center position in the crew cab. For optimal comfort, the seats shall be provided with 15.00" deep foam cushions designed with EVC (elastomeric vibration control).
The seat back shall be SCBA style with 90 degrees back. The SCBA cavity shall be adjustable from front to rear in 1.00" increments to accommodate different sized SCBA cylinders. Moving the SCBA cavity shall be accomplished by unbolting, relocating, and re-bolting it in the desired location.

The seat shall be evenly spaced center of the rear wall.

The seat shall be furnished with a 3-point, shoulder type seat belt.

**Rear Facing Seats**

There shall be two (2) forward facing seats provided, one (1) on each side of the cab, located behind the driver's seat and the officer's seat, in the crew cab. For optimal comfort, the seats shall be provided with 15.00" deep foam cushions designed with EVC (elastomeric vibration control).

The seat back shall be SCBA style with 90 degrees back. The SCBA cavity shall be adjustable from front to rear in 1.00" increments to accommodate different sized SCBA cylinders. Moving the SCBA cavity shall be accomplished by unbolting, relocating, and re-bolting it in the desired location.

The seat shall be furnished with a 3-point, shoulder type seat belt.

**SEAT UPHOLSTERY**

All seat upholstery shall be leather grain 36 oz dark silver, gray vinyl resistant to oil, grease and mildew. The cab shall have five (5) seating positions.

**AIR BOTTLE HOLDERS**

All SCBA type seats in the cab shall have a "Hands-Free" auto clamp style bracket in its backrest. For efficiency and convenience, the bracket shall include an automatic spring clamp that allows the occupant to store the SCBA bottle by simply pushing it into the seat back. For protection of all occupants in the cab, in the event of an accident, the inertial components within the clamp shall constrain the SCBA bottle in the seat and shall exceed the NFPA standard of 9G. Bracket designs with manual restraints (belts, straps, buckles) that could be inadvertently left unlocked and allow the SCBA to move freely within the cab during an accident, shall not be acceptable.

There shall be a quantity of four (4) SCBA brackets.

**SEAT BELTS**

All cab and tiller cab (if applicable) seating positions shall have red seat belts. To provide quick, easy use for occupants wearing bunker gear, the female buckle and seat belt webbing length shall meet or exceed the current edition of NFPA 1901 and CAN/ULC - S515 standards.

The 3-point shoulder type seat belts shall include height adjustment. This adjustment shall optimize the belt's effectiveness and comfort for the seated firefighter. The 3-point shoulder type
seat belts shall be furnished with dual automatic retractors that shall provide ease of operation in the normal seating position.

The 3-point shoulder type belts shall also include the Ready Reach D-loop (or equivalent) assembly to the shoulder belt system. The Ready Reach feature adds an extender arm to the D-loop location placing the D-loop in a closer, easier to reach location.

Any flip-up seats shall include a 3-point shoulder type belt only.

To ensure safe operation, the seats shall be equipped with seat belt sensors in the seat cushion and belt receptacle that shall activate an alarm indicating a seat is occupied but not buckled.

HELMET STORAGE PROVIDED BY FIRE DEPARTMENT
NFPA 1901, 2016 edition, section 14.1.7.4.1 requires a location for helmet storage be provided.

There is no helmet storage on the apparatus as manufactured. The fire department shall provide a location for storage of helmets.

CAB DOME LIGHTS
There shall be four (4) dual LED dome lights with black bezels provided. Two (2) lights shall be mounted above the inside shoulder of the driver and officer and two (2) lights shall be installed and located, one (1) on each side of the crew cab.

The color of the LED's shall be red and white.

The white LEDs shall be controlled by the door switches and the lens switch.

The color LEDs shall be controlled by the lens switch.

To ensure exceptional illumination, each white LED dome light shall provide a minimum of 10.1 foot-candles (fc) covering an entire 20.00" x 20.00" square seating position when mounted 40.00" above the seat.

ENHANCED SOFTWARE FOR CAB AND CREW CAB DOME LIGHTS
The cab and crew cab dome lights shall remain on for 10 seconds for improved visibility after the doors are closed.

The dome lights shall dim after 10 seconds or immediately if the vehicle’s transmission is put into gear.

Or based on the manufacturer standards.

PORTABLE HAND LIGHTS, PROVIDED BY FIRE DEPARTMENT
NFPA 1901, 2016 edition, section 9.9.4 requires two portable hand lights mounted in brackets fastened to the apparatus.
The hand lights are not on the apparatus as manufactured. The fire department shall provide and mount these hand lights.

**CAB INSTRUMENTATION**  
BASED ON THE MANUFACTURER STANDARDS

The cab instrument panel includes gauges, an LCD display, telltale indicator lamps, control switches, alarms, and a diagnostic panel. The function of the instrument panel controls and switches shall be identified by a label adjacent to each item. Actuation of the headlight switch shall illuminate the labels in low light conditions. Telltale indicator lamps shall not be illuminated unless necessary. The cab instruments and controls shall be conveniently located within the forward cab section, forward of the driver. The gauge assembly and switch panels are designed to be removable for ease of service and low cost of ownership.

**Gauges**

The gauge panel shall include the following ten (10) black faced gauges with black bezels to monitor vehicle performance:

- **Voltmeter gauge (volts):**
  - Low volts (11.8 VDC)
    - Amber caution indicator on the information center with intermittent alarm
    - Amber caution light on gauge assembly
  - High volts (15.5 VDC)
    - Amber caution indicator on the information center with intermittent alarm
    - Amber caution light on gauge assembly
  - Very low volts (11.3 VDC)
    - Red warning indicator on the information center with a steady alarm
    - Amber caution light on gauge assembly
  - Very high volts (16.0 VDC)
    - Red warning indicator on the information center with a steady alarm
    - Amber caution light on gauge assembly

- **Engine Tachometer (RPM)**

- **Speedometer MPH (Major Scale), KM/H (Minor Scale)**

- **Fuel level gauge (Empty - Full in fractions):**
  - Low fuel (1/8 full)
    - Amber caution indicator on the information center with intermittent alarm
    - Amber caution light on gauge assembly
  - Very low fuel (1/32 full)
    - Red caution indicator on the information center with steady alarm
    - Amber caution light on gauge assembly

- **Engine Oil pressure Gauge (PSI):**
  - Low oil pressure to activate engine warning lights and alarms
    - Red caution indicator on the information center with steady alarm
    - Amber caution light on gauge assembly

- **Front Air Pressure Gauges (PSI):**
• Low air pressure to activate warning lights and alarm
  ▪ Red warning indicator on the information center with a steady alarm
  ▪ Amber caution light on gauge assembly

• Rear Air Pressure Gauges (PSI):
  o Low air pressure to activate warning lights and alarm
    ▪ Red warning indicator on the information center with a steady alarm
    ▪ Amber caution light on gauge assembly

• Transmission Oil Temperature Gauge (Fahrenheit):
  o High transmission oil temperature activates warning lights and alarm
    ▪ Amber caution indicator on the information center with intermittent alarm
    ▪ Amber caution light on gauge assembly

• Engine Coolant Temperature Gauge (Fahrenheit):
  o High engine temperature activates an engine warning light and alarms
    ▪ Amber caution indicator on the information center with intermittent alarm
    ▪ Amber caution light on gauge assembly

• Diesel Exhaust Fluid Level Gauge (Empty - Full in fractions):
  o Low fluid (1/8 full)
    ▪ Amber indicator light in gauge dial

All gauges shall perform prove out at initial power-up to ensure proper performance.

**Indicator Lamps**
To promote safety, the following telltale indicator lamps shall be located on the instrument panel in clear view of the driver. The indicator lamps shall be of a “Dead-Front” design that is only visible when active. The colored indicator lights shall have descriptive text or symbols.

The following amber telltale lamps shall be present:

- Low coolant
- Trac cntl (traction control) (where applicable)
- Check engine
- Check trans (check transmission)
- Aux brake overheast (Auxiliary brake overheast)
- Air rest (air restriction)
- Caution (triangle symbol)
- Water in fuel
- DPF (engine diesel particulate filter regeneration)
- Trailer ABS (where applicable)
- Wait to start (where applicable)
- HET (engine high exhaust temperature) (where applicable)
- ABS (antilock brake system)
- MIL (engine emissions system malfunction indicator lamp) (where applicable)
- Side roll fault (where applicable)
• Front air bag fault (where applicable)

The following red telltale lamps shall be present:

• Warning (stop sign symbol)
• Seat belt
• Parking brake
• Stop engine
• Rack down

The following green telltale lamps shall be provided:

• Left turn
• Right turn
• Battery on

The following blue telltale lamp shall be provided:

• High beam

**Alarms**
Audible steady tone warning alarm: A steady audible tone alarm shall be provided whenever a warning message is present.

Audible pulsing tone caution alarm: A pulsing audible tone alarm (chime/chirp) shall be provided whenever a caution message is present without a warning message being present.

Alarm silence: Any active audible alarm shall be able to be silenced by holding the ignition switch at the top position for three (3) to five (5) seconds. For improved safety, silenced audible alarms shall intermittently chirp every 30 seconds until the alarm condition no longer exists. The intermittent chirp shall act as a reminder to the operator that a caution or warning condition still exists. Any new warning or caution condition shall enable the steady or pulsing tones respectively.

**Indicator Lamp and Alarm Prove-Out**
A system shall be provided which automatically tests telltale indicator lights and alarms located on the cab instrument panel. Telltale indicators and alarms shall perform prove-out at initial power-up to ensure proper performance.

**Control Switches**
For ease of use, the following controls shall be provided immediately adjacent to the cab instrument panel within easy reach of the driver. All switches shall have backlit labels for low light applications.
Headlight/Parking light switch: A three (3)-position maintained rocker switch shall be provided. The first switch position shall deactivate all parking and headlights. The second switch position shall activate the parking lights. The third switch shall activate the headlights.

Panel back lighting intensity control switch: A three (3)-position momentary rocker switch shall be provided. Pressing the top half of the switch, “Panel Up” increases the panel back lighting intensity and pressing the bottom half of the switch, “Panel Down” decreases the panel back lighting intensity. Pressing the half or bottom half of the switch several times shall allow back lighting intensity to be gradually varied from minimum to maximum intensity level for ease of use.

Ignition switch: A three (3)-position maintained/momentary rocker switch shall be provided. The first switch position shall turn off and deactivate vehicle ignition. The second switch position shall activate vehicle ignition and shall perform prove-out on the telltale indicators and alarms for 3 to 5 seconds after the switch is turned on. A green indicator lamp is activated with vehicle ignition. The third momentary position shall temporarily silence all active cab alarms. An alarm "chirp" may continue if alarm condition exists. Switching ignition to off position shall terminate the alarm silence feature and reset function of cab alarm system.

Engine start switch: A two (2)-position momentary rocker switch shall be provided. The first switch position is the default switch position. The second switch position shall activate the vehicle's engine. The switch actuator is designed to prevent accidental activation.

A hazard switch shall be provided on the instrument panel or on the steering column.

Heater, defroster, and air conditioning control panel.

Turn signal arm: A self-canceling turn signal with high beam headlight controls shall be provided.

Windshield wiper control shall include high, low, and intermittent modes.

Parking brake control: An air actuated push/pull park brake control valve shall be provided.

Chassis horn control: Activation of the chassis horn control shall be provided through the center of the steering wheel.

High idle engagement switch: A momentary rocker switch with integral indicator lamp shall be provided. The switch shall activate and deactivate the high idle function. The "OK To Engage High Idle" indicator lamp must be active for the high idle function to engage. A green indicator lamp integral to the high idle engagement switch shall indicate when the high idle function is engaged.

"OK To Engage High Idle" indicator lamp: A green indicator light shall be provided next to the high idle activation switch to indicate that the interlocks have been met to allow high idle engagement.
Emergency switching shall be controlled by multiple individual warning light switches for various groups or areas of emergency warning lights. An Emergency Master switch provided on the instrument panel that enables or disables all individual warning light switches is included.

An additional "Emergency Master" button shall be provided on the lower left-hand corner of the gauge panel to allow convenient control of the "Emergency Master" system from inside the driver's door when standing on the ground.

**Custom Switch Panels**  Based on the manufacturer standards
The design of cab instrumentation shall allow for emergency lighting and other switches to be placed within easy reach of the operator thus improving safety. There shall be positions for up to four (4) switch panels in the lower instrument console and up to six (6) switch panels in the overhead visor console. All switches have backlit labels for low light conditions.

**Diagnostic Panel**  Based on the manufacturer standards
A diagnostic panel shall be accessible while standing on the ground and located inside the driver's side door left of the steering column. The diagnostic panel shall allow diagnostic tools such as computers to connect to various vehicle systems for improved troubleshooting providing a lower cost of ownership. Diagnostic switches shall allow ABS systems to provide blink codes should a problem exist.

The diagnostic panel shall include the following:

- Engine diagnostic port
- Transmission diagnostic port
- ABS diagnostic port
- Roll sensor diagnostic port
- Command Zone USB diagnostic port
- ABS diagnostic switch (blink codes flashed on ABS telltale indicator)
- Diesel particulate filter regeneration switch (where applicable)
- Diesel particulate filter regeneration inhibit switch (where applicable)

**Cab LCD Display**  Based on the manufacturer standards
A digital four (4)-row by 20-character dot matrix display shall be integral to the gauge panel. The display shall be capable of showing simple graphical images as well as text. The display shall be split into three (3) sections. Each section shall have a dedicated function. The upper left section shall display the outside ambient temperature.

The upper right section shall display the following, along with other configuration specific information:

- Odometer
- Trip mileage
- PTO hours
The bottom section shall display INFO, CAUTION, and WARNING messages. Text messages shall automatically activate to describe the cause of an audible caution or warning alarm. The LCD shall be capable of displaying multiple text messages should more than one caution or warning condition exist.

**AIR RESTRICTION INDICATOR**  
**BASED ON THE MANUFACTURER STANDARDS**

A high air restriction warning indicator light LCD message with amber warning indicator and audible alarm shall be provided.

"**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 activate a pulsing alarm when the parking brake is released.

**DO NOT MOVE TRUCK MESSAGES**  
**BASED ON THE MANUFACTURER STANDARDS**

Messages shall be displayed on the Command Zone™ or equivalent, color display located within sight of the driver whenever the Do Not Move Truck light is active. The messages shall designate the item or items not in the stowed for vehicle travel position (parking brake released).

The following messages shall be displayed (where applicable):

- Do Not Move Truck
- LS CAB DOOR, the left side cab door is open
- LS CAB COMPT DOOR, the left side cab compartment door is open
- LS CREW CAB DOOR, the left side crew cab door is open
- STEP NOT STOWED, pump house step not stowed
- LS TURNTABLE STEP, left side turntable step not stowed
- AERIAL CONTROL DR, aerial override control compartment door is open
- LS6 COMPT DR, the left side LS6 compartment door is open
- LS5 COMPT DR, the left side LS5 compartment door is open
- LS4 COMPT DR, the left side LS4 compartment door is open
- LS3 COMPT DR, the left side LS3 compartment door is open
- LS2 COMPT DR, the left side LS2 compartment door is open
- LS1 COMPT DR, the left side LS1 compartment door is open
- LS AIR BTL COMPT DR, the left side air bottle compartment door is open
- LS BASKET STEP, the left side basket steps not stowed
- STABILIZER CTRL DR, the rear stabilizer control compartment door is open
- STABILIZER DEPLOYED, the stabilizers are not stowed.
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- LS CORD REEL DR, the left side cord reel compartment door is open
- RS CORD REEL DR, the right side cord reel compartment door is open
- B1 REAR COMPT DR, the rear B1 compartment door is open
- TURNTBL CTRL CNSL, the turntable control console not stowed.
- RS BASKET STEP, the right side basket steps not stowed
- RS AIR BTL COMPT DR, the right side air bottle compartment door is open.
- RS1 COMPT DR, the right side RS1 compartment door is open
- RS2 COMPT DR, the right side RS2 compartment door is open
- RS3 COMPT DR, the right side RS3 compartment door is open
- RS4 COMPT DR, the right side RS4 compartment door is open
- RS5 COMPT DR, the right side RS5 compartment door is open
- RS6 COMPT DR, the right side RS6 compartment door is open
- RS7 COMPT DR, the right side RS7 compartment door is open
- RS CREWCAB DR, the right side crew cab door is open
- RS CAB COMPT DR, the right side cab compartment door is open
- RS CAB DR, the right side cab door is open
- LT TOWER NOT STOWED, the light tower is not stowed

Any other device that is opened, extended, or deployed that creates a hazard or is likely to cause major damage to the apparatus if the apparatus is moved shall be displayed as a caution message after the parking brake is released.

SWITCH PANELS
The emergency light switch panel shall have a master switch for ease of use plus individual switches for selective control. Each switch panel shall contain eight (8) membrane-type switches each rated for one million (1,000,000) cycles. Panels containing less than eight (8) switch assignments shall include non-functioning black appliqués. The built-in switch panels shall be in the lower console or overhead console of the cab.

Additional switch panel(s) will be in the overhead position(s) above the windshield or in designated locations on the lower instrument panel layout.

The switches shall be membrane-type and also act as an integral indicator light. For quick, visual indication the entire surface of the switch shall be illuminated white whenever back lighting is activated and illuminated green whenever the switch is active. An active illuminated switch shall flash when interlock requirements are not met, or device is actively being load managed. For ease of use, a two (2)-ply, scratch resistant laser engraved Gravoply label or equivalent indicating the use of each switch shall be placed in the center of the switch. The label shall allow light to pass through the letters for ease of use in low light conditions.
WIPER CONTROL
Wiper control shall consist of a two (2)-speed windshield wiper control with intermittent feature and windshield washer controls. The control shall be located in the left-hand pod of the steering wheel.

HOURMETER - AERIAL DEVICE
The following aerial hour meter messages shall be included in the information centers:

- Aerial Hours, that keeps track of the time the aerial device is in motion.
- Aerial PTO Hours, that keeps track of the time the aerial master switch is on, and the aerial PTO is engaged.

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

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

SPARE CIRCUIT
There shall be five (5) pairs of wires, including a positive and a negative, installed on the apparatus.

The above wires shall have the following features:

- The positive wire shall be connected directly to the battery power
- The negative wire shall be connected to ground
- Wires shall be protected to 20 amps at 12 volts DC
- Power and ground shall terminate on the rear area of the engine tunnel
- Termination shall be with heat shrinkable butt splicing
- Wires shall be sized to 125% of the protection

This circuit(s) may be load managed when the parking brake is set.

SPARE CIRCUIT
There shall be two (2) pairs of wires, including a positive and a negative, installed on the apparatus.

The above wires shall have the following features:

- The positive wire shall be connected directly to the battery power
- The negative wire shall be connected to ground
- Wires shall be protected to 15 amps at 12 volts DC
- Power and ground shall terminate officer side dash area
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- Termination shall be with heat shrinkable butt splicing
- Wires shall be sized to 125 percent of the protection

The circuit(s) may be load managed when the parking brake is set.

**INFORMATION CENTER**  BASED ON THE MANUFACTURER STANDARDS

An information center employing a 7.00" diagonal touch screen color LCD display shall be encased in an ABS plastic housing.

The information center shall have the following specifications:

- Operate in temperatures from -40 to 185 degrees Fahrenheit
- An Optical Gel shall be placed between the LCD and protective lens
- Five weather resistant user interface switches
- Grey with black accents
- Sunlight Readable
- Linux operating system
- Minimum of 1000nits rated display
- Display can be changed to an available foreign language
- A LCD display integral to the cab gauge panel shall be included as outlined in the cab instrumentation area.
- Programmed to read US Customary

**General Screen Design**

Where possible, background colors shall be used to provide "At a Glance" vehicle information. If information provided on a screen is within acceptable limits, a green background shall be used.

If a caution or warning situation arises the following shall occur:

- An amber background/text color shall indicate a caution condition
- A red background/text color shall indicate a warning condition
- The information center shall utilize an "Alert Center" to display text messages for audible alarm tones. The text messages shall be written to identify the item(s) causing the audible alarm to sound. If more than one (1) text message occurs, the messages shall cycle every second until the problem(s) has been resolved. The background color for the "Alert Center" shall change to indicate the severity of the "warning" message. If a warning and a caution condition occur simultaneously, the red background color shall be shown for all alert center messages.
- A label for each button shall exist. The label shall indicate the function for each active button for each screen. Buttons that are not utilized on specific screens shall have a button label with no text or symbol.
Home/Transit Screen
This screen shall display the following:

- Vehicle Mitigation (if equipped)
- Water Level (if the water level system includes compatible communications to the information center)
- Foam Level (if the foam level system includes compatible communications to the information center)
- Seat Belt Monitoring Screen
- Tire Pressure Monitoring (if equipped)
- Digital Speedometer
- Active Alarms

On Scene Screen
This screen shall display the following and shall be auto activated with pump engaged (if equipped):

- Battery Voltage
- Fuel
- Oil Pressure
- Coolant Temperature
- RPM
- Water Level (if equipped)
- Foam Level (if equipped)
- Foam Concentration (if equipped)
- Water Flow Rate (if equipped)
- Water Used (if equipped)
- Active Alarms

Virtual Buttons
There shall be four (4) virtual switch panel screens that match the overhead and lower lighting and HVAC switch panels.

