SEDGWICK COUNTY, KANSAS
DIVISION OF FINANCE DEPARTMENT
Purchasing Department
525 N. Main, Suite 823 ~ Wichita, KS 67203
Phone: 316 660-7255 Fax: 316 383-7055
https://www.sedgwickcounty.org/finance/purchasing/requests-for-bid-and-proposal/

REQUEST FOR PROPOSAL
#20-0039
2 EA. 107' AERIAL TRUCKS

June 30, 2020

Sedgwick County, Kansas (hereinafter referred to as "county") is seeking a firm or firms to provide two (2) 107' Aerial trucks for Sedgwick County Fire District 1. If your firm is interested in submitting a response, please do so in accordance with the instructions contained within the attached Request for Proposal. Responses are due no later than 1:45 pm CDT, Tuesday, August 4, 2020.

To ensure that vendors have complete information prior to submitting a proposal, **a pre-proposal conference call has been scheduled for Friday, July 10, 2020 at 2:00 pm. You can connect to this conference call by dialing 316-660-7271.** This meeting is **not mandatory**.

All contact concerning this solicitation shall be made through the Purchasing Department. Bidders shall not contact county employees, department heads, using agencies, evaluation committee members or elected officials with questions or any other concerns about the solicitation. Questions, clarifications and concerns shall be submitted to the Purchasing Department in writing. Failure to comply with these guidelines may disqualify the Bidder's response.

Sincerely,

Britt Rosencutter
Buyer

BR/sa/ch

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I. About this Document

This document is a Request for Proposal. It differs from a Request for Bid or Quotation in that the county is seeking a solution, as described on the cover page and in the following Background Information section, not a bid or quotation meeting firm specifications for the lowest price. As such, the lowest price proposed will not guarantee an award recommendation. As defined in Charter Resolution No. 68, Competitive Sealed Proposals will be evaluated based upon criteria formulated around the most important features of the product(s) and/or service(s), of which quality, testing, references, service, availability, or capability may be overriding factors, and price may not be determinative in the issuance of a contract or award. The proposal evaluation criteria should be viewed as standards that measure how well a vendor's approach meets the desired requirements and needs of the county. Criteria that will be used and considered in evaluation for award are set forth in this document. The county will thoroughly review all proposals received. The county will also utilize its best judgment when determining whether to schedule a pre-proposal conference, before proposals are accepted, or meetings with vendors after receipt of all proposals. A Purchase Order/Contract will be awarded to a qualified vendor submitting the best proposal. **Sedgwick County reserves the right to select, and subsequently recommend for award, the proposed service(s) and/or product(s), which best meets its required needs, quality levels, and budget constraints**.

The nature of this work is for a public entity and will require the expenditure of public funds and/or use of public facilities, therefore the successful proposer will understand that portions (potentially all) of their proposal may become public record at any time after receipt of proposals. Proposal responses, purchase orders, and final contracts are subject to public disclosure after award. All confidential or proprietary information should be clearly denoted in proposal responses and responders should understand this information will be considered prior to release, however no guarantee is made that information will be withheld from public view.

II. Background

Sedgwick County, located in south-central Kansas, is one of the most populous of Kansas' 105 counties with a population estimated at more than 514,000 persons. It is the sixteenth largest in area, with 1,008 square miles, and reportedly has the second highest per capita wealth among Kansas' counties. Organizationally, the county is a Commission/Manager entity, employs nearly 2,500 persons, and hosts or provides a full range of municipal services, e.g.: public safety, public works, criminal justice, recreation, entertainment, cultural, human/social, and education.

III. Project Objectives

Sedgwick County, Kansas (hereinafter referred to as "county") is seeking a firm or firms to provide two (2) 107' Aerial trucks for Sedgwick County Fire District 1 in accordance with the specifications outlined.

IV. Submittals

Carefully review this Request for Proposal. It provides specific technical information necessary to aid participating firms in formulating a thorough response. Should you elect to participate, submit one (1) original **AND** one (1) electronic copy (.PDF/Word supplied on a flash drive) of the entire document with any supplementary materials to:

Britt Rosencutter
Sedgwick County Purchasing Department
525 N. Main, Suite 823
Wichita, KS 67203

SUBMITTALS are due **NO LATER THAN 1:45 pm CDT, TUESDAY, AUGUST 4, 2020**. Responses must be sealed and marked on the lower left-hand corner with the firm name and address, proposal number, and proposal due date. Late or incomplete responses will not be accepted and will not receive consideration for final award.