Page Screen
The page screen shall display the following and allow the user to progress into other screens for further functionality:

- Diagnostics
  - Faults
    - Listed by order of occurrence
    - Allows to sort by system
  - Interlock
    - Throttle Interlocks
- Pump Interlocks (if equipped)
- Aerial Interlocks (if equipped)
- PTO Interlocks (if equipped)

- Load Manager
  - A list of items to be load managed shall be provided. The list shall provide a description of the load.
  - The lower the priority numbers the earlier the device shall be shed should a low voltage condition occur.
  - The screen shall indicate if a load has been shed (disabled) or not shed.
  - "At a glance" color features are utilized on this screen.

- Systems
  - Command Zone
    - Module type and ID number
    - Module Version
    - Input or output number
    - Circuit number connected to that input or output
    - Status of the input or output
    - Power and Constant Current module diagnostic information
  - Foam (if equipped)
  - Pressure Controller (if equipped)
  - Generator Frequency (if equipped)

- Live Data
  - General Truck Data

- Maintenance
  - Engine oil and filter
  - Transmission oil and filter
  - Pump oil (if equipped)
  - Foam (if equipped)
  - Aerial (if equipped)

- Setup
  - Clock Setup
  - Date & Time
    - 12- or 24-hour format
    - Set time and date
  - Backlight
    - Daytime
    - Nighttime
    - Sensitivity
  - Unit Selection
  - Home Screen
  - Virtual Button Setup
  - On Scene Screen Setup
Configure Video Mode
- Set Video Contrast
- Set Video Color
- Set Video Tint

Do Not Move
- The screen shall indicate the approximate location and type of item that is open or is not stowed for travel. The actual status of the following devices shall be indicated:
  - Driver Side Cab Door
  - Passenger’s Side Cab Door
  - Driver Side Crew Cab Door
  - Passenger’s Side Crew Cab Door
  - Driver Side Body Doors
  - Passenger’s Side Body Doors
  - Rear Body Door(s)
  - Ladder Rack (if applicable)
  - Deck Gun (if applicable)
  - Light Tower (if applicable)
  - Hatch Door (if applicable)
  - Stabilizers (if applicable)
  - Steps (if applicable)

Notifications
- View Active Alarms
  - Shows a list of all active alarms including date and time of the occurrence is shown with each alarm
  - Silence Alarms - All alarms are silenced

Timer Screen
- HVAC (if equipped)
- Tire Information (if equipped)
- Ascendant Set Up Confirmation (if equipped)

Button functions and button labels may change with each screen.

**COLLISION MITIGATION** NOT REQUIRED, UNLESS BY NFPA
There shall be a HAAS Alert®, Model HA5 Responder-to-Vehicle (R2V) collision avoidance system provided on the apparatus. The HA5 cellular transponder module shall be installed behind the cab windshield, as high and near to the center as practical, to allow clear visibility to the sky. The module dimensions are 5.40" long x 2.70" wide x 1.30" high, and the operating temperature range is -40 degree C to 85-degree C.

The transponder shall be connected to the vehicle's emergency master circuit and battery direct power and ground.
While responding with emergency lights on, the HA5 transponder sends alert messages via cellular network to motorists in the vicinity of the responding truck that are equipped with the WAZE app.

While on scene with emergency lights on, the HA5 transponder sends road hazard alerts to motorists in the vicinity of the truck that are equipped with the WAZE app.

The HA5 Responder-to-Vehicle (R2V) collision avoidance system shall include the transponder and a 5-year cellular plan subscription.

Activation of the HAAS Alert system requires a representative of the customer to accept the End User License Agreement (EULA) via an on-line portal.

**VEHICLE DATA RECORDER**
There shall be a vehicle data recorder (VDR) capable of reading and storing vehicle information provided.

The information stored on the VDR can be downloaded through a USB port mounted in a convenient location determined by cab model. A USB cable can be used to connect the VDR to a laptop to retrieve required information. The program to download the information from the VDR will be available to download on-line.

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
- Seat Belt Buckled Status - Yes/No by Position
- Master Optical Warning Device Switch - On/Off
- Time - 24 Hour Time
- Date - Year/Month/Day

**Seat Belt Monitoring System**
A seat belt monitoring system (SBMS) shall be provided on the color display and in the center overhead of the cab instrument panel. The SBMS shall be capable of monitoring up to 10 seating positions indicating the status of each seat position per the following:

- Seat Occupied & Buckled = Green LED indicator illuminated
- Seat Occupied & Unbuckled = Red LED indicator with audible alarm
- No Occupant & Buckled = Red LED indicator with audible alarm
- No Occupant & Unbuckled = No indicator and no alarm

The seat belt monitoring screen shall become active on the color display when:

- The home screen is active:
  - and there is any occupant seated but not buckled or any belt buckled with an occupant.
  - and there is no other Do Not Move Apparatus conditions present. As soon as all Do Not Move Apparatus conditions are cleared, the SBMS shall be activated.

The SBMS shall include an audible alarm that shall warn that an unbuckled occupant condition exists, and the parking brake is released, or the transmission is not in park.

**RADIO ANTENNA MOUNT**

There shall be one (1) standard 1.125”, 18 thread antenna-mounting base(s) installed on the right side on the cab roof with high efficiency, low loss, coaxial cable(s) routed to the instrument panel area. A weatherproof cap shall be installed on the mount.

**COMBO ANTENNA**

There shall be one (1), Sierra Wireless bolt on, low profile 6-in-1 dome antenna(s).

The 6-in-1 Dome has a low-profile design that contains six isolated high-performance antenna elements in a single housing for optimal coverage; two ultra-wideband elements spanning 698-2700 MHz support MiMo/diversity at LTE frequencies; a high-performance GNSS antenna with an integrated 26 dB gain LNA, and three dual-band 2.4/5 GHz Wi-Fi elements that provide 3x3 MiMo Wi-Fi. The antenna is ground plane independent, cable length 16.4 feet.

The antenna shall be black.

The cables shall be routed within the cab-to-cab roof.

**VEHICLE CAMERA SYSTEM**

There shall be a color vehicle camera system provided with the following:

- One (1) camera located at the rear of the apparatus, pointing rearward, displayed automatically with the vehicle in reverse

The camera images shall be displayed on the left side vehicle information center display. Audio from the microphone on the active camera shall be emitted by an amplified speaker on the ceiling behind the driver.

The following components shall be included:
- One (1) SV-CW134639CAI, camera
- One (1) amplified speaker (if applicable)
- All necessary cables

**ELECTRICAL POWER CONTROL SYSTEM**

The primary power distribution shall be located forward of the officer’s seating position and be easily accessible while standing on the ground for simplified maintenance and troubleshooting. Additional electrical distribution centers shall be provided throughout the vehicle to house the vehicle’s electrical power, circuit protection, and control components. The electrical distribution centers shall be located strategically throughout the vehicle to minimize wire length. For ease of maintenance, all electrical distribution centers shall be easily accessible. All distribution centers containing fuses, circuit breakers and/or relays shall be easily accessible.

Distribution centers located throughout the vehicle shall contain battery powered studs for supplying customer installed equipment thus providing a lower cost of ownership.

Circuit protection devices, which conform to SAE standards, shall be utilized to protect electrical circuits. All circuit protection devices shall be rated per NFPA requirements to prevent wire and component damage when subjected to extreme current overload. General protection circuit breakers shall be Type-I automatic reset (continuously resetting). When required, automotive type fuses shall be utilized to protect electronic equipment. Control relays and solenoid shall have a direct current rating of 125 percent of the maximum current for which the circuit is protected per NFPA.

**Solid-State Control System**

A solid-state electronics-based control system shall be utilized to achieve advanced operation and control of the vehicle components. A fully computerized vehicle network shall consist of electronic modules, electronic control modules to include a see-through housing, a power indicator, a status indicator, and circuit indicators located near their point of use to reduce harness lengths and improve reliability. The control system shall comply with SAE J1939-11 recommended practices.

The control system shall operate as a master-slave system whereas the main control module instructs all other system components. The system shall contain patented Mission Critical software that maintains critical vehicle operations in the unlikely event of a main controller error. The system shall utilize a Real Time Operating System (RTOS) fully compliant with OSEK/VDX™ specifications providing a lower cost of ownership.

For increased reliability and simplified use, the control system modules shall include the following attributes:

- Green LED indicator light for module power
- Red LED indicator light for network communication stability status
- Control system self-test at activation and continually throughout vehicle operation
No moving parts due to transistor logic
Software logic control for NFPA mandated safety interlocks and indicators
Integrated electrical system load management without additional components
Integrated electrical load sequencing system without additional components
Customized control software to the vehicle's configuration
Factory and field programmable to accommodate changes to the vehicle's operating parameters

To assure long life and operation in a broad range of environmental conditions, the solid-state control system modules shall meet the following specifications:

- Module circuit board shall meet SAE J771 specifications
- Operating temperature from -40°C to +70°C
- Storage temperature from -40°C to +70°C
- Vibration to 50g

IP67 rated enclosure (Totally protected against dust and protected against the effect of temporary immersion between 15 centimeters and one (1) meter)

Operating voltage from eight (8) volts to 32 volts DC

The main controller shall activate status indicators and audible alarms designed to provide warning of problems before they become critical.

**Circuit Protection and Control Diagram**
Copies of all job-specific, computer network input and output (I/O) connections shall be provided with each chassis. The sheets shall indicate the function of each module connection point, circuit protection information (where applicable), wire numbers, wire colors and load management information.

**On-Board Electrical System Diagnostics**
The on-board information center shall include the following diagnostic information:

- Text description of active warning or caution alarms
- Simplified warning indicators
- Amber caution indication with intermittent alarm
- Red warning indication with steady tone alarm

Advanced diagnostic features shall be provided in this control system. From the display or connected wireless device, these features allow the user to monitor the real-time status of every input or output on the vehicle. It also allows users logged in as an administrator to force on inputs or outputs to assist the troubleshooting process.
### TCU Module with Wi-Fi

Not required

An in-cab module shall provide Wi-Fi wireless interface and data logging capability (no exception). The Wi-Fi interface shall comply with IEEE 802.11 b/g/n capabilities while communicating at 2.4 Gigahertz. The module shall communicate through a black Wi-Fi antenna allowing a line of site communication range of up to 300 feet with a roof mounted antenna.

The module shall transmit a password protected web page to a Wi-Fi enabled device (i.e. most smart phones, tablets, or laptops) allowing two levels of user interaction. The firefighter level shall allow vehicle monitoring of the vehicle and firefighting systems on the apparatus. The technician level shall allow diagnostic access to inputs and outputs installed on the Command Zone™, control and information system.

The TCU capability shall record faults from the engine, transmission, ABS and Command Zone™, control and information systems as they occur. No other data shall be recorded at the time the fault occurs. The data TCU shall provide up to 2 Gigabytes of data storage.

The TCU shall provide a means to download the TCU information and update software in the device.

### Indicator Light and Alarm Prove-Out System

A system shall be provided which automatically tests basic indicator lights and alarms located on the cab instrument panel.

### Voltage Monitor System

A voltage monitoring system shall be provided to indicate the status of the battery system connected to the vehicle’s electrical load. The system shall provide visual and audible warning when the system voltage is below or above optimum levels.

The alarm shall activate if the system falls below 11.8 volts DC for more than two (2) minutes.

### Dedicated Radio Equipment Connection Points

There shall be three (3) studs provided in the primary power distribution center located in front of the officer for two-way radio equipment. The studs shall consist of the following:

- 12-volt 40-amp battery switched power
- 12-volt 60-amp ignition switched power
- 12-volt 60-amp direct battery power

There shall also be a 12-volt 100-amp ground stud located in or adjacent to the power distribution center.

### EMI/RFI Protection

To prevent erroneous signals from crosstalk contamination and interference, the electrical system shall meet, at a minimum, SAE J551/2, thus reducing undesired electromagnetic and radio frequency emissions. An advanced electrical system shall be used to ensure radiated and
conducted electromagnetic interference (EMI) or radio frequency interference (RFI) emissions are suppressed at their source.

The apparatus shall have the ability to operate in the electromagnetic environment typically found in fire ground operations to ensure clean operations. The electrical system shall meet, without exceptions, electromagnetic susceptibility conforming to SAE J1113/25 Region 1, Class C EMR for 10KHz-1GHz to 100 Volts/Meter. The vehicle OEM, upon request, shall provide EMC testing reports from testing conducted on an entire apparatus and shall certify that the vehicle meets SAE J551/2 and SAE J1113/25 Region 1, Class C EMR for 10KHz-1GHz to 100 Volts/Meter requirements. Component and partial (incomplete) vehicle testing is not adequate as overall vehicle design can impact test results and thus is not acceptable by itself.

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

**ELECTRICAL SYSTEM PROGNOSTICS**

There shall be a software-based vehicle tool provided to predict the remaining life of the vehicle’s critical fluid and events.

The system shall send automatic indications to the information center and/or wireless enabled devices to proactively alert of upcoming service intervals.

Prognostics shall include the following:

- Engine oil and filter
- Transmission oil and filter

**TELEMATICS SYSTEM**

There shall be a cellular based vehicle telematics system consisting of a Telematic Control Unit (TCU) with external cellular Wi-Fi and GPS antenna, and access to a web-based user interface portal provided.

The TCU shall be fully integrated into the electrical system. It shall monitor the vehicle through the CAN data bus and transmit data through a secure 4G LTE cellular connection and be provided with a 3-year subscription.

After accepting the end user license agreement, the vehicle administrator shall have access to vehicle location information and vehicle data via a secure web-based interface portal.

The web-based interface will allow users to access vehicle data and configure monitoring tools, providing a global view of the location of each connected asset and a summary of fleet data, which include:
- User defined interval notifications
- User defined fault alerts
- Remote access to Command Zone diagnostics
- Vehicle analytics and activity monitoring
- Vehicle system status

**ELECTRICAL**

All 12-volt electrical equipment installed by the apparatus manufacturer shall conform to modern automotive practices. All wiring shall be of high temperature crosslink type. Wiring shall be run, in loom or conduit, where exposed and have grommets where wire passes through sheet metal. Automatic reset circuit breakers shall be provided which conform to SAE Standards. The 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. The 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 the 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 applied completely over the metal portion of the terminal.

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.

**BATTERY SYSTEM**

There shall be six (6) 12 volt Exide®, Model 31S950X3W, batteries that include the following features shall be provided: Or Equivalent.

- 950 CCA, cold cranking amps
- 190-amp reserve capacity
- High cycle
- Group 31
- Rating of 5700 CCA at 0 degrees Fahrenheit
- 1140 minutes of reserve capacity
- Threaded stainless steel studs

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.

**BATTERY SYSTEM**

There shall be a single starting system with an ignition switch and starter button provided and located on the cab instrument panel.

**MASTER BATTERY SWITCH**

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

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

**BATTERY COMPARTMENTS**

Batteries shall be placed on non-corrosive mats. Batteries shall be stored in well-ventilated compartments that are located under the cab and bolted directly to the chassis frame. The battery compartments shall be constructed of painted 0.188" stainless steel plate and be designed to accommodate a maximum of three (3) group 31 batteries in each compartment. 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.
JUMPER STUDS
One (1) set of battery jumper studs with plastic color-coded covers shall be included on the battery compartments.

BATTERY CHARGER
There shall be a Kussmaul™, Chief Series Smart Charger 4012, product code 091-266-12-40, 40-amp battery charger with build-in touch screen display provided. Or equivalent.

The battery charger shall be wired to the AC shoreline inlet through a junction box located near the battery charger.

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

AIR COMPRESSOR
There shall be one (1) Kussmaul part number 091-9-12V-HP, 12 volt DC 100 PSI air compressor with auto drain provided.

There shall be no timer to control the air compressor activation intervals.

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

AUTO EJECT FOR SHORELINE
There shall be a Kussmaul™, part number 091-55-15-120, 15 amp 120 volt AC shoreline inlet provided to operate the dedicated 120 volt AC circuits on the apparatus.

The inlet shall include a Kussmaul Chief Series part number 091-55-266-XX weatherproof flip up cover with OLED DC display. The color of the cover shall be red.

There shall be a release solenoid wired to the vehicle's starter to eject the AC connector when the engine is starting.

The shoreline(s) shall be connected to the battery charger.

There shall be a mating connector body supplied with the loose equipment.

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

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

The shoreline receptacle shall be located on the driver side of cab, above wheel.
GENERATOR TO SHORELINE TRANSFER SWITCH
There shall be an automatic transfer switch between the onboard generator and the shoreline inlet. The loads connected to the transfer switch shall be power from the onboard generator when the generator is running.

ALTERNATOR
A Delco Remy®, Model 55SI, alternator shall be provided. It shall have a rated output current of 430 amps, as measured by SAE method J56. The alternator shall feature an integral regulator and rectifier system that has been tested and qualified to an ambient temperature of 257 degrees Fahrenheit (125 degrees Celsius). The alternator shall be connected to the power and ground distribution system with heavy-duty cables sized to carry the full rated alternator output. Or equivalent.

ELECTRONIC LOAD MANAGER
An electronic load management (ELM) system shall be provided so that it monitors the vehicles 12-volt electrical system, automatically reducing the electrical load in the event of a low voltage condition, and automatically restoring the shed electrical loads when a low voltage condition expires. This ensures the integrity of the electrical system.

For improved reliability and ease of use, the load manager system shall be an integral part of the vehicle’s solid state control system requiring no additional components to perform load management tasks. Load management systems which require additional components shall not be allowed.

The system shall include the following features:

- System voltage monitoring.
- A shed load shall remain inactive for a minimum of five minutes to prevent the load from cycling on and off.
- Sixteen available electronic load shedding levels.
- Priority levels can be set for individual outputs.
- High Idle to activate before any electric loads are shed and deactivate with the service brake.
  - If enabled:
    - "Load Man Hi-Idle On" shall display on the information center.
    - Hi-Idle shall not activate until 30 seconds after engine start up.
- Individual switch "on" indicator to flash when the particular load has been shed.
- The information center indicates system voltage.

The information center, where applicable, includes a "Load Manager" screen indicating the following:

- Load managed items list, with priority levels and item condition.
- Individual load managed item condition.
A sequencer shall be provided that automatically activates and deactivates vehicle loads in a preset sequence thereby protecting the alternator from power surges. This sequencer operation shall allow a gradual increase or decrease in alternator output, rather than loading or dumping the entire 12-volt load to prolong the life of the alternator.

For improved reliability and ease of use, the load sequencing system shall be an integral part of the vehicle’s solid state control system requiring no additional components to perform load sequencing tasks. Load sequencing systems which require additional components shall not be allowed.

Emergency light sequencing shall operate in conjunction with the emergency master light switch. When the emergency master switch is activated, the emergency lights shall be activated one by one at half-second intervals. Sequenced emergency light switch indicators shall flash while waiting for activation.

When the emergency master switch is deactivated, the sequencer shall deactivate the warning light loads in the reverse order.

Sequencing of the following items shall also occur, in conjunction with the ignition switch, at half-second intervals:

- Cab Heater and Air Conditioning
- Crew Cab Heater (if applicable)
- Crew Cab Air Conditioning (if applicable)
- Exhaust Fans (if applicable)
- Third Evaporator (if applicable)

**HEADLIGHTS WITH HALO FLASH**

There shall be a HiViz part number FT-4X6-4KIT or equivalent, that includes four (4) 4.00" high x 6.00" long rectangular LED lights with "Halo" parking lamp illumination around the outside of the lamps mounted in the front quad style housing. The headlights to include chrome bezels on each side of the cab grille:

- the outside lamp on each side shall contain a part number FT-4X6-HL or equivalent with low beam LEDs
- the inside lamp on each side shall contain a part number FT-4X6-H or equivalent with high beam LEDs
- the "Halo" around the headlights shall be controlled by the headlight/parking light switch
- the lights shall be controlled through the headlight switch
The "Halo" around the headlights shall flash alternately from driver side to passenger side when emergency master switch is on, a "Halo Flash" switch in the cab is on, and the parking brake is released.