Proposal responses will be acknowledged and read into record at bid opening which will occur at 2:00 pm CDT, on the due date. No information other than the respondent's name will be disclosed at bid opening.

V. Scope of Work

Proposals taking total exception to specifications shall not be acceptable. Proposers shall submit a detailed proposal. A letter only, even though written on a company letterhead, shall not be sufficient. Proposals shall be submitted in the same sequence as specifications for ease of evaluation, comparison, and checking of compliance. Any exception to these requirements shall not be tolerated.

This document has several headings, which are in bold type and underlined. The headings should be considered a question on how the manufacturer will complete the item or how the manufacturer meets or intends to meet the qualifications set forth.

A. Sedgwick County Fire District 1 will require certain items to be used in the manufacturing of this apparatus. Under certain headings this equipment or method of construction will be noted as a specification. These specifications point out the preferred qualifications on this apparatus. Any exceptions from the preferred qualifications will require an in-depth explanation of the manufacturer's intent and purpose.

B. Any other items or options that the manufacturer deems necessary, relevant or advantageous to this apparatus can be submitted with the proposal. These items should be listed with the price of the proposed item on a separate page(s) under the header "Additional Provisions." The County reserves the right to select one (1), some or none of the options identified.

It shall be the intent of this request for proposal(s) to outline the general intent of favorable provisions for the furnishing and delivery of a complete fire apparatus. These detailed specifications cover the preferred minimum requirements as to the type of construction and test to which the apparatus shall conform, together with certain details as to finish, equipment and appliances with which the successful proposer shall conform. Minor details of construction and materials, which are not otherwise specified, are left to the discretion of the contractor. The manufacturer shall provide loose equipment only when specified by the County. Otherwise, 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.

In order to ensure fair, ethical and legal competition, neither original equipment manufacturer (OEM) or parent company of the OEM shall have ever been fined or convicted of price fixing, bid rigging, or collusion in any domestic or international fire apparatus market (no exception).

Proposals shall only be considered from companies that have an established reputation in the field of fire apparatus construction and have been in business for a minimum of 20 years. Further, proposer shall maintain dedicated service facilities for the repair and service of products. Evidence of such a facility shall be included in the proposal.

Each proposer shall furnish satisfactory evidence of their ability to construct the apparatus specified and shall state the state and location of the factory where the apparatus is to be built. The proposer shall also show that the company is in position to render prompt service and to furnish replacement parts.

Each proposal shall be accompanied by a detailed set of Contractor's Specifications consisting of a detailed description of the apparatus and equipment proposed, and to which the apparatus furnished under contract shall conform. These specifications shall indicate size, type, model and make of all component parts and equipment.

Proposers shall also indicate in the "Yes/No" column if their proposal complies on each item (paragraph) specified. Exceptions shall be allowed if they are equal to or superior to that specified and provided they are listed and fully explained on a separate page.

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

	Description	Bidder Complies	
		Yes	No

SPECIFICATIONS FOR A MINIMUM 107' HEAVY DUTY AERIAL LADDER

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.

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 complete and submitted with the bid. **Omissions and variations shall result in immediate rejection of 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 ensure fair, ethical, and legal competition, neither the OEM nor parent company of the OEM. 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 brands of apparatus, they must only bid the top of the line that meets specification.

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

Any apparatus manufacturer or their parent company who has had a performance bond called in the last 10 years, shall not be eligible to bid. Any bids from these manufactures shall be immediately rejected (no exception).

Each bid shall be accompanied by a set of 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 size, type, model and make of all components parts and equipment, providing proof of compliance with each and every item in the departments advertised specifications. A letter only, even though written on 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 photo copies and submits these specifications as their own construction details will be considered non responsive. This shall render such proposal ineligible for award.

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

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 rejected (no exception).

Bids not including all exceptions is 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 on 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 due consideration to distribution of load between the front and rear axles. Weight balance and distribution shall be in accordance with the recommendations of the National Fire Protection Association.

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 ensure 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.		
1.	**MANUALS AND SERVICE INFORMATION**		
	The manufacturer shall supply at time of delivery, complete operation, and maintenance manuals covering the completed apparatus as delivered. A permanent plate shall be mounted in the driver's compartment which specifies the quantity and type of fluids required, including engine oil, engine coolant, transmission, pump transmission lubrication, pump primer and drive axle.		
2.	**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.		
3.	**PERFORMANCE TESTS AND REQUIREMENTS** A road test shall be conducted with the apparatus fully loaded and a continuous run of ten (10) miles or more shall be made under all driving conditions, during which time the apparatus shall show no loss of power or overheating. The transmission drive shaft or shafts, and rear axles shall run quietly and be free from abnormal vibration or noise throughout the operating range of the apparatus. Vehicle shall adhere to the following parameters:		
A	The apparatus, when fully equipped and loaded, shall have not less than 25% nor more than 50% of the weight on the front axle, and not less than 50% nor more than 75% on the rear axle.		

B	The apparatus shall be capable of accelerating to 35 mph from a standing start within 25 seconds on a level concrete highway without exceeding the maximum governed rpm of the engine.		
C	The service brakes shall be capable of stopping a fully loaded vehicle in 35 feet at 20 mph on a level concrete highway. The air brake system shall conform to Federal Motor Vehicle Safety Standards (FMVSS) 121.		
D	The apparatus, fully loaded, shall be capable of obtaining a speed of 50 mph on a level concrete highway with the engine not exceeding its governed rpm (full load).		
4.	**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 proposer 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 proposer 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.		
5.	**SERVICE AND WARRANTY SUPPORT (DEALERSHIP)** TO ENSURE 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 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 within three hundred fifty (350) miles of the Fire Department.		
6.	**SERVICE AND WARRANTY SUPPORT (MANUFACTURER)** To provide an additional layer of service support, the successful manufacturer must also own a 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 $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 a staff of adequate size (a minimum of 30 personnel) 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.		
7.	**LIABILITY** The successful proposer 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.		
8.	**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 operator 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.		
9.	**EXCEPTIONS** All exceptions shall be stated no matter how seemingly minor. Any exceptions not taken shall be assumed by the purchaser to be included in the proposal, regardless of the cost to the bidder.		
10.	**NFPA 2016 STANDARDS**		
A	This unit shall comply with the NFPA standards effective January 1, 2016, except for fire department directed exceptions. These exceptions shall be set forth in the Statement of Exceptions.		
B	Certification of slip resistance of all stepping, standing and walking surfaces must be supplied with delivery of the apparatus.		
C	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.		

D	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.		
E	The manufacturer shall have programs in place for training, proficiency testing and performance for any staff involved with certifications.		
F	An official of the company shall designate, in writing, who is qualified to witness and certify test results.		
11.	**NFPA COMPLIANCE**		
	Apparatus proposed by the bidder shall meet the applicable requirements of the National Fire Protection Association (NFPA) as stated in the 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."		
12.	**VEHICLE INSPECTION PROGRAM CERTIFICATION** To assure the vehicle is built to current NFPA 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 of NFPA 1901. The certification includes: all design, production, operational, and performance testing of not only the apparatus, but those components that are installed on the apparatus.		
A	**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.**		
13.	**INSPECTION CERTIFICATE** A third party inspection certificate for the aerial device shall be furnished upon delivery of the aerial device. The certificate shall indicate that the aerial device has been inspected on the production line and after final assembly.		
A	Visual structural inspections shall be performed on all welds on both aluminum and steel ladders.		
B	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 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.		
14.	**PUMP TEST** The rated water pump shall be tested, approved, and certified by an ISO certified independent third party testing agency at the manufacturer's expense. The test results, along with 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.		