**FRONT DIRECTIONALS**
The front directionals shall be Whelen®, Model M62T or equivalent, 4.31” high x 6.75” wide x 1.37” deep directional lights with amber LEDs. The lens color(s) to be clear. The directional’s shall be housed in the same common bezel as the front warning light and shall be located above the headlights. The housing must be polished, and the trim shall be chrome.

The flash pattern of the directional lights shall be Steady On (Arrow).

**INTERMEDIATE LIGHT**
There shall be two (2) Weldon, Model 9186-8580-29 or equivalent, amber LED turn signal marker lights furnished, one (1) each side, in the rear fender panel. The light shall double as a turn signal and marker light.

**CAB CLEARANCE/MARKER/ID LIGHTS**
There shall be seven (7) amber LED lights provided per the following:

- Three (3) amber LED identification lights shall be installed in the center of the cab above the windshield.
- Two (2) amber LED clearance lights shall be installed, one (1) on each outboard side of the cab above the windshield as close to the outside of the apparatus as practical.
- Two (2) amber LED clearance lights shall be installed, one (1) on each side of the cab as high and far forward as practical.

The lights shall be installed without guards.

**FRONT CAB SIDE DIRECTIONAL/MARKER LIGHTS**
There shall be two (2) Weldon, Model 9186-8580-29 or equivalent, amber LED lights installed in front of the cab door, one (1) on each side of the cab.

The lights shall activate as marker lights with the headlight switch and directional lights with the corresponding directional circuit.

**REAR CLEARANCE/MARKER/ID LIGHTING**
There shall be three (3) LED identification lights located at the rear of the apparatus installed per the following:

- As close as practical to the vertical centerline and one (1) on each outside edge
- Centers spaced not less than 6.00” or more than 12.00” apart
- Red in color
- All at the same height
- All visible from the rear
There shall be two (2) LED lights installed at the rear of the apparatus used as clearance lights located at the rear of the apparatus per the following:

- To indicate the overall width of the vehicle
- One (1) each side of the vertical centerline
- As near the top as practical
- Red in color
- To be visible from the rear
- All at the same height

There shall be two (2) LED lights installed on the side of the apparatus used as marker lights as close to the rear as practical per the following:

- To indicate the overall length of the vehicle
- One (1) each side of the vertical centerline
- As near the top as practical
- Red in color
- To be visible from the side
- All at the same height

There shall be two (2) red reflectors located on the rear of the truck facing the rear. One (1) each side, as far to the outside as practical, at a minimum of 15.00", but no more than 60.00", above the ground.

There shall be two (2) red reflectors located on the side of the truck facing the side. One (1) each side, as far to the rear as practical, at a minimum of 15.00", but no more than 60.00", above the ground.

Per FMVSS 108 and CMVSS 108 requirements.

**MARKER LIGHTS**
There shall be one (1) pair of amber and red LED marker lights with rubber arm, located at the rear most, lower corner of the body. 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.

**REAR FMVSS LIGHTING**
The rear stop/tail and directional lighting included in the rear taillight housing shall include the following:

- Two (2) Whelen®, Model M62BTT or equivalent, 4.30" high x 6.70" wide x 1.40" deep brake/taillights with red LEDs
• Two (2) Whelen, Model M62T or equivalent, 4.30” high x 6.70” wide x 1.40” deep directional lights with amber LEDs. The directional lights shall be set to Steady On (Arrow) flash pattern.
• The lens color(s) to be clear.

There shall be two (2) Whelen Model M62BU or equivalent, LED backup lights provided in the taillight housing.

**LICENSE PLATE BRACKET**

There shall be one (1) Weldon, Model 0J10-0393-00 or equivalent, license plate bracket located below the tailboard on a removable bolt-on bracket located center.

A Weldon, Model 9186-23882-30 or equivalent, incandescent step light shall illuminate the license plate.

**LIGHTING BEZEL**

There shall be two (2) Whelen, Model M6FCV4P or equivalent, four (4) place chromed ABS housings for the rear M6 series stop/tail, directional, back up, scene lights or warning lights.

**BACK-UP ALARM**

A PRECO, Model 1040 or equivalent, 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 ten (10) dBA above surrounding environmental noise levels.

**CAB PERIMETER SCENE LIGHTS**

There shall be four (4) Amdor, Model AY-LB-12HW020, 350 lumens each, 20.00” white LED strip lights provided, one (1) for each cab door. Or equivalent.

These lights shall be activated automatically when the battery switch is on, and the exit doors are opened or by the same means as the body perimeter scene lights.

**PUMP HOUSE PERIMETER LIGHTS**

There shall be one (1) Amdor, Model AY-LB-12HW020, 350 lumens, 20.00” LED weatherproof strip light with bracket provided under the passenger’s side pump panel running board. Or equivalent.

If the combination of options in the vehicle does not permit clearance for a 20.00” light, a 12.00” version of the Amdor light shall be installed.

The light shall be activated when the battery switch is on, and controlled by the same means as the body perimeter lights.

**BODY PERIMETER SCENE LIGHTS**

There shall be three (3) Amdor®, Model AY-LB-12HW012, 190 lumens, 12.00” long, white 12-volt DC LED strip lights provided. Or equivalent.
The lights shall be mounted in the following locations.

- One (1) light shall be provided under the left side turntable access steps
- One (1) light shall be provided under the left side basket access steps
- One (1) light shall be provided under the right-side basket access steps

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

**ENHANCED SOFTWARE FOR PERIMETER LIGHTS**

All perimeter lights shall be deactivated when the parking brake is released unless alternate control is selected.

The cab and crew cab perimeter lights shall remain on for ten (10) seconds for improved visibility after the doors close.

**STEP ILLUMINATION**

The running board(s) under the pump panel(s) shall be illuminated by the lights included in the overhead pump panel light shield.

Additional steps on the apparatus shall be illuminated per the current edition of NFPA 1901.

**12 VOLT LIGHTING**

There shall be one (1) HiViz Model FT-B-46-*-* or equivalent, 2.56" high x 46.00" long x 2.45" deep 13,306 effective lumens 12-volt DC light with white LEDs provided as far forward as possible on the front cab roof centered. The LEDs shall be configured with a combination of flood and spot optics.

The painted parts of the light housing and brackets to be white.

The scene LEDs shall be activated by a switch at the driver's side switch panel.

The white LEDs may be load managed when the parking brake is applied.

**12 VOLT LIGHTING**

There shall be one (1) HiViz Model FT-MB-15-*-* or equivalent, 2.06" high x 19.77" long x 2.45" deep, 5,544 effective lumens 12-volt DC light(s) with a combination of flood and spot optics and adjustable mounting bracket(s) installed on the cab PS cab roof. The light(s) to be installed on 30-degree angled bracket(s) raising the light(s) off the roof of the cab and to the outside of the cab.

The painted parts of the light housing and brackets to be white.

The light(s) shall be activated by a switch at the driver's side switch panel.

The light(s) may be load managed when the parking brake is applied.
12 VOLT LIGHTING
There shall be one (1) HiViz Model FT-MB-15-*-* or equivalent, 2.06” high x 19.77” long x 2.45” deep, 5,544 effective lumens 12-volt DC light(s) with a combination of flood and spot optics and adjustable mounting bracket(s) installed on the cab DS Cab Roof. The light(s) to be installed on 30-degree angled bracket(s) raising the light(s) off the roof of the cab and to the outside of the cab.

The painted parts of the light housing and brackets to be white.

The light(s) shall be activated by a switch at the driver's side switch panel and when the cab or crew cab doors on the driver's side are open.

The light(s) may be load managed when the parking brake is applied.

12 VOLT LIGHTING - BODY
There shall be three (3) HiViz®, Model FT-GSMJR-* or equivalent, 3,000 effective lumens 5.05” high x 7.41” wide x 1.55” deep light(s) with white LEDs installed on the body rear truck. The light(s) should include chrome optic holders, chrome bezels and black fixture body.

The light(s) shall be activated by a switch at the driver's side switch panel and side lights activated when shifting the chassis transmission into reverse when the emergency master switch is on.

The light(s) may be load managed when the parking brake is applied.

12 VOLT LIGHTING
There shall be two (2) HiViz Model FT-MB-18-TR-*-* or equivalent, 6,652.8 effective lumens 2.87” high x 25.20” long x 2.45” deep 12-volt DC light(s) with white LEDs and a combination of flood and spot optics provided on the apparatus, located on the PS body.

The painted parts of the light housing and brackets to be white.

The light(s) shall be controlled by a switch at the driver's side switch panel.

The light(s) may be load managed when the parking brake is applied.

12 VOLT LIGHTING
There shall be two (2) HiViz Model FT-MB-18-TR-*-* or equivalent, 6,652.8 effective lumens 2.87” high x 25.20” long x 2.45” deep 12-volt DC light(s) with white LEDs and a combination of flood and spot optics provided on the apparatus, located on the DS body.

The painted parts of the light housing and brackets to be white.

The light(s) shall be controlled by a switch at the driver's side switch panel.

The light(s) may be load managed when the parking brake is applied.
HOSE BED LIGHTS
There shall be 12-volt DC light strips with stainless steel protective covers and white LEDs provided to illuminate the hose bed area per the following:

- A light strip shall be installed along the front edge of the hose bed facing rearward.
- A light strip shall be installed under the boom support facing forward.

The lights shall be activated when the parking brake is applied.

REAR SCENE LIGHTS
There shall be two (2) Whelen®, Model M6ZC or equivalent white LED scene lights mounted in Model M6P15* or equivalent, 15-degree chrome trim angled downward, installed at the rear of the apparatus. These lights shall be installed between 58.00” and 72.00” above the ground.

The lights shall be controlled by a switch at the driver's side switch panel.

WALKING SURFACE LIGHT
There shall be two (2) Model P25 12-volt DC LED lights with chrome housing provided to illuminate the top of the body walking surface. These LED lights shall be located on the rear facing surface of the upper portion of the body to illuminate the walking surface to the platform basket. There shall be a Model FRP, 4” round black 12-volt DC LED floodlight located forward on the left side top of the body. Or equivalent.

These lights shall be activated when "Aerial Master" is on.

WATER TANK
The water tank shall have a capacity of 300 gallons and shall be constructed of UV stabilized ultra-high impact polypropylene plastic.

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

The tank shall be baffled in accordance with the current edition of NFPA 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 0.38” polypropylene plastic and extend from the bottom of the tank through the top cover to allow positive welding.

The transverse partitions extend from 4.00” 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 0.50” polypropylene.

It shall be recessed 0.38” 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 (2) of the dowels shall be drilled and tapped (0.50" 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 on top of the torque box with the use of two (2) brackets constructed of structural steel. The torque box shall resist transferring any torsional stress caused by the chassis frame flexing to the water tank.

Rubber cushions, 0.50" thick x 3.00" wide, shall be placed on all horizontal surfaces that the tank rests on.

Stops shall be provided to prevent an empty tank from bouncing excessively while moving the vehicle.

The tank mounting system shall be approved by the manufacturer.

The fill tower shall be constructed of .50" polypropylene and shall be a minimum of 6.00" wide x 12.00" long.

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

An overflow pipe, constructed of 3.00" 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.

**HOSE BED**

The hose bed shall be fabricated of 0.125" 5052-H32 aluminum with a tensile strength range of 31,000 to 38,000 psi.

The hose bed shall be located between the aerial boom support and water tank.

There shall be a hose chute to the side and rear of the hose bed on the right side to allow for payout/removal of the hose.

The hose bed flooring shall consist of removable aluminum grating with a top surface that is perforated to aid in hose aeration.

The hose bed/cargo area walls shall be unpainted and dual action finished.

The hose capacity shall be a minimum of 800 feet of 5.00" large diameter hose.
**AERIAL HOSE BED HOSE RESTRAINT**  BASED ON THE MANUFACTURER STANDARDS

The hose in the hose bed shall be restrained as follows:

- The hose bed forward of the aerial boom support and in the upper body area shall be restrained by a red vinyl cover with Velcro® securing all four (4) sides.
- The hose bed chute located under the aerial basket shall be restrained by an aluminum treadplate cover and guide plate at the transition point of the upper hose bed to the lower hose chute. The cover shall hinge to the inside to allow ease of access to the hose.
- The rear of the hose bed chute shall be restrained with black webbing that shall have 1.00" web straps that loop through footman loops and fasten with spring clip and hook fasteners.

**RUNNING BOARDS**

The running boards shall be fabricated of 0.125" 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 0.50”.

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**

Access to the turntable shall be provided by a set of swing-down steps on the left side of the truck. There shall be no bottom flip step provided. The bottom step shall have a step height not exceeding 24.00" from the ground to the top surface of the step at any time. All steps shall have a height no greater than 14.00" from top surface to top surface.

The access steps shall be located just behind the front body and in front of the middle stabilizer.

The swing down step assembly shall be constructed of D/A finished aluminum with bright aluminum treadplate steps. The steps shall have a punched grip pattern design.

The stepwell shall be lined with bright aluminum treadplate to act as scuff plates.

A knurled aluminum handrail shall be provided on the left side of the steps.

Holes shall be provided in each sidestep plate for hand holds.

The steps shall be connected to the "Do Not Move Truck" indicator in the cab.
STEP LIGHTS
There shall be three (3) white P25 LED or equivalent step lights provided for the aerial turntable access steps.

In order to ensure exceptional illumination, each light shall provide a minimum of 25 foot-candles (fc) covering an entire 15” x 15” square placed ten (10) inches below the light and a minimum of 1.5 fc covering an entire 30” x 30” square at the same ten (10) inch distance below the light.

The step lights shall be activated when the parking brake is applied.

SMOOTH ALUMINUM REAR WALL
The rear wall shall be smooth aluminum.

TOW EYES
Two (2) rear painted tow eyes shall be located at the rear of the apparatus and shall be mounted directly to the frame rails. The inner and outer edges of the tow eyes shall be radiused. Each tow eye shall be rated for 9000lb. Tow eyes shall be painted to match the lower job color.

RUNNING BOARD INSERT
Grip Strut inserts or equivalent shall be provided on the running boards.

COMPARTMENTATION  DEPENDS ON MANUFACTURER STANDARDS
Compartmentation shall be fabricated of 0.125” 5052 aluminum.

Side compartments shall be an integral assembly with the rear fenders.

Circular fender liners shall be provided. For prevention of rust pockets and ease of maintenance, the fender liners shall be formed from aluminum and removable for maintenance.

Compartment flooring shall be of a sweep out design with the floor higher than the compartment door lip.

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

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

Side compartment covers shall be separate from the compartment tops.

All screws and bolts, which are not Grade 8, shall be stainless steel and where they protrude into a compartment shall have acorn nuts on the ends to prevent injury.

UNDERBODY SUPPORT SYSTEM
The backbone of the body support system shall begin with the aerial torque box which is the strongest component of the apparatus and is designed for sustaining maximum loads.
An aluminum body structure shall be mounted to the aerial torque box at four (4) points using neoprene elastomer isolators. The front mounts shall attach from structural steel brackets on the sides of the torque box to a structural tube on the body. The rear mounts shall attach structural members on the rear body to the top of the rear down rigger mounting structure.

The combination of the elastomer isolators and the body structure design allow the chassis and torque box to flex without driving loads into the body.

The compartment floor support design shall result in an 800 lb. equipment support rating per lower compartment, and a 500 lb. equipment support rating for the upper, over the axle compartments.

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 be vented to provide one (1) way airflow out of the compartment that prevents water and dirt from gaining access to the compartment.

TESTING OF BODY DESIGN
Body structural analysis shall be fully tested. Proven engineering and test techniques such as finite element analysis, model analysis, and strain gauging have been performed with special attention given to fatigue, life and structural integrity of the body and substructure.

The body shall be tested while loaded to its greatest in-service weight.

The criteria used during the testing procedure shall include:

- Raising opposite corners of the vehicle tires 9.00" to simulate the twisting a truck may experience when driving over a curb.
- Making a 90-degree turn, while driving at 20 mph to simulate aggressive driving conditions.
- Driving the vehicle on at 35 mph on a washboard road.
- Driving the vehicle at 55 mph on a smooth road.
- Accelerating the vehicle fully, until reaching the approximate speed of 45 mph on rough pavement.

LEFT SIDE COMPARTMENTATION
COMPARTMENTATION DEPENDS ON THE MANUFACTURER BIDDING
The override door forward of the stabilizer shall include a pair of flush lift and turn latches.
A full height double door compartment ahead of the rear wheels shall be approximately 29.13" wide x 28.25" high x 27.13" deep inside with a clear door opening of approximately 25.13" wide x 26.37" high.

One (1) lift up door compartment above the fender compartments and over the rear axles shall be provided. The compartment shall be approximately 84.00" wide x 22.13" high x 27.13" deep inside with a clear door opening of approximately 81.25" wide x 19.13" high.

A full height double door compartment behind the rear wheels shall be approximately 41.25" wide x 55.75" high x 27.13" deep. There shall be a blister in the upper right side of this compartment for the boom support. The clear door opening shall be approximately 37.25" wide x 52.00" high.

One (1) single lap door compartment behind the rear stabilizer shall be provided. The compartment shall be approximately 18.13" wide x 45.75" high x 27.13" deep inside with a clear door opening of approximately 14.87" wide x 43.87" high.

**RIGHT SIDE COMPARTMENTATION**

COMPARTMENTATION DEPENDS ON THE MANUFACTURER BIDDING

A full height single lap door compartment ahead of the front stabilizer shall be provided. The compartment shall be approximately 18.38" wide x 35.25" high x 9.91" deep inside with a clear door opening of approximately 15.00" wide x 33.37" high.

A full height double door compartment ahead of the rear wheels shall be approximately 29.13" wide x 28.25" high x 27.13" deep inside with a clear door opening of approximately 25.13" wide x 26.37" high.

One (1) lift up door compartment above the fender compartments and over the rear axles shall be provided. The compartment shall be approximately 59.00" wide x 22.13" high x 15.75" deep inside with a clear door opening of approximately 56.25" wide x 19.13" high.

A full height double door compartment behind the rear wheels shall be approximately 41.25" wide x 55.75" high. It shall be 27.13" deep in the lower 41.50" of compartment height and 15.75" deep in the remaining upper portion. The clear door opening shall be approximately 37.25" wide x 52.00" high.

One (1) single lap door compartment behind the rear stabilizer shall be provided. The compartment shall be approximately 18.13" wide x 45.75" high x 27.13" deep in the lower 38.63" of compartment height and 9.00" deep inside the remaining upper portion. The clear door opening shall be approximately 14.87" wide x 43.87" high.

**SIDE COMPARTMENT DOORS**

All hinged compartment doors shall be lap style with double panel construction and fabricated of .09" 5052H32 aluminum. Doors shall be a minimum of 1.50" thick. To provide additional door strength, a "C" section reinforcement shall be installed between the outer and interior panels.
Doors shall be provided with a closed cell rubber gasket around the surface that laps onto the body. A second heavy-duty automotive rubber molding with a hollow core shall be installed on the door framing that seals onto the interior panel, to ensure a weather resisting compartment.

All compartment doors shall have polished stainless steel continuous hinge with a pin diameter of .25", that is bolted or screwed on with stainless steel fasteners. (Hinges which are welded on shall not be acceptable). A dielectric substance shall be applied to each hinge fastener.

All door lock mechanisms shall be fully enclosed within the door panels to prevent fouling of the lock in the event equipment inside shifts into the lock area.

Doors shall be latched with recessed, polished stainless steel "D" ring handles and Eberhard 106 locks.

To prevent corrosion caused by dissimilar metals, compartment door handles shall not be attached to the outer door panel with screws. A rubber gasket shall be provided between the "D" ring handle and the door.

**REAR BUMPER**
A 3.00" rear bumper shall be furnished. The bumper shall be constructed of steel and shall be covered with polished aluminum treadplate. The bumper shall be 2.50" deep x 4.00" high and shall be spaced away from the body approximately 0.50". The corners of the bumper shall be angled at 45 degrees to be flushed with the angled rear body. It shall extend the full width of the body.

**COMPARTMENT LIGHTING**
There shall be nine (9) compartment(s) with two (2) white 12-volt DC LED compartment light strips. The dual light strips shall be centered vertically along each side of the door framing. There shall be two (2) light strips per compartment. The dual light strips shall be in all body compartment(s).

Any remaining compartments without light strips shall have a 6.00" diameter Truck-Lite, Model: 79384 lights or equivalent. Each light shall have a number 1076, one filament, two wire bulb.

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

**MOUNTING TRACKS**
There shall be recessed tracks installed vertically to support the adjustable shelf(s).

Tracks shall not protrude into any compartment in order to provide the greatest compartment space and widest shelves possible.

The tracks shall be provided in each compartment except for the one that contains the pump operator's panel.
## ADJUSTABLE SHELVES
There shall be two (2) shelves with a capacity of 500 lb. provided.

The shelf construction shall consist of .188” aluminum painted spatter gray with 2.00” sides.

Each shelf shall be infinitely adjustable by means of a threaded fastener, which slides in a track.

The shelves shall be held in place by .12” thick stamped plated brackets and bolts.

The location(s) shall be in RS2 in the upper third and in LS2 centered between the floor and ceiling.

## SLIDE-OUT FLOOR MOUNTED TRAY
There shall be two (2) floor mounted slide-out tray(s) with 2.00” sides provided LS2, RS2. Each tray shall be rated for up to 500lb in the extended position. The tray(s) shall be constructed of .19” aluminum with non-welded corners. The finish shall be painted spatter gray.

There shall be two undermount-roller bearing type slides rated at 250lb each provided. The pair of slides shall have a safety factor rating of 2.

To ensure years of dependable service, the slides shall be coated with a finish that is tested to withstand a minimum of 1,000 hours of salt spray per ASTM B117.

To ensure years of easy operation, the slides shall require no more than a 50lb force for push-in or pull-out movement when fully loaded after having been subjected to a 40-hour vibration (shaker) test under full load. The vibration drive file shall have been generated from accelerometer data collected from a heavy truck chassis driven over rough gravel roads in an unloaded condition. Proof of compliance shall be provided upon request.

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

## SLIDE-OUT TOOLBOARD BASED OFF MANUFACTURER STANDARDS
There shall be two (2) slide-out tool board(s) provided.

The tool board shall be a minimum of 0.188" thick with .203" diameter holes in a pegboard pattern with 1.00" centers between holes.

A 1.00” x 1.00” aluminum tube frame shall be welded to the edge of the pegboard. A handhold cutout shall be provided on the outboard edge of the tool board.

The board shall be mounted on an under-mount roller bearing type slide rated at 250 lb. with a factor of safety of 2.

To ensure years of dependable service the slides shall be coated with a finish that is tested to withstand a minimum of 1,000 hours of salt spray per ASTM B117.
To ensure years of easy operation, the slides shall require no more than a 50-pound force for push-in or pull-out movement when fully loaded after having been subjected to a 40-hour vibration (shaker) test under full load. The vibration drive file shall have been generated from accelerometer data collected from a heavy truck chassis driven over rough gravel roads in an unloaded condition. Proof of compliance shall be provided upon request.

The slide shall be mounted on adjustable tracks side to side within the compartment.

The board shall have positive lock in the stowed and extended position.

The tool board(s) shall be spatter gray painted and installed in B1, 8.00" from the left door frame and in B1, 12.00" from the left door frame.

**RUB RAIL**

**BASED OFF MANUFACTURER STANDARDS**

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

The trim shall be 3.12" high with 1.50" 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**

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

An unpainted fender liner shall be provided to avoid paint chipping. The liners shall be removable to aid in the maintenance of rear suspension components.

A dielectric barrier shall be provided between the fender crown fasteners (screws) and the fender sheet metal to prevent corrosion.

The fender crowns shall be held in place with stainless steel screws that thread directly into a composite nut and not directly into the parent body sheet metal to eliminate dissimilar metals contact and greatly reduce the chance for corrosion.

**HARD SUCTION HOSE**

Hard suction hose shall not be required.

**HANDRAILS**

The handrails shall be 1.25" diameter knurled aluminum 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.
Handrails shall be provided to meet NFPA 1901 section 15.8 requirements. The handrails shall be installed as noted on the sales drawing.

A step shall be provided below the right side running board.

**DOUBLE AIR BOTTLE STORAGE IN FENDER PANEL CORNER**
A total of one (1) air bottle compartment shall be provided in the upper corner(s) of the right-side fender panel. The compartment(s) shall be located on the right side ahead of the rear wheel. The air bottle compartment(s) shall be 7.50" wide x 7.50" tall x 26.00" deep. Each compartment shall be square with angled corners and be mounted separately in a diagonal fashion, one above the other.

A triangular shaped vertically hinged door with a Southco raised trigger C2 chrome lever latch shall be provided for each compartment. The door shall be polished stainless steel. A dielectric barrier shall be provided between the door hinge, hinge fasteners and the body sheet metal.

Each compartment shall have a drain hole and black rubber matting.

**THREE AIR BOTTLE/EXTINGUISHER STORAGE COMPARTMENT**
A total of two (2) air bottle compartments shall be provided and located on the left side and the right side centered between the tandem rear wheels. The compartment shall consist of individual bins each designed to hold air bottles or extinguishers with a maximum diameter of 8.00" and a maximum depth of 26.00".

Each compartment shall hold three (3), two (2) stored next to each other in the top area, and one (1) stored centered below. Each bin shall be separated by a partition.

A drain hole and black rubber matting shall be provided on the floor of each compartment. A lift up with pneumatic spring with a pair of Southco raised trigger C2 chrome lever latches shall be provided for each compartment. The door shall be polished stainless steel. A dielectric barrier shall be provided between the door hinge, hinge fasteners and the body sheet metal.

**COMPARTMENT STRAP**
Straps shall be provided in the compartment(s) to help contain the equipment. The straps shall wrap around the neck of each and attach to the wall of the compartment.

**EXTINGUISHER/AIR BOTTLE STORAGE (TRIANGULAR)**
A total of two (2) extinguisher/air bottle/storage compartments shall be provided PS forward PS rear. The triangular shaped compartment shall be sized to fit an 8.00" diameter extinguisher in the lower area and an 8.00" diameter extinguisher in the upper area. The compartment shall be approximately 25.50" deep. A partition shall be provided to separate the compartment. Also, inside the compartment, black rubber matting shall be provided. The compartment shall be furnished with a drain hole. A polished stainless steel, triangular shaped door with a Southco raised trigger C2 chrome lever latch shall be provided to contain the air bottles. A dielectric barrier shall be provided between the door hinge, hinge fasteners and the body sheet metal.
**AIR BOTTLE COMPARTMENT STRAP**
A strap shall be provided in the air bottle compartment(s) to help contain the bottles when the vehicle is parked on an incline. The strap shall wrap around the neck and attach to the wall of the compartment.

**AIR BOTTLE STORAGE**
A total of one (1) air bottle compartment shall be provided and located on the left side rearward of the rear wheels. The triangular door shall cover the air bottle opening and the fuel tank access. The air bottle compartment shall be a minimum of 15.00" wide x 7.50" tall x 26.00" deep. A polished stainless steel, triangular shaped door with a Southco raised trigger C2 chrome lever latch shall be provided. A dielectric barrier shall be provided between the door hinge, hinge fasteners and the body sheet metal.

Inside the compartment, black rubber matting shall be provided.

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

**ADDED EXTENSION LADDER**
There shall be two (2) 24', two (2) section, aluminum, Duo-Safety Series 900A extension ladder provided.

**AERIAL EXTENSION LADDERS**
There shall be one (1) 28' two (2) section aluminum Duo-Safety Series 1200-A extension ladder(s) provided and located in the aerial torque box.

**ROOF LADDER**
There shall be one (1) 16' aluminum, Duo-Safety, Series 875-DR roof ladder(s) provided. The ladder(s) shall have hooks on one end.

**ADDED ROOF LADDER**
There shall be one (1) 18' aluminum roof ladder, Series 875-A-DR provided.

**ADDED ROOF LADDER**
There shall be one (1) 20' aluminum, Duo-Safety, Series 875-DR roof ladder(s) provided.

**AERIAL EXTENSION LADDER**
There shall be a 16' aluminum extension, Series 1000-A ladder provided.

**AERIAL FOLDING LADDER**
There shall be two (2) 10' aluminum Duo-Safety Series 585-A folding ladder(s) provided and located in the aerial torque box.

**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 rollup door shall be provided at the rear, double faced, aluminum construction, and an anodized satin finish. A polished stainless steel lift bar is to be provided for the rear roll-up door. The latching mechanism shall consist of a full-length lift bar lock with latches on the outer extrusion of the door frame. Can use non-roll up doors to (i.e. 2 swing out doors with piano hinge)

A 6.00” tall stainless plate with a 2-bend flange and a stainless-steel hinge shall be provided to secure the aerial ladder complement. The plate assembly shall be mounted to the bottom of the entrance of the torque box ladder storage area. Only required if NFPA required.

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 rollup door cannot close, which shall activate the “Open Door” Indicator Light within the cab. The roll-up door together with a Southco raised trigger C2 chrome lever latch on each side of the plate shall secure the plate in the vertical position. The doors should have door switches, which shall activate the “Open Door” Indicator light, if the plate is not required by NFPA.

**GENERATOR STORAGE**
Provisions shall be made in the compartment below the ladder storage for locating a hydraulic generator.

**LADDER STORAGE LIGHTING**
There shall be 36.00” white 12-volt DC LED strip lights provided to illuminate the torque box ladder storage area and the compartment directly below the ladder storage. One (1) light shall be provided on each side of the ladder storage area.

The lights shall be activated when the ladder storage compartment door is opened.

**LITTLE GIANT LADDER STORAGE**
Storage shall be provided in for a Little Giant ladder. The ladder shall be stored in a location of ease. A Velcro® strap or bracket shall be provided to aid in restraint and removal of the Little Giant ladder. The ladder shall be a Little Giant Super Duty Model 17 – 10402 or equivalent.

**PIKE POLES**
There shall be one (1) 12’ Duo Safety pike pole(s) with fiberglass handles provided. The pike pole(s) shall be stored in tubular holders located in the ground ladder storage compartment.

**10’ PIKE POLE**
One (1) pike pole 10’ long Duo Safety with a fiberglass handle, shall be provided.
<table>
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<tr>
<th>6 FT PIKE POLE</th>
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<tr>
<td>There shall be two (2) Fire Hooks Unlimited NY roof hook RH-6, 6-foot pike pole(s) with steel handles and pry end provided nested behind cab.</td>
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<tr>
<th>3' PIKE POLE</th>
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<tr>
<td>There shall be two (2) 3’ Duo Safety pike pole(s) with fiberglass shaft and “D” handles shipped loose.</td>
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<tr>
<th>ADDITIONAL PIKE POLE(S)</th>
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<tr>
<td>- two (2) 8’ long pike pole(s), Fire Hooks Unlimited #RH-8 with steel handle and pry end shall be provided.</td>
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<tr>
<th>PIKE POLE STORAGE IN TORQUE BOX/LADDER STORAGE</th>
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<tr>
<td>There shall be ABS tubing provided in the torque box/ladder storage area for a total of six (6) pike poles.</td>
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<tr>
<td>If the head of a pike pole can come into contact with a painted surface, a stainless-steel scuff plate shall be provided.</td>
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<tr>
<th>PUMP COMPARTMENT</th>
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<tr>
<td>The pump compartment shall be separate from the hose body and compartments so that each may flex independently of the other. The pump compartment shall be constructed of the same material as the body compartmentation.</td>
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<tr>
<td>The pump compartment substructure shall be a fabricated assembly of steel tubing, angles and channels which support both the fire pump and the side running boards.</td>
</tr>
<tr>
<td>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.</td>
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<tr>
<td>Pump compartment, pump, plumbing and gauge panels shall be removable from the chassis in a single assembly.</td>
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<tr>
<th>PUMP MOUNTING</th>
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<tr>
<td>The 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.</td>
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<tr>
<th>LEFT SIDE PUMP CONTROL PANELS</th>
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<tr>
<td>All pump controls and gauges shall be located on the left side of the apparatus and properly identified.</td>
</tr>
<tr>
<td>The layout of the pump control panel shall be ergonomically efficient and systematically organized.</td>
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</table>
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. The linkage from the control rod to the valve shall be stainless steel, this shall not include the clevis ends of the linkage which shall remain anodized steel.

**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.

Trim rings shall be installed around all inlets and outlets.

**MIDSHIP FIRE PUMP**

The Midship fire pump shall be a Hale (preferred) or Waterous 2000 gpm single (1) stage midship mounted centrifugal type.

Pump shall be the class "A" type.

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

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

Entire pump and both suction and discharge passages shall be hydrostatically tested to a pressure of 600 psi (40.8 bar).

The pump shall be fully tested at the pump manufacturer's factory to the performance requirements outlined in the current NFPA 1901 standards and shall be free from objectionable pulsation and vibration.

Pump body and related parts shall be of fine grain, alloy cast iron with a minimum tensile strength of 30,000 psi (2041.2 bar). Pumps utilizing castings made of lower tensile strength cast iron shall not be acceptable.

All moving parts in contact with water shall be of high-quality bronze or stainless steel.

**MECHANICAL SEAL ON PUMP**

The pump shall be equipped with a self-adjusting, maintenance-free, mechanical shaft seal.

The mechanical seal shall consist of a flat, highly polished, spring fed carbon ring that rotates with the impeller shaft. The carbon ring shall press against a highly polished stainless steel stationary ring that is sealed within the pump body.

In addition, a throttling ring shall be pressed into the steel chamber cover, providing a very small clearance around the rotating shaft in the event of a mechanical seal failure. The pump performance shall not deteriorate, nor shall the pump lose prime while drafting if the seal fails during pump operation.

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, high tensile aluminum, horizontally split casing. Power transfer to pump shall be through a passive lubricated, Morse HY-VO 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 to eliminate the need for water cooling.

**PUMPING MODE**

An interlock system shall be provided to ensure that the pump drive system components are properly engaged so that the apparatus can be safely operated. The interlock system shall be designed to allow stationery pumping only.
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 left 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".

The pump shift shall be interlocked to prevent the pump from being shifted out of gear when the chassis transmission is in gear to meet NFPA requirements.

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. The heat exchanger 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. The exchanger shall be plumbed to the master drain valve.

INTAKE RELIEF VALVE - PUMP
There shall be One (1) Elkhart Style 40 relief valve(s) or equivalent installed on the suction side of the pump preset at 125 psi.

The relief valve(s) shall have a working range of 75 psi to 250 psi.

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

The relief valve pressure control shall be located behind the right-side pump panel with a stainless-steel access door.

PRESSURE CONTROLLER
A Pump Boss Model PBA300 or equivalent pressure governor shall be provided.

A pressure transducer shall be installed in the water discharge manifold on the pump.

The display panel shall be located on the pump operator's panel.
**PRIMING PUMP**
The priming pump shall be a Trident Emergency Products compressed air powered, high efficiency, multistage venturi based AirPrime System, conforming to standards outlined in the current edition of NFPA 1901. **Will accept, but prefer a Hale T-Handle electronic primer as well, as this is standard in the department.**

All wetted metallic parts of the priming system are to be of brass and stainless-steel construction.

One (1) priming control shall open the priming valve and start the pump primer.

**PUMP MANUALS**
There shall be a total of two (2) pump manuals provided by the pump manufacturer and furnished with the apparatus. The manuals shall be provided by the pump manufacturer in the form of two (2) electronic copies. Each manual shall cover pump operation, maintenance, and parts.

**PLUMBING, STAINLESS STEEL AND HOSE**
All inlet and outlet lines shall be plumbed with either stainless steel pipe, flexible polypropylene tubing or synthetic rubber hose reinforced with hi-tensile polyester braid. All hoses shall be equipped with brass or stainless-steel couplings. All stainless steel hard plumbing shall be a minimum of a schedule 10 wall thickness.

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

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

All piping, hose and fittings shall have a minimum of a 500 PSI hydrodynamic pressure rating.

**MAIN PUMP INLETS**
Two (2) 6.00" pump inlets shall be provided. One (1) on the left side and One (1) on the right side of the vehicle. MIV’s shall be installed to each inlet with switches to operate each one as designed. Switches shall be located on the DS pump panel area.

The suction inlets shall include removable zinc screens that are designed to provide cathodic protection for the pump, thus reducing corrosion in the pump. Should have a front suction (If possible).
SHORT SUCTION TUBE(S)
The suction tube(s) on the water pump shall have short suction tube(s) installed to allow for installation of adapters, elbows, or intake valves without excessive overhang.

MAIN PUMP INLET CAP
The main pump inlets shall have National Standard Threads with a long handle chrome cap. The cap shall incorporate a 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. Large diameter intakes MUST BE MIV’S

Valves shall have a ten (10) year warranty.

The location of the valve for the one (1) inlet shall be recessed behind the pump panel.

ANODE, INLET
One (1) pair of sacrificial Zinc anodes shall be provided in the water pump to protect the pump from corrosion. One (1) shall be placed in the inlet side of the pump and the other one (1) in the discharge side of the pump.

INLET BLEEDER VALVE
A 0.75" bleeder valve shall be provided for each side gated inlet. The valves shall be located behind the panel with a “T” 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. The Tank to pump line shall run 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.
The control handle shall be marked yellow.

**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 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 stainless steel handwheel with a dial position indicator built into the center of the handwheel.

Any 3.00 inch or larger discharge valve shall be a slow-operating valve in accordance with NFPA 16.7.5.3.

**LEFT SIDE DISCHARGE OUTLETS**
There shall be One (1) discharge outlet with a 2.50” valve on the left side of the apparatus, terminating with a 2.50” (M) National Standard hose thread adapter. There shall be One (1) 3.00” valve on the left side of the apparatus, terminating with a 3.00” (M) National Standard hose thread adapter, with a 45-degree elbow, then adapted to a 4” Stortz adapter. I adjusted to read what was in red, however, I would leave the (2) 2.5” valves on this side, as that is how our pumpers are set up.

**LEFT SIDE OUTLET ELBOWS**
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 incorporate a thread design to automatically relieve stored pressure in the line when disconnected (no exception).

**RIGHT SIDE DISCHARGE OUTLETS**
There shall be One (1) discharge outlet with a 2.50” valve on the right side of the apparatus, terminating with a 2.50” (M) National Standard hose thread adapter.

**RIGHT SIDE OUTLET ELBOWS**
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 incorporate a thread design to automatically relieve stored pressure in the line when disconnected (no exception).
LARGE DIAMETER DISCHARGE OUTLET
There shall be a 4.00" discharge outlet with a 4.00" Akron valve installed on the right side of the apparatus, terminating with a 4.00" (M) National Standard hose thread adapter. This discharge outlet shall be actuated with a small handwheel control at the pump operator's control panel.

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

LARGE DIAMETER OUTLET ELBOWS
The 4.00" outlet(s) shall be furnished with one (1) 4.00" (F) National Standard hose thread x 5.00" Storz elbow adapter with Storz cap.

FRONT DISCHARGE OUTLET
There shall be one (1) 1.50" discharge outlet piped to the front. The plumbing shall be routed along the side of the apparatus and terminate on the top of the center of the front bumper.

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

There shall be Class 1 air control drains provided at all low points of the piping.

DISCHARGE CAPS/INLET PLUGS
Chrome plated, rocker lug, caps with chain shall be furnished for all discharge outlets 1.00" through 3.00" in size, besides the pre-connected hose outlets.

Chrome plated, rocker lug, plugs with chain shall be furnished for all auxiliary inlets 1.00" through 3.00" in size.

The caps and plugs shall incorporate a thread design to automatically relieve stored pressure in the line when disconnected (no exception).

OUTLET BLEEDER VALVE
A 0.75" 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 T 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 T 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.

**AERIAL OUTLET**
The aerial waterway shall be plumbed from the pump to the water tower line with 5.00" pipe and a 4.00" Akron valve. The small handwheel control for the waterway valve shall be located at the pump operator's panel.

An indicator shall be provided to show the position of the valve.

**CROSSLAY HOSE BEDS**
There shall be a minimum of One (1) crosslay with 1.50" outlets shall be provided. Each bed to be capable of carrying 250' 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 0.25" aluminum and shall provide adjustment from side to side. The divider shall be unpainted with a brushed finish.

Stainless steel vertical scuff plates shall be provided at hose bed ends (each side of vehicle). Bottom of hose bed ends (each side) shall also be equipped with a stainless-steel scuff plate.

Crosslay bed flooring shall consist of removable perforated brushed aluminum.

**2.50" CROSSLAY HOSE BED**
One (1) crosslay with a 2.50" outlet shall be provided. This bed to be capable of carrying 250' of 2.50" double jacketed hose and shall be plumbed with 2.50" i.d. pipe and gated with a 2.50" quarter turn ball valve.

Outlet to be equipped with a 2.50" National Standard hose thread 90-degree swivel located in the hose bed so that hose may be removed from either side of apparatus.

The crosslay control shall be on the pump operator's panel.

The center crosslay dividers shall be fabricated of 0.25" aluminum and shall provide adjustment from side to side. The divider shall be unpainted with a brushed finish.

Stainless steel vertical scuff plates shall be provided at hose bed ends (each side of vehicle). Bottom of hose bed ends (each side) shall also be equipped with a stainless steel scuff plate.

Crosslay bed flooring shall consist of removable perforated brushed aluminum.
**CROSSLAY/DEADLAY HOSE RESTRAINT**
Elastic netting shall be provided across the top and ends of two (2) crosslay/deadlay opening(s) to secure the hose during travel. The netting shall be permanently attached at the top center of the crosslay/deadlay bed and removable on each end.

**FOAM SYSTEM**
A foam system shall not be required on this apparatus.

**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, flip down 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 DA finished aluminum with a Morton Cass insert.

The platform shall be approximately 13.75” deep when in the stowed position and approximately 22.00” deep when extended. The platform stepping surface shall be 28.00” 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 OPERATOR’S PLATFORM PERIMETER LIGHT**
There shall be an On Scene Solutions, Model Night Stick Access or equivalent, 20.00” white 12-volt DC LED strip light provided to illuminate the ground area.

**PUMP AND GAUGE PANEL**
The pump and gauge panels shall be constructed of aluminum with a black vinyl finish. A polished aluminum trim molding shall be provided around each panel.

**PUMP ACCESS**
Based off the manufacturer bidding

**Right Side Panel**
The right-side upper pump panel shall be removable.

**Panel Fastener**
The removable panels shall be secured with chrome flush lift and turn latch.

The left side pump panels shall be attached with screws.

The right-side lower pump panel (drain bank) shall be attached with screws.
**PUMP COMPARTMENT LIGHT**
There shall be one (1) Whelen®, Model 3SC0CDCR or equivalent, 3.00” white 12-volt DC LED light(s) with Whelen, Model 3FLANGEC or equivalent, flange(s) installed in the pump compartment.

Engine monitoring graduated LED indicators shall be incorporated with the pressure controller.

Also provided at the pump panel shall be the following:

- Master Pump Drain Control

**THROTTLE READY GREEN INDICATOR LIGHT**
There shall be a green indicator light integrated with the pressure governor and/or engine throttle installed on the pump operators panel that is activated when the pump is in throttle ready mode.

**OK TO PUMP INDICATOR LIGHT**
There shall be a green indicator light installed on the pump operators panel that is activated when the pump is in Ok to Pump mode.

**AIR HORN BUTTON**
An air horn control button shall be provided at the pump operator’s control panel. This button shall be red in color and properly labeled “Evacuation”.

**VACUUM AND PRESSURE GAUGES**
The pump vacuum and pressure gauges shall be liquid filled and manufactured by Class 1 Incorporated ©.

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 (1) 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 or equivalent 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
There shall be an electronic water level gauge provided on the operator's panel that registers water level by means of five (5) colored LED lights. The lights shall be durable, ultra-bright five (5) LED design viewable at 180 degrees. The water level indicators shall be as follows:

- 100 percent = Green
- 75 percent = Yellow
- 50 percent = Yellow
- 25 percent = Yellow
- Refill = Red

The light shall flash when the level drops below the given level indicator to provide an eighth of a tank indication. To further alert the pump operator, the lights shall flash sequentially when the water tank is empty.

The level measurement shall be based on the sensing of head pressure of the fluid in the tank.

The display shall be constructed of a solid plastic material with a chrome plated die cast bezel to reduce vibrations that can cause broken wires and loose electronic components. The encapsulated design shall provide complete protection from water and environmental elements. An industrial pressure transducer shall be mounted to the outside of the tank. The field calibratable display measures head pressure to accurately show the tank level.

There shall be a Hale part number 106877 or equivalent, 4-light driver module included with this installation to power additional water level gauges.

The system(s) shall be energized when ignition switch and parking brake are applied.
WATER LEVEL GAUGE
There shall be two (2) additional water level indicator(s), Whelen®, Model PSTANK2, LED module with chrome trim, installed one (1) each side rearward of crew cab doors.

This light module(s) shall include four (4) colored levels, and function similar to the water level indicator located at the operator's panel:

- First green module indicates a full water level
- Second blue module indicates a water level above 3/4 full
- Third amber module indicates a water level above 1/2 full
- Last red module indicates a water level above 1/4 full and empty
  - Above 1/4 this light shall be steady burning
  - At empty this light shall be flashing

The flash rate shall be determined by the main water level tank sensor.

This module shall be activated when the ignition switch and parking brake are applied.

PUMP PANEL ILLUMINATION
There shall two (2) stainless steel light shields installed over the pump operator's panels per the following:

- One (1) shield over the left side pump panel
- One (1) shield over the right-side pump panel

The shields shall include three (3) 12-volt DC lights with white LEDs to illuminate the controls, switches, essential instructions, gauges, and instruments necessary for the operation of the apparatus. The outside lights shall be activated by the pump panel light switch. The left side center light shall be activated when the pump is in "Ok to Pump" mode.

There shall be a light activated above the pump panel light switch when the parking brake is applied. This is to afford the operator some illumination when first approaching the control panel.

AIR HORN SYSTEM
Two (2) Hadley round air horns with 6.00" bell shall be recessed in the front bumper. The horn system shall be piped to the air brake system wet tank utilizing 0.38" tubing. A pressure protection valve shall be installed in-line to prevent loss of air in the air brake system. The horns shall be in position 3 & 5.

Air Horn Location  Should be based on manufacturer standards.
The air horns shall be located on each side of the bumper, inside of the frame rails.

Air Horn Control
The air horn(s) shall be activated by the following:
• Steering wheel horn ring with electric/air horn selector switch

• Right side lanyard. The lanyard to be vinyl covered 0.12” cable.

**ELECTRONIC SIREN**
A Whelen®, Model 295SLSA1 or equivalent, electronic siren with noise canceling microphone shall be provided.

This siren to be active when the battery switch is on, and that emergency master switch is on.

Electronic siren head shall be recessed in the driver side center switch panel. Or based on the manufacturer bidding.

The electronic siren shall be controlled on the siren head only. No horn button or foot switches shall be required.

**SPEAKER**
There shall be one (1) Whelen®, Model SA315P or equivalent, black nylon composite, 100-watt, speaker with through bumper mounting brackets and polished stainless-steel grille provided.

The speaker shall be connected to the siren amplifier.

The speaker(s) shall be recessed in the center of the front bumper.

**AUXILIARY MECHANICAL SIREN**
There shall be a Federal Signal Model Q2B mechanical siren furnished and installed in the front of the apparatus.

The Q2B siren shall be chrome finish.

The siren shall have a 2-gauge cable connected to a power solenoid that is connected by a 2-gauge cable ran battery direct to the primary chassis batteries and shall be labeled Q2B+ at the battery. The power solenoid shall only be enabled when the emergency master switch is on.

The siren shall have a 2-gauge ground wire connected to the chassis battery stud. The cable shall be labeled Q2B- at the battery.

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

**MECHANICAL SIREN CONTROL**
The mechanical siren shall be activated by the following:

• Right-side push-button switch on the dashboard.
• Left side foot switch.
A momentary chrome push button switch shall be included in the right-side dash panel to activate the siren brake.

**FRONT ZONE UPPER WARNING LIGHTS**
There shall be two (2) 21.50" Whelen® Freedom™ IV LED lightbars or equivalent mounted on the cab roof, one (1) on each side, above the left and right door, at a 30-degree angle. With One (1) mounted front, center of the cab to provide adequate warning to oncoming vehicles.

The left side lightbar shall include the following:
- One (1) red flashing LED module in the outside end position.
- One (1) red flashing LED module in the outside front corner position.
- One (1) red flashing LED module in the outside front position.
- One (1) white flashing LED module in the inside front position.
- One (1) red flashing LED module in the inside front corner position.

The right side lightbar shall include the following:
- One (1) red flashing LED module in the inside front corner position.
- One (1) white flashing LED module in the inside front position.
- One (1) red flashing LED module in the outside front position.
- One (1) red flashing LED module in the outside front corner position.
- One (1) red flashing LED module in the outside end position.

Center lightbar shall include the following:
- One (1) red flashing LED module in the outside front corner position.
- One (1) red flashing LED module in the outside front position.
- One (1) red flashing LED module in the inside front position.
- One (1) red flashing LED module in the inside front corner position.

There shall be clear lenses included on the lightbar.

There shall be a switch in the cab on the switch panel to control the lightbars.

The white LEDs shall be disabled when the parking brake is applied.

The two (2) red flashing LED modules in the inside front and the two red flashing LED modules in the inside front corner positions may be load managed when the parking brake is applied.
**LIGHTS, FRONT ZONE LOWER**
Two (2) Whelen model M6°C LED or equivalent flashing warning lights shall be installed on the cab face above the headlights, in a common bezel with the directional lights.

The driver's side front warning light to be red.

The passenger's side front warning light to be red.

Both lights shall include a clear lens.

There shall be a switch located in the cab on the switch panel to control the lights.

**HEADLIGHT FLASHER**
The high beam headlights shall flash alternately between the left and right side.

There shall be a switch installed in the cab on the switch panel to control the high beam flash. This switch shall be live when the battery switch and the emergency master switches are on.

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

**SIDE ZONE LOWER LIGHTING**
There shall be four (4) Whelen®, Model M6°C or equivalent, flashing LED warning lights with chrome trim installed per the following:

- Two (2) lights, one (1) each side on the bumper extension. The side front lights to be red.
- Two (2) lights, one (1) on each side above rear wheels. The side rear lights to be red.
- The lights shall include a clear lens.

There shall be a switch in the cab on the switch panel to control the lights.

**REAR ZONE LOWER LIGHTING**
There shall be two (2) Whelen®, Model M6°C or equivalent, LED flashing warning lights located at the rear of the apparatus.

- The driver's side rear light to be red
- The passenger's side rear light to be red

Both lights shall include a lens that is clear.

There shall be a switch located in the cab on the switch panel to control the lights.

**REAR/SIDE ZONE UPPER WARNING LIGHTS**
There shall be two (2) Whelen®, Model L31H*FN or equivalent, LED warning beacons provided at the rear of the truck, located one (1) each side. There shall be a switch located in the cab on the switch panel to control the beacons.
Village of Jordan Tower

The color of the lights shall be red LEDs with both domes clear.

**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 3 cycles.

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

Line voltage electrical system equipment and materials included on the apparatus shall be listed and installed in accordance with the manufacturer's instructions. All products shall be used only in the manner for which they have been listed.

**Grounding**

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 following information:

- Rated voltage(s) and type (ac or dc)
- Phase
- Rated frequency
- Rated amperage
- Continuous rated watts
- Power source engine speed

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 144.00” (3658 mm) in length.

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

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

**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 12.00” (305 mm), or properly shielded, from exhaust piping
• Separated from fuel lines by a minimum of 6.00" (152 mm) distance

Electrical cord or conduit shall be supported within 6.00" (152 mm) of any junction boxes and at a minimum of every 24.00" (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 24.00" (610 mm) from the ground. Receptacles on off-road vehicles shall be a minimum of 30.00" (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 30.00" (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 an independent third-party certification organization.

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 AC (alternating current) electrical power system. The generator shall be a Harrison, Model MID10.0, 10,000-watt hydraulic driven unit. Or equivalent

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

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’s performance a digital meter panel shall be furnished and mounted on the pump operator’s panel.

**GENERATOR LOCATION**

The generator shall be installed below the ladder storage in the rear compartment. Proper ventilation shall be provided for generator operation. A removable aluminum treadplate cover shall be provided over the rear of the generator. There shall be open access to the hydraulic reservoir fill.

**GENERATOR START**

There shall be a switch provided on the cab instrument panel to engage the generator.
CIRCUIT BREAKER PANEL
A circuit breaker panel shall be recessed high into the left wall of compartment LS4. A directory for each breaker shall be provided adjacent to the circuit breaker panel. Identification of circuits shall be done in a durable manner that provides years of service.

ELECTRIC CORD REEL LOCATION BASED ON MANUFACTURER BIDDING.
There shall be two (2) Hannay Reels Inc, Model ELFCR1622-14-16 or equivalent low profile 3-conductor cord reel(s) provided. The motor location shall be on the side of the reel for the smallest height and depth.

The exterior finish of the reel(s) shall be painted #269 gray from the reel manufacturer.

The reel shall be provided with a guarded momentary 12-volt electric rewind switch that is label for its intended use. The switch shall be located near the reel at a height not to exceed 72.00 inches above the operator’s standing position.

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

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

The reel(s) shall be installed one (1) reel in the forward hose bed feeding into the front of LS over wheel Compartment through the compartment wall. and one (1) reel in the forward hose bed feeding into the front of RS over wheel Compartment through the compartment wall.

CORD
Provided for electric distribution shall be two (2) lengths, one (1) for each reel, of 200 feet of yellow 10/3 electrical cord, weather resistant 105 degree Celsius to -50 degree Celsius, 600-volt jacketed SOOW cord. No connector shall be installed on the end of the cord.

PORTABLE JUNCTION BOX
There shall be two (2) Akron EJBX electric junction box(es) provided.

There shall be a cable strain relief and a 1.00’ pigtail with black plastic ribbed grip, NEMA L5-20, 20-amp, 120-volt twist lock plug provided for each box.

Each box shall be provided with the following:
- three (3) 15/20-amp 120-volt AC duplex straight blade receptacle with flip up covers
- one (1) 20-amp 120-volt AC twist lock single receptacles with flip up covers
- a 120-volt AC light inside the box

120 VOLT RECEPTACLE
There shall be two (2), Hubbell part number USB20A51 or equivalent, 15/20-amp 120-volt AC three (3) wire straight blade duplex receptacle(s) with interior stainless steel wall plate(s)
installed one front and one rear engine tunnel. The NEMA configuration for the receptacle(s) shall be 5-20R.

The receptacle(s) shall be powered from shoreline inlet.

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

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

Each receptacle shall include two (2) 5-amp 5-volt DC USB ports.

**120 VOLT RECEPTACLE**

There shall be four (4), 4-place receptacle box(es) with four (4) 15/20-amp 120-volt AC three (3) wire straight blade receptacles with interior stainless steel wall plate(s) installed RS1 RS4 LS1 LS4. The NEMA configuration for the receptacles shall be 5-20R.

The receptacle(s) shall be powered from the shoreline inlet.

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

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

**AERIAL GENERAL INFORMATION**  DEPENDS ON THE MANUFACTURER BIDDING

It is the intent of these specifications to describe a mid-mounted telescoping, elevating platform. The unit shall consist of a five (5) section, steel ladder with a self-leveling basket attached to the ladder fly section.

**Operation on Grades**

The aerial unit shall be capable of operating safely on any slope up to 10 degrees at full capacities. (Operation beyond this limit shall be at the operator's discretion).

**Construction Standards**

The ladder shall be constructed to meet all the requirements as described in the current edition of NFPA 1901.

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 percent 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 percent 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.

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 shall comply with the American Welding Society standards. All welding personnel shall be certified as qualified under AWS welding codes.

The aerial device shall be capable of operating in either of the two (2) following conditions:

- Conditions of high wind up to 35 mph
- Conditions of icing, up to a coating of 0.25” over the entire aerial structure

All of the design criteria must be supported by the following test data:

- Strain gage testing of the complete aerial device

The following criteria 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
- Material testing that is performed after the mill test shall be for verification only and not with the intent of changing the classification.

**Ladder Construction** Based on the manufacturer bidding.

The ladder shall be comprised of five (5) sections and shall extend to a nominal height, of 100’ above the ground, as measured by 1901 recommendations. The ladder (handrails, base rails, trusses, k-braces, and rungs) shall be constructed of welded, high strength steel certified by the manufacturer as being a minimum of 100,000 lb. per square inch of yield strength. All critical points shall be reinforced, for extra rigidity, and to provide a high strength-to-weight ratio. Ladder rungs shall be round and welded to each section in two (2) places with “K” bracing for
torsional rigidity. A minimum of 70.25" of overlap between each of the aerial sections shall be provided.

The inside width dimensions of the ladder shall be:

<table>
<thead>
<tr>
<th>Section</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Section:</td>
<td>56.12&quot;</td>
</tr>
<tr>
<td>Lower Mid-Section:</td>
<td>46.12&quot;</td>
</tr>
<tr>
<td>Center Mid-Section:</td>
<td>36.62&quot;</td>
</tr>
<tr>
<td>Upper Mid-Section:</td>
<td>28.12&quot;</td>
</tr>
<tr>
<td>Fly Section:</td>
<td>22.12&quot;</td>
</tr>
</tbody>
</table>

The height of the handrails above the centerline of the rungs shall be:

<table>
<thead>
<tr>
<th>Section</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Section:</td>
<td>40.72&quot;</td>
</tr>
<tr>
<td>Lower Mid-Section:</td>
<td>39.08&quot;</td>
</tr>
<tr>
<td>Center Mid-Section:</td>
<td>32.32&quot;</td>
</tr>
<tr>
<td>Upper Mid-Section:</td>
<td>29.02&quot;</td>
</tr>
<tr>
<td>Fly Section:</td>
<td>26.37&quot;</td>
</tr>
</tbody>
</table>

**Vertical Height**
The height of the unit shall extend to minimum of no less than 95’, as measured by a plumb line from the top surface of the basket handrail assembly to the ground, with the basket raised to a 77-degree angle.

**Horizontal Reach**  Based on the manufacturer bidding.
The rated horizontal reach shall be based off the overall length of the aerial device 95’ or 100’.
The measurement of horizontal reach shall be consistent with NFPA standards.

**Mounting of Elevating Platform**
The aerial device shall be mid mounted, to a torque box, on the truck chassis.

**Torque Box**
A “torsion box” subframe shall be installed between two sets of stabilizers. The torque box shall be constructed of 100,000 lb. per square inch yield steel with an integral ladder storage box. The torque box assembly shall be 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 forty-eight 0.750” SAE grade 8 bolts with nuts.

**Turntable**
The turntable shall be coated with a non-skid, chemical resistant material in the walking areas. The stepping surfaces shall meet the skid-resistance requirements in the current NFPA 1901 standard.
The turntable shall serve as a step for access to the ladder.

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 1.62" diameter extruded 6061-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 15 degrees below horizontal to 77 degrees above horizontal. The lift cylinder shall be attached to each side of the base section. The lift cylinders shall have a 7.50" internal diameter (bore), 3.50" diameter cylinder rod and a 53.89" stroke. The lift cylinder rod shall be chrome plated, to provide smooth operation of the aerial and reduce seal wear. The lift cylinders shall be equipped with integral holding valves located in the cylinder, to prevent the unit from descending should the charged lines be severed, at any point within the hydraulic system and to maintain the ladder in the bedded position during road travel. The integral holding valves shall NOT be located in the transfer tubes.

The elevation system shall be controlled by the microprocessor. The microprocessor shall provide the following features:

- Collision avoidance of the elevation system to prevent accidental body damage
- Automatic deceleration when the aerial device is lowered into the cradle
- Automatic deceleration at the end of stroke, in maximum raise and lower positions
- Deceleration of the aerial device from 0 to -15 degrees

**Extension/Retraction System**  
*Depends on the manufacturer bidding.*
A hydraulically powered, extension and retraction system shall be provided through dual hydraulic cylinders and wire ropes. The extension cylinder shall have a 6.50" internal diameter (bore), 2.75" diameter rod and a 53.12" stroke. Each set shall be capable of operating the ladder in the event of a failure, of the other. For safety, systems that use only a single extension/retraction system shall not be acceptable. The extension cylinder rod shall be chrome plated to provide smooth operation of the aerial device and reduce seal wear. The extension/retraction cylinders shall be equipped, with integral holding valves, to prevent the unit from retracting should the charged line be severed, at any point within the hydraulic system. The integral holding valves shall NOT be located in the transfer tubes.

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 extension/retraction system shall be controlled by the microprocessor. The microprocessor shall provide the following features:

- Automatic deceleration at the end of stroke, in maximum extend and retract positions
- Controls the rate of retraction while flowing water

All sheaves and sheave pins shall utilize greaseable bronze bushings. Sheave pins shall be polished stainless steel (no exception).

**Rotation System**
A 54.00" diameter, external tooth, monorace rotation bearing shall be used for the rotation system and shall provide 360-degree continuous rotation. The turntable shall be bolted to the bearing using 30 SAE grade 8, 0.875" diameter bolts. To secure the bearing to the base support, 36 grade 8, 0.875" diameter bolts shall be used. The turntable base and the torque box bearing plate shall be machined to fit the bearing, thereby providing even distribution of forces. Two (2) hydraulically driven, planetary gear boxes, with drive speed reducer, shall be used to provide infinite and minute rotation control, throughout the entire rotational travel. Each planetary gearbox has a torque rating of 130,000 lb. per square inch. A spring applied, hydraulically released, disc type, swing brake shall be furnished to provide positive braking of the turntable assembly. Provisions shall be made for auxiliary operation of the rotation system should complete loss of normal hydraulic power occur.

The rotation system shall be controlled by the microprocessor. The microprocessor shall provide the following features:

- Automatic deceleration as you near a cab or body collision zone
- Envelope control of rotation system to prevent accidental body damage
- Prevent the aerial from being rotated into the short-jacked side of the unit

**Manual Override Controls**
Manual override controls shall be provided for all aerial and stabilizer functions.

**Ladder Slide Mechanism**
Wear pads shall be used between the telescoping ladder sections, to reduce friction for smoother operation. Slide pads shall also be used to control side play between the ladder sections.

**Basket Leveling System**
A basket leveling system shall be provided and so designed, that the basket with its rated load, can be supported and maintained level, relative to the turntable, regardless of the elevation or flexion of the ladder.

The leveling of the basket features a hydraulic cylinder system mounted between the ladder fly section and the basket with each side capable of supporting the load, while maintaining the basket level.
The hydraulic circuitry includes pressure operated counterbalance valves, on the load side of the cylinders, to prevent the basket from tipping should the hydraulic lines be severed.

The microprocessor shall control the level of the basket during bedding operations, preventing the basket from hitting the body deck when the truck is set up on unlevel ground.

**Rotation Interlock**

The microprocessor shall be used to prevent the rotation of the aerial device, to the side in which the stabilizers have not been fully deployed (short-jacked). The microprocessor 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. **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.**

**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).

**35 MPH Wind Conditions/Dry**

<table>
<thead>
<tr>
<th>Degree of Elevation</th>
<th>-15 to 9</th>
<th>10 to 19</th>
<th>20 to 29</th>
<th>30 to 39</th>
<th>40 to 49</th>
<th>50 to 59</th>
<th>60 to 77</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basket</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>Fly</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>250</td>
<td>250</td>
<td>500</td>
</tr>
<tr>
<td>Upper Mid</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>250</td>
<td>250</td>
<td>500</td>
</tr>
<tr>
<td>Center Mid</td>
<td>-</td>
<td>-</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Lower Mid</td>
<td>-</td>
<td>-</td>
<td>250</td>
<td>250</td>
<td>500</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Base</td>
<td>-</td>
<td>250</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>750</td>
</tr>
</tbody>
</table>

**Water Tower Operation**

The following capacities shall be based upon continuous 360-degree rotation and full extension.

**35 MPH Wind Conditions/Water Charged**

<table>
<thead>
<tr>
<th>Degree of Elevation</th>
<th>-15 to 9</th>
<th>10 to 19</th>
<th>20 to 29</th>
<th>30 to 39</th>
<th>40 to 49</th>
<th>50 to 59</th>
<th>60 to 77</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basket</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Fly</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>250</td>
</tr>
<tr>
<td>Upper Mid</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>250</td>
<td>250</td>
</tr>
</tbody>
</table>
Village of Jordan Tower

| Center Mid | - | - | - | 250 | 250 | 500 |
| Lower Mid  | - | - | 250 | 250 | 500 | 500 |
| Base       | - | 250 | 250 | 500 | 500 |

**Elevation -15 to 77 Degrees**
The aerial device shall be able to maintain the above load capacities while flowing up to 1500 GPM and a nozzle position of 0 to 90 degrees to either side of the ladder centerline, and as far above and below horizontal to the platform as nozzle design allows.

The aerial device shall be able to maintain the above load capacities while flowing up to 2000 GPM and a nozzle position of 0 to 45 degrees to either side of the ladder centerline, and 30 degrees above horizontal and as far below horizontal to the platform as nozzle design allows.

Reduced loads in the basket can be redistributed in 250 lb. Increments to the fly, mid, or base as needed.

**Ladder Cradle Interlock System**
A ladder cradle interlock system shall be provided through the microprocessor to prevent the lifting of the aerial device from the nested position until the operator places all the stabilizers in a load supporting configuration. A switch shall be installed at the boom support to prevent operation of the stabilizers once the aerial has been elevated from the nested position.

**AERIAL BOOM PANEL**
There shall be one boom panel provided on each side of the aerial ladder base section. The boom panel shall be painted #90 red.

The boom panels shall be designed so no mounting bolts are in the face of the panel. This shall keep the lettering surface free of holes.

**AERIAL DEVICE RUNG COVERS**
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.

The center portion of each rung cover shall be black and the outside 2.00" edge at each side shall be safety yellow.

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.
STOKES STORAGE BRACKETS  DEPENDS ON THE MANUFACTURER BIDDING
There shall be one (1) aluminum bracket(s) provided at the base section of the aerial ladder on the right side of the aerial device while viewed from the turntable. The brackets shall be located above the aerial boom panel. The brackets shall be painted to match the aerial device and include locking pins to secure the basket. A compartment can be an equivalent.

LADDER STORAGE MOUNTING BRACKETS
There shall be brackets that are painted to match the aerial device provided near the end of the fly section of the aerial for mounting a roof ladder.

The mounting brackets shall accommodate a 16’ Duo-Safety 875-DR roof/wall ladder as determined by the type of aerial device and the available space.

STABILITY TEST
An aerial stability test shall be run on this apparatus using the maximum weight allowance for tip options.

BASKET STRUCTURE
The complete basket structure shall be constructed of welded high strength steel certified by the manufacturer to have a minimum of 100,000 lb. per square inch yield strength on all structural members. The aerial basket shall be fully tested and independent third party certified.

The flooring of the basket shall be multi-piece Morton Cass material, preventing the accumulation of water on the standing surface. The floor shall measure approximately 33.63” long x 72.75” wide. The stepping surfaces shall meet the skid-resistance requirements of current NFPA 1901 standard.

The outside basket steps used for transferring in and out of the basket shall be at the same level as the basket floor and shall be constructed of aluminum treadplate. The steps on the front and sides are approximately 8.00” deep. The front corners of the basket step shall be mitered at 45 degrees to allow the basket to be maneuvered closer to buildings when approaching at an angle.

Four (4) stainless steel pompier belt safety loops shall be attached to the inside of the basket. Two (2) lifting eyes shall be provided on the bottom side of the basket support structure. Each lifting eye shall be rated for 500lb.

Four (4) rubber bumpers are provided on the bottom side of the basket structure for damage protection when setting it down on a surface.

The basket interior shall be illuminated as required per the current edition of NFPA 1901. Electrical sub-components shall be mounted under the basket in an enclosed area providing protection from heat exposure while allowing for easy servicing and maintaining an unobstructed basket interior.
BASKET SIDES

The sides of the basket shall be of tubular steel construction and aluminum sheet skin, and along with the basket doors, shall form a continuous 42.00" high wall around the basket.

PLATFORM ENTRANCES/EXITS  

**DEPENDS ON THE MANUFACTURER BIDDING**

Two (2) swing-in, spring-loaded, self-closing doors shall be of steel frame construction with an aluminum sheet skin and shall be provided at 45-degree angles at the front of the platform. A paddle style door latch shall allow the basket doors to be opened from the outside by applying pressure to the paddle with the hand. The rear of the platform shall be equipped with a vertical self-closing gate for transfer to and from the platform's ladder device.

ACCESSORY MOUNTING RECEPTACLES

Universal accessory mounting receptacles shall be permanently affixed on the left side of the basket to receive options such as the rescue basket holders, rappelling arms, roof ladder brackets, winch, etc. Complete interchangeability shall be required without modification to the basket.

LIGHTS FOR TURNTABLE WALKWAY

There shall be On Scene Model 73006-WHW or equivalent 6.00" long white LED lights and P25 white LED lights with chrome housing provided at the aerial turntable. The lights shall be located to illuminate the entire walking surface of the turntable including the area around the turntable console. These lights shall be activated by the aerial master switch.

TURNTABLE CONSOLE LIGHTING

There shall be one (1), TecNiq Model E10 or equivalent, white LED light mounted in the turntable console cover to illuminate the controls located on both the upper and lower portion of the turntable control station. These lights shall be activated by the aerial master switch.

BASKET HEAT SHIELDS

A heat reflective shield constructed of 0.063 aluminum shall be provided on the front, sides, bottom, and access doors of the basket. It depends on the manufacturer bidding.

The front, side and access door heat shields shall be painted to match the aerial basket.

The heat shields on the bottom of the basket shall be easily removable for ease of servicing components located under the basket. These heat shields shall be provided with a non-glare finish.

INFORMATION CENTER  

**BASED OFF THE MANUFACTURER THAT IS BIDDING.**

There shall be an information center provided. The information center shall operate in temperatures from -40 to 185 degrees Fahrenheit. The information center shall employ a Linux operating system and a 7.00" (diagonal measurement) LCD display. The LCD shall have 1000 nits rated color display. The LCD shall be daylight visible. The LCD display shall be encased in an ABS, grey plastic housing with a black decal. There shall be five (5), weather-resistant user...
interface buttons provided. The LCD display can be changed to an optional single foreign language.

**Operation**
The information center shall be designed for easy operation in everyday use. There shall be a page button to cycle from one screen to the next screen in a rotating fashion. A video button shall allow an NTSC camera signal into the information center to be displayed on the LCD. If any button is pressed while viewing a video feed, the information center shall return to the vehicle information screens. There shall be a menu button to provide access to maintenance, setup, and diagnostic screens. All other button labels shall be specific to the information being viewed.

**General Screen Design**
Where possible, background colors shall be used to provide vehicle information *At a Glance*. If the information provided on a screen is within acceptable limits, a green background color shall be used. If the information provided on a screen is not within acceptable limits, an amber background color shall indicate a cautious condition and a red background color shall indicate a warning condition.

Every screen in the information center shall include the aerial tip temperature, the time (12- or 24-hour mode) and a text Alert Center. The time shall be synchronized between all Command Zone color displays located on the vehicle. The Alert Center shall display text messages for audible alarms. The text messages shall identify any items causing the audible alarm to sound. If more than one (1) audible alarm is activated, the text message for each alarm shall cycle every second until the problems have been resolved. The background for the Alert Center shall change to indicate the severity of the warning message. Amber shall indicate a caution condition and red shall indicate a warning condition. If a warning and a caution condition occur simultaneously, the red background color shall be shown for all Alert Center messages.

A label shall be provided for each button. The label shall indicate the function for each active button for each screen. If the button is not utilized on specific screens, it shall have a button label with no text.

Symbols shall accurately depict the aerial device type the information pertains to such as rear mount ladder, rear mount platform, mid-mount ladder or mid-mount platform.

**Page Screens**
The Information center shall include the following pages:

The Aerial Main and Load Chart page shall indicate the following information:

Rungs Aligned and Rungs Not Aligned shall be indicated with text and respective green or red colored ladder symbols.
Ladder Elevation shall be indicated via a fire apparatus vehicle with ladder symbol with the degree of elevation indicated between the vehicle and ladder.

Water Flow (if applicable) shall be indicated via a water nozzle symbol and text indicating flow / time.

Breathing Air Levels shall be indicated via an air bottle symbol and text indicating the percentage (%) of air remaining. A green bar graph shown inside the bottle shall indicate oxygen levels above 20 percent. A red bar graph shall indicate oxygen levels at or below 20 percent. When oxygen levels are at or below 10 percent the red bar graph shall flash.

The Aerial Load Chart shall indicate the load limit on each section of the ladder based on actual ladder position and water flow (if applicable).

At A Glance color features shall be utilized on this screen. Caution type conditions shall be indicated via a yellow background. Warning type conditions shall be indicated via a red background. Conditions operating within acceptable limits shall be indicated via a green background.

The Aerial Reach and Hydraulic Systems page shall indicate the following information:

Aerial Hydraulic Oil Temperature shall be indicated with symbol and text. At a glance feature shall be utilized.

Aerial Hydraulic Oil Pressure shall be indicated with a symbol and text. At a glance feature shall be utilized.

The following calculations shall be indicated on a representative vehicle symbol:

Aerial Device Extension length.

Aerial Device Height indicating the height of the aerial device tip from the ground.

Aerial Device Reach indicates the horizontal distance the aerial reaches from the turntable.

Aerial Device Angle indicating the angle from the vehicle which the device is at.

At A Glance color feature shall be utilized on this screen. Caution type conditions shall be indicated via a yellow background. Warning type conditions shall be indicated via a red background. Conditions operating within acceptable limits shall be indicated via a green background.

The Level Vehicle page shall indicate the following information:

The grade of the vehicle shall be indicated via a fire apparatus vehicle symbol with the degree of grade shown in text format. The symbol shall tilt depending on the vehicle grade.
The slope of the vehicle shall be indicated via a fire apparatus vehicle symbol with the degree of slope shown in text format. The symbol shall tilt dependent on the vehicle slope.

Outriggers status shall be indicated via a colored symbol for each outrigger present. Each outrigger status shall be defined as one of the following:

Outrigger stowed indicated with a silver pan located close to the vehicle
Outrigger fully extended indicated with a fully deployed green outrigger
Outrigger short-jacked indicated by a yellow outrigger partially deployed
Outrigger not set indicated by a red outrigger that is not set on the ground

A text box located on the vehicle symbol shall be utilized to identify the overall status of the outrigger leveling system. The following status shall be indicated in the text box:

Deployed status shall indicate all outriggers are properly set on the ground at full extension
Short, jacked status shall indicate one or more outriggers are set on the ground but not fully extended.

Not Set status shall indicate one or more outriggers is not properly set on the ground.

The stowed status shall indicate all outriggers are stowed for vehicle travel.

A bedding assist alert shall indicate that the aerial device is being aligned by the Command Zone system as the operator lowers the aerial device into the cradle with the joystick.

At A Glance color feature shall be utilized on this screen. Caution type conditions shall be indicated via a yellow background. Warning type conditions shall be indicated via a red background. Conditions operating within acceptable limits shall be indicated via a green background.

Menu Screens
The following screens shall be available through the Menu button:

The View System Information screen shall display aerial device hours, aerial PTO hours, ladder aligned for stowing, aerial rotation angle, total water flow (if applicable), and aerial waterway valve status (if applicable).

The Set Display Brightness screen shall allow brightness increase and decrease and include a default setting button.

The Configure Video Mode screen shall allow setting of video contrast, video color and video tint.

The Set Startup screen allows setting of the screen that shall be active at vehicle power-up.
The Set Date and Time screen has a 12- or 24-hour format and allows setting of the time and date.

The View Active Alarms screen shows a list of all active alarms including the date and time of each alarm occurrence and shows all alarms that are silenced.

The System Diagnostics screen allows the user to view system status for each module and its respective inputs and outputs. Viewable data shall include the module type and ID number; the module version; and module diagnostics information including input or output number, the circuit number connected to that input or output, the circuit name (item connected to the circuit), status of the input or output, and other module diagnostic information.

Aerial calibration screen indicates items that may be calibrated by the user and instructions to follow for proper calibration of the aerial device.

Button functions and button labels may change with each screen.

**LOWER CONTROL STATION**
A lower control station with pendant control shall be located at the rear of the apparatus in an easily accessible area. The controls and indication labels shall be illuminated for nighttime operation. The following items shall be furnished at the lower control station and shall be clearly identified and conveniently located for ease of operation and viewing:

- Level assist switch
- Override switch to override microprocessor
- Emergency power unit switch

**AERIAL DEVICE CONTROL STATIONS**
There shall be two (2) aerial device control stations, one (1) shall be referred to as the basket control station, and the other as the turntable control station. All elevation, extension, and rotation controls shall operate from both locations. The controls shall permit the operator to regulate the speed of the aerial functions, within the safe limits as determined by the manufacturer and NFPA standards. The controls shall be clearly marked and illuminated for nighttime operation.

Each control shall be equipped with an operator presence, preventing accidental activation.

**TURNTABLE CONTROL STATION**
The turntable control station shall be located on the right side of the turntable so the operator may easily observe the basket while operating the controls. A console cover shall be provided at the turntable control station. The controls shall be so designed to allow the turntable control station to immediately override the basket controls even if the ladder is being operated by the basket controls.
The following items shall also be provided at the turntable control station and be clearly identified and illuminated for nighttime operation and conveniently located for ease of operation and viewing:

- Three (3) separate controls for raise/lower, extend/retract, and left/right rotation
- Intercom controls
- Tip tracking light switch
- Emergency power unit switch
- Operator’s load chart
- Two (2) position switch for selecting aerial operational speed
- Aerial monitor switches

**BASKET CONTROL STATION**

The basket control station shall be located at the front, center of the platform basket. The following items shall also be provided at the basket control station and be clearly identified and illuminated for nighttime operation and conveniently located for ease of operation and viewing:

- Three (3) separate controls for raise/lower, extend/retract, and left/right rotation
- Intercom controls
- Tip tracking light switch
- Basket leveling switches
- Operator’s load chart
- Aerial monitor switches

**HIGH IDLE**

The high idle shall be controlled by the microprocessor. The microprocessor shall automatically adjust the engine rpm, to compensate for the amount of load placed upon the system. The system shall include a safety device that allows activation of the high idle only when the parking brake is set, and the transmission is placed in neutral.

**INTERIOR BASKET ILLUMINATION**

There shall be three (3) 20.00” weather resistant strip lights with white LEDs and stainless-steel shield provided to illuminate the interior of the aerial basket.

- One (1) light over the control console
- One (1) light on the left side rear of the basket
- One (1) light on the right-side rear of the basket

The lights shall be activated when the battery switch is on, and the aerial master switch is on.

**STABILIZERS**

The vehicle shall come equipped with a stabilization system consisting of six (6) hydraulically operated stabilizers. The middle two (2) shall be out and down style, the front and rear two (2)
shall be down only. 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 18' measured from the centerline of the jack footpads when the beams are fully extended. The beams shall be 6.81" wide x 13.00" high with 1.00" thick top and bottom plates and 1/2" thick sides of 100,000-PSI minimum yield strength steel. The cylinders shall have pilot-operated check valves with thermal relief designed to ensure 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 62.25" stroke.

The front vertical jack cylinders shall be capable of 15.00" ground penetration. The middle and rear 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, 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: 4.25" bore, 3.00" rod, and 34.88" stroke.

The middle and rear stabilizer jack shall have a pan that shall be a maximum of 14.00" wide to allow the extension of the stabilizer between parked cars or other obstacles. This pan 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. The front stabilizers shall be designed for easy cab tilt.

**STABILIZER PADS**

**BASED ON THE MANUFACTURER BIDDING**

The stabilizer footpad shall include an integrated stabilizer pad. 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 automatically position itself when being stowed so that no portion of the foot extends outside the body.

**STABILIZER CONTROLS**

**BASED ON THE MANUFACTURER BIDDING**

A portable stabilizer control pendant shall be provided. The control pendant shall be weatherproof and oil resistant. Each function and indicator light shall be labeled on a mylar lexan panel. The control pendant can be taken as far away as 15’ from the vehicle with an attached coil cable.
The stabilizer control pendant shall include the following:

- One (1) green power indicator light for stabilizer control that shall be illuminated when the Stabilizer Power Enable switch has been activated. This shall be interlocked such that the aerial master must be activated, the ladder is in the cradle, or the Global Override at the rear of the apparatus is activated.
- Two (2) electric toggle switches for stabilizers: each toggle switch shall control the extend/retract (middle only) and raise/lower (front/middle/rear) of its respective stabilizer to allow vehicle set up in restricted areas and/or on uneven surfaces.
- Level assist switch: The stabilizer control system shall incorporate a computerized leveling system to enhance the stabilizer set up. The computerized system shall ensure full stabilizer extension, proper jack penetration, and shall level the vehicle within eight tenths of a degree of level for safe operation of the aerial device.
- Stow assist switch: The stabilizer control system shall incorporate a computerized system to move all six (6) stabilizer shoes to the full raised position while this switch is held.
- Tilt assist toggle switch: The stabilizer control system shall incorporate a computerized system to tilt the chassis to five (5) degrees for enhanced side angle deployment of the aerial device.
- One (1) electric push button switch for engaging the emergency power unit.
- One (1) red "stabilizer not stowed" indicator light: this light shall illuminate when the stabilizers are not in the fully stowed position.
- Two (2) fully extended beams green indicator lights: these lights shall be illuminated when each of the respective stabilizer beams are fully extended.
- Six (6) firm on ground green indicator lights: each light shall be illuminated when its respective stabilizer shoe is in the load supporting condition.

Each toggle switch shall activate the engine fast idle automatically.

Manual override shall be supplied for each stabilizer control valve.

A stabilizer deployment audible warning alarm shall be provided and activated by the stabilizer movement.

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 PAN AND TRIM MATERIAL**  
BASED ON THE MANUFACTURER BIDDING.  
The aerial stabilizer pans shall be polished stainless steel and the aerial stabilizer trim shall be polished stainless steel.

**STABILIZER CONTROL BOX DOOR**  
A vertically hinged smooth aluminum door shall be provided over the stabilizer control box. The door shall be hinged along the inboard edge and provided with a flush lift and turn latch.

**STABILIZER PLACEMENT**  
DEPENDS ON THE MANUFACTURER THAT IS BIDDING.  
There shall be two (2) cameras provided and installed on the body, one (1) directly above each stabilizer. The cameras shall be activated with a switch in the cab and shall provide a picture to specify the fully extended stabilizer position allowing the driver the ability to position the vehicle with the proper clearance for stabilizer deployment.

**HYDRAULIC SYSTEM**  
All hose assemblies shall be assembled and crimped by the hose manufacturers certified technician.

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.

All hydraulic fittings and tubing shall be plated or constructed of 304 stainless steel to minimize corrosion.

The fitting shall use an O-ring seal where possible to minimize hydraulic leaks.

An interlock shall be provided that prevents activation of the hydraulic pump until the transmission is placed in neutral and the parking brake is set as outlined in the current NFPA 1901 standard.

The system shall meet the performance requirement of the current NFPA 1901 standard, which requires adequate cooling less than 2.5 hours of operations.

All hydraulic components that are non-sealing whose failure could result in the movement of the aerial shall comply with current NFPA 1901 standards and have burst strength of 4:1.

Dynamic sealing components whose failure could cause aerial movement shall have a margin of 2:1 on maximum operating pressure per the current NFPA 1901 standard.
All hydraulic hoses, tubes, and connections shall have a minimum burst strength of 3:1 per the current NFPA 1901 standard.

A chassis mounted positive displacement piston pump for consistent pressure and rapid responses shall supply hydraulic power for all aerial operations. The positive displacement pump shall provide 3,000psi. The hydraulic pump shall be solely dedicated to aerial operations (no exception).

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.

Oil samples can be taken from the hydraulic manifold GP1 port which is also used for verifying system pressure.

Ball valves shall be provided in the hydraulic suction lines to permit component servicing without draining the oil reservoir.

The aerial shall incorporate the use of trombone steel tubes inside the stabilizer beams to eliminate hydraulic hose wear and leaks.

Hydraulic power to the ladder shall be transferred from the pedestal by a hydraulic swivel.

The system hydraulic pressure shall be displayed on the turntable display.

The hydraulic system shall be additionally protected from excessive pressure by a secondary pressure relief valve set at 3,500 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 cartridge 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.
POWER TAKEOFF/HYDRAULIC PUMP
The apparatus shall be equipped with a power takeoff driven by the chassis transmission and actuated by an electric shift, located inside the cab. The power takeoff which drives the hydraulic pump shall meet all the requirements for the aerial unit operations.

An amber indicator light shall be installed on the cab instrument panel to notify the operator that the power takeoff is engaged.

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

The hydraulic system shall be supplied with a variable displacement load and pressure compensating piston pump. The pump shall meet the demands of all three simultaneous aerial functions. The pump shall provide proper flow for 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 hydraulic system shall be designed with an auxiliary power unit meeting the guidelines of the current NFPA 1901 standard.

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 electrically controlled and be located below the swivel and integrated with the stabilizer control manifold. The handles shall be oriented outward and shall be spaced 1.80” apart. The valve spools shall be designed to bleed off downstream pressure, in the neutral position and allow proper sealing of any cylinder holding cartridge.

OIL RESERVOIR
The oil reservoir shall have a minimum capacity of 39 gallons. The oil fill location shall be easily accessible and be labeled “Hydraulic Oil Only” and indicate the grade of oil that is installed in the reservoir. A drain port shall be provided.

Two suction ports shall be provided, one for the main hydraulic pump and one for the emergency pump. The emergency suction port shall be raised slightly off the bottom of the reservoir.

Magnetic filter shall be installed in line with the return hose.
A float type sending unit in the reservoir shall provide an indication of oil level on an electronic display. A temperature sending unit in the reservoir shall provide indication of the oil temperature on an electronic display.

The hydraulic oil reservoir shall be labeled per the current edition of NFPA 1901 standard.

**RETURN FILTER**
The low-pressure oil return filter shall be remote mounted in the return line and designed to prevent oil loss during filter change. A 50-psi bypass shall be included to protect the element and hydraulic system during lower-than-normal operating temperatures. The system shall incorporate the following filter to provide dependable service:

- return filter: beta 1000 at 6 microns

**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 36 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.

**WATER SWIVEL**
Water shall be transferred to the aerial waterway by means of a 5.00" internal diameter waterway, through the swivel, permitting 360-degree continuous rotation.

**13-BIT ABSOLUTE ENCODER**
The aerial ladder shall be equipped with a 13-Bit Absolute Encoder which provides 8192 counts per shaft turn for position and direction reference.

The 13-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 13-Bit Absolute Encoder shall allow power to be returned to the system without having to re-zero the settings.

The 13-Bit Absolute Encoder shall be an integral part of a micro-processor-based control system.
ELECTRICAL SYSTEM

The aerial device shall utilize a microprocessor-based control system. The system shall consist of the following components:

- Control System Modules

Each of the control system modules shall be configured as follows:

- Sealed to a NEMA 4X rating
- Operating range from -40 degrees F to 156 degrees F (-40 degrees C to 70 degrees C)
- Communicate using J1939 data link
- Two (2) diagnostic LED lights
  - One (1) green light that illuminates when module has power (B+) and ground
  - One (1) red light that flashes to indicate the module is capable of communicating via the data link
- Up to 16 diagnostic LEDs on each module
- Ground matrix identification system

The following control system modules shall be used:

- Control Module
  - Main controller for the system
  - USB connection allows for computer diagnostics
- Power Module
  - Built-in fault sensing
  - Eight (8) digital outputs
  - Pulse width modulating (PWM) capable
  - 10A continuous per output
  - Circuit protection based on actual current draw (not affected by heat)
- Current Control Module
  - Built-in fault sensing
  - Three (3) analog inputs
  - Eight (8) digital outputs
  - Pulse width modulating (PWM) capable
  - 3A continuous per output
  - Closed Loop System
  - Circuit protection based on actual current draw (not affected by heat)
- Input Module
  - 16 software selectable (digital or analog) inputs
- Output Module
  - 16 digital outputs
- Input/Output Module
  - Eight (8) software selectable (digital or analog) inputs
Village of Jordan Tower

- Eight (8) digital outputs
  - Valve Module
    - 36 digital inputs
    - 36 digital outputs

**TIP LIGHT**
There shall be two (2) Whelen® Model MPB* or equivalent, 4,100 lumens 12-volt DC LED lights with adjustable mounts installed on the front of the basket. The painted parts of this light assembly to be white.

The lights shall be controlled with the tracking lights.

**TRACKING LIGHTS**  
**BASED ON THE MANUFACTURER BIDDING:**
There shall be two (2) HiViz Model FT-WL-X-9-* or equivalent, 7,200 raw lumens 12-volt DC lights with white LEDs and adjustable bail mounts installed near the tip of the base section of the aerial device. The lights are installed at the tip, so the overall width of the apparatus is not affected. The lights shall be mounted below the top edge of the aerial device so the overall height of the apparatus is not affected. The lights shall include the following:

- The left-side tracking light to include a combination of flood and spot optics
- The right-side tracking light to include a combination of flood and spot optics
- The painted parts of the light housing and brackets to be black

The tracking lights shall be controlled by a switch located at the platform/tip and turntable.

**BASKET ACCESS**  
**BASED ON MANUFACTURER THAT IS BIDDING**
Access to the basket shall be provided by a pull-out, swing-down climbing ladder. The 2.25" deep climbing ladder surfaces shall be constructed with Traction Tread®. The bottom step shall be a flip-down, stirrup step. The access ladder shall be recessed into the angled corners of the rear body on each side. Hand holds shall be provided in each side of the ladder.

The stepwell finish shall be aluminum treadplate.

All stepping surfaces shall have a height not greater than 14.00" from top surface to top surface.

The bottom stepping height shall not exceed 24.00" from the ground to the top of the stepping surface at any time.

**STEP LIGHTS**
There shall be two (2) white LED step lights with chrome housing provided for each set of aerial basket access steps.
To ensure exceptional illumination, each light shall provide a minimum of 25 foot-candles (fc) covering an entire 15” x 15” square placed ten (10) inches below the light and a minimum of 1.5 fc covering an entire 30” x 30” square at the same ten (10) inch distance below the light.

The step lights shall be actuated when parking brake is applied.

These lights shall meet NFPA requirements for step lighting.

**LIGHTING ON AERIAL DEVICE**
There shall be TecNiq, Model D02 or equivalent, LED rung lighting provided on both sides of the aerial ladder base, middle and fly sections. The lighting shall be located adjacent to the ladder rungs along the lower rail of the ladder sections and shall run the length of the ladder section.

The color of the sections shall be per the following:

- The base section of the ladder to be red.
- The mid-section of the ladder to be white.
- The fly section of the ladder to be blue.

The LED rung lighting shall be activated when the aerial master switch is activated.

The lights may be load managed when the parking brake is applied.

**STABILIZER WARNING LIGHTS**
There shall be our (4) Whelen®, Model M6*C or equivalent, LED flashing warning lights with Whelen, Model M6FC or equivalent, chrome flanges installed, one (1) on each stabilizer cover panel.

- The front stabilizer pan lights shall be red LED with a clear lens
- The rear stabilizer pan lights shall be red LED with a clear lens

These warning lights shall be activated by the same switch as the side warning lights.

**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 or equivalent.

The lights shall be recessed in the horizontal beam of the stabilizer.

These warning lights shall be activated with the aerial master switch.

**STABILIZER SCENE LIGHTS**
There shall be one (1) Amdor®, Model AY-LB-12HW012 or equivalent, 190 lumens, 12” long, white LED strip light installed under each stabilizer beam to illuminate the surrounding area. A total of six (6) lights shall be installed. The lights shall be activated by the aerial master switch.
**DC POWER CABLE TO TIP**
There shall be a cable installed in the aerial device to provide 12.88 amps @ 12 volts DC to the tip of the aerial device.

**3-WAY AERIAL COMMUNICATION SYSTEM**
There shall be a Fire Research model ICA910 or equivalent, three-way intercom system provided. There shall be two (2) control modules located, one (1) at the turntable operator console and one (1) at the pump panel. Each control module shall have an LED volume display and push-button volume control. A hands-free module shall be located at the aerial tip or platform and constantly transmit to the other module unless the push-to-talk button is pressed.

Each intercom unit shall be weatherproof.

**BREATHING AIR**
Breathing air shall be supplied to the aerial platform. The air system shall incorporate one (1) 437 cubic feet, 4500-psi cylinder. To allow the turntable operator an unobstructed view of the platform the cylinder shall be mounted on the left side of the aerial base section while viewed from the turntable. A pressure regulator is located at the air cylinder. A shutoff valve with guard shall be provided on the cylinder. The air shall be routed to the basket using hose especially designed for use in breathing air systems. At the platform, the breathing air shall be accessible via two (2) quick couplings for air masks. These shall have a Hansen brass 3000 series coupling. Two (2) couplings shall be located at the rear of the basket, one (1) on each side. There shall be a weather resistant storage compartment for two (2) air masks provided at the basket with a rubber draw latch. A 50’ recharge hose shall be provided for refilling the air cylinder without having to remove the tank from its mounting.

The breathing air cylinder shall be designed and constructed to conform to the requirements of the United Nations (UN) on the transportation of dangerous goods.

**BREATHING AIR LEVEL AND WARNING SYSTEM**
The level of breathing air remaining shall be visible on the LCD display at all operating positions. The display shall incorporate a low-pressure warning circuit that activates an audible alarm when 20% maximum air cylinder capacity remains. A second, louder audible alarm shall activate when the remaining air level drops to 10% of maximum air cylinder capacity.

**AERIAL PEDESTAL**
The aerial pedestal shall accommodate the height of the cab.

**3-IN-1 BASKET OPTION BRACKETS**
Brackets shall be provided to increase the safety of firefighters during fire ground and rescue operations. The removable brackets shall have the following three (3) functions: securing a roof ladder to the basket, two (2) rappelling anchor points, and mounting bars to allow the secure mounting of a rescue basket stretcher.
The roof ladder mounting bracket shall be designed to allow firefighter access below the basket using up to a 20’ roof ladder. The ladder shall be secured through its beams and one (1) rung, by a 1.00” diameter aluminum rod capable of being positively latched in place and able to withstand a minimum of a 500lb load. There shall be a latch to keep the ladder in a vertical position at all times. A set of nylon guides shall be provided to aid in positioning the roof ladder on the mounting brackets.

Two (2) rappelling arms shall be provided. Forged stainless steel eyebolts with a 1.38” inside diameter shall be incorporated into the design of the brackets for use as a rappel line anchor. Each anchor point shall have a capacity of 300lb.

Rescue basket support brackets shall be provided to allow patient transport using the aerial. Two (2) quick clip basket straps shall be used to secure the basket to the brackets.

Strain gauging and testing shall have been completed on the system (ladder and complete holding device) to ensure structural integrity of all components and maintain a minimum of two to one (2:1) safety factor.

**AERIAL TURNTABLE MANSAPER™ BAR** DEPENDS ON THE MANUFACTURER THAT IS BIDDING
A ManSaver™ bar or equivalent shall be installed at the aerial turntable.

**AERIAL WATERWAY**
The aerial waterway shall be capable of being supplied by either a midship mounted pump or an external water source through a 5.00” intake at the side of the apparatus.

A 5.00” water swivel shall be installed below the aerial turntable permitting the ladder to rotate 360 degrees continuously.

A 5.00” water swivel shall be installed at the aerial heel pivot pin that shall permit water tower operations of -15 degrees to 77 degrees. The heel pivot pin shall not be integral with the waterway swivel at any point. The waterway design shall allow complete servicing of the waterway swivel without disturbing the heel pivot pin.

A telescoping aluminum waterway shall be installed on the side of the aerial ladder sections. The waterway shall consist of a 5.50” diameter tube for the base section, 5.00” diameter tube for the lower mid-section, 4.50” diameter tube for the center mid-section, 4.00” diameter tube for the upper mid-section, and 3.50” diameter tube for the fly section.

A 1.50” drain shall be provided for the waterway. The drain shall be located below the body on the right-side rearward of the running board.

**WATERWAY SEALS**
The waterway seals shall be of type-B Poly Pak 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 thermal polymer. The guides shall provide positive centering of the extendible sections within each other and the base section to ensure longer service life and smoother operation.

**PLATFORM WATER SYSTEM**
A 4.00” (internal diameter) water swivel shall connect the fly section waterway to the platform waterway. The water swivel shall permit water tower operations from -15 degrees to 77 degrees. The water shall be routed from the swivel to a 4.00” gear operated valve(s) on the front of the platform using a combination of 4.00” tubes and piping. The monitor(s) shall be bolted onto the valve(s).

A 2.50” preset pressure relief valve shall be provided in the waterway system. It shall be designed to protect the aerial waterway from excess pressure. It shall dump water to the ground when operating.

A shower nozzle rated at 75 gpm shall be provided beneath the platform for heat protection for the platform personnel. A direct linkage control for the shower nozzle shall be provided.

One (1) 2.50” outlet shall be provided at the front of the platform with a swivel elbow. The pre-connect shall be furnished with 2.50” NST threads and chrome plated cap. The pre-connect shall be located on the right side of the basket when viewed from the turntable.

There shall be no plumbing provided for a second pre-connect.

**AERIAL MONITOR**  **BASED ON MANUFACTURER BIDDING.**
An Akron Model 3481 manual handwheel controlled monitor shall be provided at the front of the platform with an Akron 3499 stacked tips and 3485 stream shaper.

**WATERWAY FLOWMETER**
Waterway flow, including total water flowed, shall be monitored by the microprocessor. An LCD display shall be located at the upper and lower control stations.

**WATERWAY INLET**
There shall be a 5.00” schedule 10 stainless steel inlet pipe on the right side of the apparatus. The inlet shall be connected to the base of the ladder, through the turntable swivel, to assure continuous rotation. The inlet shall terminate with a 5.00” NST chrome adapter and a long-handled chrome cap.

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

**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 three (3) consecutive days.

**DEALER FURNISHED LOOSE EQUIPMENT ALLOWANCE**
The bidder will include a $fifteen (15),000.00 stipend fund for miscellaneous brackets, fabrications and labor for equipment mounting. Should the cost of equipment mounting, and brackets exceed that amount, the balance will be paid by the purchaser or should the amount be less the balance will be refunded to the customer.

**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 9.9.3 and 9.9.4 shall be provided by the fire department.

- 800 ft (240 m) of 2.50” (65 mm) or larger fire hose, in any combination.
- 400 ft (120 m) of 1.50” (38 mm), 1.75” (45 mm), or 2.00” (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 1.00” (25 mm), 1.125” (29 mm), and 1.25” (32 mm) tips.
- One (1) SCBA complying with NFPA 1981 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.
- Two (2) hydrant wrenches.
- One (1) double female 2.50" (65 mm) adapter with National Hose threads.
- One (1) double male 2.50" (65 mm) adapter with National Hose threads.
- One (1) rubber mallet, for use on suction hose connections.
- Four (4) ladder belts meeting the requirements of NFPA 1983.
- One (1) 150 ft (45 m) light-use life safety rope meeting the requirements of NFPA 1983.
- One (1) 150 ft (45 m) general-use life safety rope meeting the requirements of NFPA 1983.
- 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 (2) at the shoulders, two (2) at the sides, and one (1) at the front.
- Five (5) fluorescent orange traffic cones not less than 28.00" (711 mm) in height, each equipped with a 6.00" (152 mm) retro-reflective white band no more than 4.00" (152 mm) from the top of the cone, and an additional 4.00" (102 mm) retro-reflective white band 2.00" (51 mm) below the 6.00" (152 mm) band.
- Five (5) illuminated warning devices such as highway flares, unless the five (5) fluorescent orange traffic cones have illuminating capabilities.
- One (1) 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 3.00" (75 mm) shall include a pressure relief device that meets the requirements of 16.6.6.
- If the apparatus does not have a 2.50" National Hose (NH) intake, an adapter from 2.50" 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 2.50" National Hose (NH) threads, adapters shall be carried to allow feeding the supply hose from a 2.50" NH thread male discharge and to allow the hose to connect to a 2.50" NH female intake, mounted in brackets fastened to the apparatus if not already mounted directly to the discharge or intake.

**SOFT SUCTION HOSE PROVIDED BY DEALER**

NFPA 1901, 2016 edition, section 9.8.2.1 requires a minimum of 20' of suction hose or 15' of supply hose shall be carried.

The hose is not on the apparatus as manufactured. The dealer shall provide suction or supply hose.
DRY CHEMICAL EXTINGUISHER PROVIDED BY FIRE DEPARTMENT
NFPA 1901, 2016 edition, section 9.9.4 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, 2016 edition, section 9.9.4 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.

AERIAL LADDER BELTS
The following ladder belts shall be provided:

- no small/medium belts
- two (2) large/extra-large belts for 34"-42" waist
- one (1) XXL belt for 42"-50" waist

FLATHEAD AXE PROVIDED BY FIRE DEPARTMENT
NFPA 1901, 2016 edition, Section 9.9.4 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.

PICKHEAD AXE PROVIDED BY FIRE DEPARTMENT
NFPA 1901, 2016 edition, Section 9.9.4 requires one (1) pick head 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 PROCESS  **DEPENDS ON THE MANUFACTURER BIDDING.**
The exterior custom cab and body painting procedure shall consist of a seven (7) 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. Imperfections on the exterior surfaces shall be removed and sanded to a smooth finish. Exterior seams shall be sealed before painting. Exterior surfaces that shall not be painted include; chrome plating, polished stainless steel, anodized aluminum and bright aluminum treadplate.

2. **Chemical Cleaning and Pretreatment** - All surfaces shall be chemically cleaned to remove dirt, oil, grease, and metal oxides to ensure the subsequent coatings bond well.
The aluminum surfaces shall be properly cleaned and treated using a high pressure, high temperature 4 step Acid Etch process. The steel and stainless surfaces shall be properly cleaned and treated using a high temperature 3 step process specifically designed for steel or stainless. The chemical treatment converts the metal surface to a passive condition to help prevent corrosion.

3. **Surfacer Primer** - The Surfacer Primer shall be applied to a chemically treated metal surface to provide a strong corrosion protective basecoat. A minimum thickness of 2 mils of Surfacer Primer is applied to surfaces that require a Critical aesthetic finish. The Surfacer Primer is a two-component high solids urethane that has excellent sanding properties and an extra smooth finish when sanded.

4. **Finish Sanding** - The Surfacer Primer shall be sanded with a fine grit abrasive to achieve an ultra-smooth finish. This sanding process is critical to produce a smooth mirror like finish in the topcoat.

5. **Sealer Primer** - The Sealer Primer is applied prior to the Basecoat in all areas that have not been previously primed with the Surfacer Primer. The Sealer Primer is a two-component high solids urethane that goes on smoothly and provides excellent gloss hold out when top coated.

6. **Basecoat Paint** - Two coats of high performance, two component high solids polyurethane basecoat shall be applied. The Basecoat shall be applied to a thickness that shall achieve the proper color match. The Basecoat shall be used in conjunction with a urethane clear coat to provide protection from the environment.

7. **Clear Coat** - Two (2) coats of Clear Coat shall be applied over the Basecoat color. The Clear Coat is a two-component high solid urethane that provides superior gloss and durability to the exterior surfaces. Lap style and roll-up doors shall be Clear Coated to match the body. Paint warranty for the roll-up doors shall be provided by the roll-up door manufacturer.

After the cab and body are painted, the color shall be verified to make sure that it matches the color standard. Electronic color measuring equipment shall be used to compare the color sample to the color standard entered into the computer. Color specifications shall be used to determine the color match. A Delta E reading shall be used to determine a good color match within each family color.

All removable items such as brackets, compartment doors, door hinges, and trim shall be removed and painted separately if required, to ensure paint is behind all mounted items. Body assemblies that cannot be finish painted after assembly shall be finish painted before assembly.

The paint finish quality levels for critical areas of the apparatus (cab front and sides, body sides and doors, and boom lettering panels) are to meet or exceed Cadillac/General Motors GMW15777 global paint requirements. Orange peel levels are to meet or exceed the #6 A.C.T.standard in critical areas. These requirements must be met in order for the exterior paint finish to be considered acceptable. The manufacturer's written paint standards shall be available upon request.
Environmental Impact
The contractor shall meet or exceed all current state 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 percent efficiency factor.
- Particulate emissions from painting operations shall be collected by a dry filter or water wash process. If the dry filter is used, it shall have an efficiency rating of 98 percent. Water wash systems shall be 99.97 percent efficient
- Water from water wash booths shall be reused. Solids shall be removed on a continual basis to keep the water clean.
- Paint waste is disposed of in an environmentally safe manner.
- Empty metal paint containers shall be recycled to recover the metal.
- Solvents used in clean-up operations shall be recycled on-site or sent off-site for distillation and returned for reuse.

Additionally, the finished apparatus shall not be manufactured with or contain products that have ozone depleting substances. The contractor shall, upon demand, present evidence that the manufacturing facility meets the above conditions and that it is in compliance with his state EPA rules and regulations.

CAB PAINT
The cab shall be painted #90 red.

BODY PAINT
The body shall be painted to match the lower section of the cab.
PAINT/SEAL CHASSIS FRAME ASSEMBLY

The following components shall be treated with epoxy E-coat protection prior to finishing paint: Or equivalent

- Two (2) C-channel frame rails
- Two (2) frame liners

The E-coat process shall meet the technical properties shown.

Before the frame rails are finish painted, all areas shall be sealed with a 3M 2084 metal sealant after the components are torqued to the frame rails: Or equivalent

- The joint between the main frame and the liner
- The joint between all crossmembers and the frame
- The joint between all spring hangers and the frame

The chassis frame assembly shall be finished with primer and gloss paint to match the lower job color 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 finish painted are:

- Frame rails
- Frame liners
- Cross members
- Axles
- Suspensions
- Steering gear
- Battery boxes
- Bumper extension weldment
- Frame extensions
- Body mounting angles
- Rear Body support substructure (front and rear)
- Pump house substructure
- Air tanks
- Steel fuel tank
- Castings
- Individual piece parts used in chassis and body assembly

After the chassis frame assembly is finish painted, the following non-torqued joints shall be sealed with a SG-510A rust-proofing compound:

#### FILM TECHNICAL PROPERTIES

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>TEST METHOD</th>
<th>PERFORMANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>-</td>
<td>Black</td>
</tr>
<tr>
<td>Film Thickness</td>
<td>-</td>
<td>0.5 - 1.5 mils</td>
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<td>Gloss: 60 Degree</td>
<td>ASTM D523</td>
<td>65 - 85</td>
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<td>Hardness</td>
<td>ASTM D3363</td>
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<td>Direct Impact</td>
<td>ASTM D2794</td>
<td>100 in. - lbs. Minimum</td>
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<tr>
<td>Reverse Impact</td>
<td>ASTM D2794</td>
<td>60 in. - lbs. Minimum</td>
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<tr>
<td>Corrosion Adhesion</td>
<td>ASTM D3359</td>
<td>45 - 58</td>
</tr>
<tr>
<td>Humidity</td>
<td>ASTM D1735</td>
<td>1000 Hours Minimum</td>
</tr>
<tr>
<td>Water Immersion</td>
<td>ASTM D870</td>
<td>250 Hours Minimum</td>
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<tr>
<td>Gravimeter</td>
<td>GM95308P</td>
<td>6 Minimum</td>
</tr>
<tr>
<td>Tensile</td>
<td>GM95315P</td>
<td>12 - 13 in.</td>
</tr>
</tbody>
</table>

*Cold rolled steel substrates, Zn Phosphate pretreatment, 85.4% average Film Thickness, cured 30 minutes @ 392°F.

**Corrosion Resistance: CRT / Zinc Phos / Non-Chrome**: 1 - 2 mm

**Salt Spray**: ASTM B117, cold rolled steel tabs painted cured 30 minutes @ 392°F. (Average Test Result: 3 cycles).
• All bolted on chassis components that could be vulnerable to rust (i.e. body mounting angles, air tanks, etc.)

To summarize, all metal-to-metal contact components that are prone to rust, shall be protected.

**AXLE HUB PAINT**
All axle hubs shall be painted to match the primary job color.

**COMPARTMENT INTERIOR PAINT**
The interior of all compartments shall be painted with a gray spatter type paint.

**AERIAL DEVICE PAINT COLOR**  **DEPENDS ON THE MANUFACTURER BIDDING**
The aerial device paint procedure shall consist of a seven (7) step finishing process as follows:

1. **Manual Surface Preparation** - All exposed metal surfaces on the aerial device structural components above the rotation point shall be thoroughly cleaned and mechanically shot-blasted to remove metal impurities and prepare the aerial for painting.

2. **Zinc Rich Primer** - Zinc rich primer shall be applied to the torque box and stabilizers.

3. **Primer/Surfacer Coats** - A two (2) component epoxy primer/surfacer shall be applied to the mechanically shot-blasted metal surfaces to provide a strong corrosion protective base coat and to smooth out the surface. All seams shall be caulked with a two (2) component epoxy caulk before painting.

4. **Hand Sanding** - The primer/surfacer coat of the outer surfaces of the handrails and base rails shall be lightly sanded to a smooth finish.

5. **Primer Coat** - A two (2) component epoxy primer coat shall be applied over the sanded primer.

6. **Topcoat Paint** - Urethane base coat shall be applied to opacity for correct color matching.

7. **Clear Coat** - Two (2) coats of an automotive grade two (2) component urethane shall be applied.

Surfaces that shall not be painted include all chrome plated, polished stainless steel, anodized aluminum, and bright aluminum treadplate.

All buyout components, such as monitor, nozzle, gauges, etc. shall be supplied as received from the vendor.

Removable items such as brackets shall be removed and painted separately to ensure paint coverage behind all mounted items.

The aerial device components shall be painted as follows using the aforementioned seven (7) step finishing process:
Aerial basket and basket leveling cylinders at tip: silver metallic 601
Aerial device ladder sections and extension cylinders: silver metallic 601
Aerial turntable and leveling cylinders (if applicable) at turntable: red 90
Aerial control console: red 90
Aerial lift cylinders: red 90
Aerial rotation motor (if applicable): red 90
Aerial torque box, support structure and components below the rotation point: red 90
Aerial stabilizers (middle and rear only): red 90
Aerial boom support: red 90

REFLECTIVE BAND
A 10.00" white reflective band shall be provided across the front of the vehicle and along the sides of the body.
The reflective band provided on the cab face shall be at the headlight level.

REAR CHEVRON STRIPING
There shall be alternating chevron striping located on the rear-facing vertical surface of the apparatus. Covered surfaces shall include the rear wall and aluminum doors. Rear compartment doors, stainless steel access doors, and the rear bumper shall not be covered.
The colors shall be red and fluorescent yellow green diamond grade.
Each stripe shall be 6.00" in width.
This shall meet the requirements of the current edition of NFPA 1901, which states that 50% of the rear surface shall be covered with chevron striping.

REFLECTIVE STRIPE ON STABILIZERS
There shall be a 4.00" wide fluorescent yellow green diamond grade reflective stripe provided on the forward and rear facing side of all aerial stabilizers.

CAB DOOR REFLECTIVE STRIPE
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
The lettering shall be totally encapsulated between two (2) layers of clear vinyl.

LETTERING
Forty-one (41) to sixty (60) genuine gold leaf lettering, 11.00" high, with highlight and shade shall be provided.
FIRE APPARATUS PARTS MANUAL
There shall be one (1) custom parts manual(s) in USB flash drive format for the complete fire apparatus provided.

The manual(s) 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 parts

Each 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 these manuals 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.

CHASSIS SERVICE MANUALS
There shall be one (1) chassis service manuals on USB flash drives containing parts and service information on major components provided with the completed unit.

The manual 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.

**CHASSIS OPERATION MANUAL**
The chassis operation manual shall be provided on one (1) USB flash drive.

**ONE (1) YEAR MATERIAL AND WORKMANSHIP**
Each new piece of apparatus shall be provided with a minimum of one (1) year basic apparatus material and workmanship limited warranty. The warranty shall cover such portions of the apparatus built by the manufacturer as being free from defects in material and workmanship that would arise under normal use and service.

A copy of the warranty certificate shall be submitted with the bid package (no exception).

**ENGINE WARRANTY**
A Cummins five (5) year limited engine warranty shall be provided. A copy of the warranty certificate shall be submitted with the bid package.

**STEERING GEAR WARRANTY**
A TRW one (1) year limited steering gear warranty shall be provided. A copy of the warranty certificate shall be submitted with the bid package.

**FIFTY (50) YEAR STRUCTURAL INTEGRITY**
The chassis frame shall be provided with a fifty (50) year material and workmanship limited warranty. The warranty shall cover the chassis frame as being free from defects in material and workmanship that would arise under normal use and service.

A copy of the warranty certificate shall be submitted with the bid package (no exception).

**FRONT AXLE WARRANTY**
An Eaton five (5) year/100,000-mile parts and labor warranty shall be provided.

**TDM REAR AXLE FIVE (5) YEAR MATERIAL AND WORKMANSHIP WARRANTY**
A Meritor™ Axle 5-year limited warranty shall be provided.

**ABS BRAKE SYSTEM THREE (3) YEAR MATERIAL AND WORKMANSHIP WARRANTY**
A Meritor Wabco™ ABS brake system three (3) year limited warranty shall be provided.

**TEN (10) YEAR STRUCTURAL INTEGRITY**
The new cab shall be provided with a ten (10) year material and workmanship limited warranty. The warranty shall cover such portions of the cab built by the manufacturer as being free from structural failures caused by defects in material and workmanship that would arise under normal use and service.

A copy of the warranty certificate shall be submitted with the bid package (no exception).
TEN (10) YEAR PRO-RATED PAINT AND CORROSION
Each new piece of apparatus shall be provided with a ten (10) year pro-rated paint and corrosion limited warranty on the apparatus cab. The warranty shall cover painted exterior surfaces of the body to be free from blistering, peeling, corrosion, or any other adhesion defect caused by defective manufacturing methods or paint material selection that would arise under normal use and service.

A copy of the warranty certificate shall be submitted with the bid package (no exception).

FIVE (5) YEAR MATERIAL AND WORKMANSHIP
The electronic modules and display(s) shall be provided with a five (5) year material and workmanship limited warranty. The warranty shall cover electronic modules to be free from failures caused by defects in material and workmanship.

A copy of the warranty certificate shall be submitted with the bid package (no exception).

CAMERA SYSTEM WARRANTY
A fifty-four (54) month warranty shall be provided for the camera system.

COMPARTMENT LIGHT WARRANTY
A ten (10) year material and workmanship limited warranty shall be provided for the 12-volt DC LED strip lights. The warranty shall cover the LED strip lights to be free from defects in material and workmanship that would arise under normal use.

A copy of the warranty certificate shall be submitted with the bid package (no exception).

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

TRANSMISSION COOLER WARRANTY
The transmission cooler shall carry a five (5) year part and labor warranty (exclusive to the transmission cooler). In addition, a collateral damage warranty shall also be in effect for the first three (3) years of the warranty coverage and shall not exceed $10,000 per occurrence. A copy of the warranty certificate shall be submitted with the bid package.

WATER TANK WARRANTY
The UPF poly water tank shall be provided with a lifetime material and workmanship limited warranty.

A copy of the warranty certificate shall be submitted with the bid package (no exception).

TEN (10) YEAR STRUCTURAL INTEGRITY
Each new piece of apparatus shall be provided with a ten (10) year material and workmanship limited warranty on the apparatus body. The warranty shall cover such portions of the apparatus
built by the manufacturer as being free from defects in material and workmanship that would arise under normal use and service.

A copy of the warranty certificate shall be submitted with the bid package (no exception).

**ROLL UP DOOR MATERIAL AND WORKMANSHIP WARRANTY**

A Gortite roll-up door limited warranty shall be provided. The mechanical components of the roll-up door shall be warranted against defects in material and workmanship for the lifetime of the vehicle. A **six (6) year** limited warranty shall be provided on painted and satin roll-up doors.

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

**PUMP WARRANTY**

The Waterous pump shall be provided with a Seven (7) year material and workmanship limited warranty.

A copy of the warranty certificate shall be submitted with the bid package (no exception).

**TEN (10) YEAR 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 certificate shall be submitted with the bid package (no exception).

**TWENTY (20) YEAR AERIAL DEVICE STRUCTURAL INTEGRITY WARRANTY**

The aerial device shall be provided with a twenty (20) year material and workmanship limited warranty. The warranty shall cover such portions of the apparatus built by the manufacturer as being free from defects in material and workmanship that would arise under normal use and service. This warranty shall be limited to the torque box, turntable, aerial sections, and other structural components.

A copy of the warranty certificate shall be submitted with the bid package (no exception).

**AERIAL SWIVEL WARRANTY**

An Amity five (5) year limited swivel warranty shall be provided. A copy of the warranty certificate shall be submitted with the bid package (no exception).

**HYDRAULIC SYSTEM COMPONENTS WARRANTY**

Aerial hydraulic system components shall be provided with a five (5) year material and workmanship limited warranty.
### HYDRAULIC SEAL WARRANTY
Aerial hydraulic seals shall be provided with a three (3) year material and workmanship limited warranty.

A copy of the warranty certificates shall be submitted with the bid package (no exception).

### AERIAL WATERWAY WARRANTY
An Amity ten (10) year limited waterway warranty shall be provided. A copy of the warranty certificate shall be submitted with the bid package (no exception).

### FOUR (4) YEAR PRO-RATED PAINT AND CORROSION
The aerial device shall be provided with a four (4) year pro-rated paint and corrosion limited warranty. The warranty shall cover exterior painted surfaces of the aerial device to be free from blistering, peeling, corrosion, or any other adhesion defect caused by defective manufacturing methods or paint material selection that would arise under normal use and service.

A copy of the warranty certificate shall be submitted with the bid package (no exception).

### FIVE (5) YEAR MATERIAL AND WORKMANSHIP
The electronic modules and display(s) shall be provided with a five (5) year material and workmanship limited warranty. The warranty shall cover electronic modules to be free from failures caused by defects in material and workmanship.

A copy of the warranty certificate shall be submitted with the bid package (no exception).

### TWO (2) YEAR GENERATOR MATERIAL AND WORKMANSHIP WARRANTY
A Harrison Hydra-Gen generator two (2) year limited warranty shall be provided.

### TEN (10) YEAR PRO-RATED PAINT AND CORROSION
Each new piece of apparatus shall be provided with a ten (10) year pro-rated paint and corrosion limited warranty on the apparatus body. The warranty shall cover painted exterior surfaces of the body to be free from blistering, peeling, corrosion, or any other adhesion defect caused by defective manufacturing methods or paint material selection that would arise under normal use and service.

A copy of the warranty certificate shall be submitted with the bid package (no exception).

### THREE (3) YEAR MATERIAL AND WORKMANSHIP
The gold leaf lamination shall be provided with a three (3) year material and workmanship limited warranty. The warranty shall cover the gold leaf lamination as being free from defects in material and workmanship that would arise under normal use and service.

A copy of the warranty certificate shall be submitted with the bid package (no exception).
VEHICLE STABILITY CERTIFICATION
The fire apparatus manufacturer shall provide a certification stating the apparatus complies with NFPA 1901, current edition, section 4.13, Vehicle Stability. The certification shall be provided at the time of bid.

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 delivery.

POWER STEERING CERTIFICATION
The fire apparatus manufacturer shall provide a certification stating the power steering system installed meets the requirements of the component supplier. The certification shall be provided at the time of bid.

CAB INTEGRITY CERTIFICATION
The fire apparatus manufacturer shall provide a cab crash test certification with this proposal. The certification shall state that a specimen representing the substantial structural configuration of the cab has been tested and certified by an independent third-party test facility. Testing events shall be documented with photographs, real-time and high-speed video, vehicle accelerometers, cart accelerometers, and a laser speed trap. The fire apparatus manufacturer shall provide a state licensed professional engineer to witness and certify all testing events. Testing shall meet or exceed the requirements below:

- SAE J2422 Cab Roof Strength Evaluation - Quasi-Static Loading Heavy Trucks.
- European Occupant Protection Standard ECE Regulation No.29.
- SAE J2420 COE Frontal Strength Evaluation - Dynamic Loading Heavy Trucks.

Side Impact
The cab shall be subjected to dynamic preload where a 14,320-lb moving barrier is slammed into the side of the cab at 5.50 mph, striking with an impact of 13,000 ft-lb of force. This test is part of the SAE J2422 test procedure and more closely represents the forces a cab shall see in a rollover incident.

Frontal Impact
The same cab shall withstand a frontal impact of 32,600 ft-lb of force using a moving barrier in accordance with SAE J2420.

Additional Frontal Impact
The same cab shall withstand a frontal impact of 65,098 ft-lb of force using a moving barrier. (Twice the force required by SAE J2420)

Roof Crush
The cab shall be subjected to a roof crush force of 22,500 lb. This value meets the ECE 29 criteria and is equivalent to the front axle rating up to a maximum of ten (10) metric tons.
**Additional Roof Crush**
The same cab shall be subjected to a roof crush force of 110,000 lbs. (Four and a half times the load criteria of ECE 29)

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, like those provided on the apparatus, have been tested and have met these criteria without structural damage, latch malfunction, or significant component wear.

**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.

**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 lb. 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, at time of delivery, that each seat mount and cab structure design was pull tested to the required force and met the appropriate criteria.

**PERFORMANCE CERTIFICATIONS**

**Cab Air Conditioning**
Good cab air conditioning temperature and air flow performance keeps occupants comfortable, reduces humidity, and provides a climate for recuperation while at the scene. The cab air conditioning system shall cool the cab from a heat-soaked condition at 100 degrees Fahrenheit to an average of 78 degrees Fahrenheit in 30 minutes. The bidder shall certify that a substantially similar cab has been tested and has met these criteria.
Cab Defroster
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 Auxiliary Heater
Good cab heat performance and regulation provides a more effective working environment for personnel, whether in-transit, or at a scene. An auxiliary cab heater shall warm the cab 77 degrees Fahrenheit from a cold soak, within 30 minutes when tested using the coolant supply methods found in SAE J381. The bidder shall certify, at time of delivery, that a substantially similar cab has been tested and has met these criteria.

AMP DRAW REPORT
The bidder shall provide, at the time of bid and delivery, an itemized printout of the expected amp draws of the entire vehicle's electrical system.

The manufacturer of the apparatus shall provide the following:

- Documentation of the electrical system performance tests.
- A written load analysis, which shall include the following:
  - The nameplate rating of the alternator.
  - The alternator rating under the conditions specified per:
    - Applicable NFPA 1901 or 1906 (Current Edition).
  - The minimum continuous load of each component that is specified per:
    - Applicable NFPA 1901 or 1906 (Current Edition).
  - Additional loads that, when added to the minimum continuous load, determine the total connected load.
  - Each individual intermittent load.

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