15.	**GENERATOR TEST** If the unit has a generator, the generator shall be tested, approved, and certified at the manufacturer's expense. The test results shall be provided to the Fire Department at the time of delivery.		
16.	**BREATHING AIR TEST** If the unit has breathing air, an air sample shall be drawn from the air system to certify that the air quality meets the requirements of NFPA 1989, *Standard on Breathing Air Quality for Fire and Emergency Services Respiratory Protection.*		
17.	**TRAINING** Training from a factory-certified trainer will be provided on each unit for a maximum of 24 hours (three 8 hour shifts). There will also be a factory trainer on aerial devices. This training can take place on the consecutive days you choose. For volunteer departments, this training can be provided on weekend schedules. Additional training will be provided at the manufacturer's location for electrical, independent front suspension and aerial by factory experts in each area. Transportation, meals, lodging will be provided. All travel will be by air.		
18.	**WEEKLY PHOTO REPORTS** There will be provided with this order a weekly construction photo report via e-mail of the unit(s). This will be a detailed report showing all aspects of the build of the unit(s).		
19.	**SERVICE** The proposer has service centers within the State of bidding and also has mobile service to the department location. These services will cover the state of Kansas. SCFD will be provided with phone numbers, contact persons, and an emergency 24/7 number from the dealership. You can also contact your sales person in emergencies. SCFD will also be provided with a 24/7 phone number to customer service from the factory level as well.		
20.	**INSPECTION TRIP(S)** The bidder shall provide three (3) factory inspection trip(s) for three customer representative(s). The inspection trip(s) shall be scheduled at times mutually agreed upon between the manufacturer's representative and the customer. All costs such as travel, lodging and meals shall be the responsibility of the bidder.		
21.	**AFTERMARKET SUPPORT WEBSITE** A Customer Service website shall provide authorized dealers access to comprehensive information pertaining to the maintenance and service of their customer's apparatus. This tool shall provide the authorized dealer the ability to service and support their customers to the best of their ability with factory support at their fingertips. This website shall also be accessible to the end user through the guest login. Limited access is available and vehicle specific parts information accessible by entering a specific VIN number. All end users should see their local authorized dealer for additional support and service. The website shall provide the following to the designated individuals: - Authorized dealer only: ability to access truck detail information on the major components of the vehicle, warranty information, available vehicle photographs, vehicle drawings, sales options, applicable vehicle software downloads, etc. - Authorized dealer and customer: parts look-up capability, with the aid of digital photographs, part drawings, and assembly drawings. - Authorized dealer only: ability to electronically submit warranty claims directly to the factory for reimbursement. - Authorized dealer only: accessibility to multiple dealer reports that allow the dealership to maintain communication with the customer on the status of orders, claims, and phone contacts.		

	- Authorized dealer and customer: access to all currently published Operation and Maintenance and Service publications. - Authorized dealer only: access to manufacturer Service Bulletins and Work Instructions containing information on current service topics and recommendations provided. - Authorized dealer and customer: access to upcoming training classes offered by the manufacturer. - Authorized dealer only: access to interactive electronic learning modules (Operators Guides) covering the operation of major vehicle components. - Authorized dealer only: access to customer service articles, corporate news, quarterly newsletters, and key contacts.		
22.	**BID BOND** All bidders shall provide a bid bond as security for the bid in the form of a 10% bid bond to accompany their bid. This bid bond shall be issued by a Surety Company who is listed on the U.S. Treasury Departments list of acceptable sureties as published in Department Circular 570. The bid bond shall be issued by an authorized representative of the Surety Company and shall be accompanied by a certified power of attorney dated on or before the date of bid. The bid bond shall include language, which assures that the bidder/principal shall give a bond or bonds as may be specified in the bidding or contract documents, with good and sufficient surety for the faithful performance of the contract, including the Basic One (1) Year Limited Warranty, and for the prompt payment of labor and material furnished in the prosecution of the contract. Proposals received from bidders who do not manufacture the chassis shall provide a warranty that shall be issued jointly and severally by, and signed by, both the bidder and the chassis manufacturer. If the successful bidder does not manufacture the chassis, the bidder shall supply a warranty bond, in addition to their performance bond, along with their signed contract. This warranty bond shall guarantee all terms and conditions of the Basic One (1) Year Limited Warranty and names both the bidder and chassis manufacturer as co-principals. This warranty bond shall be issued for the contract amount and shall remain in force for a term which is consistent with the term of the Basic One (1) Year Limited Warranty. Notwithstanding any document or assertion to the contrary, any surety bond related to the sale of a vehicle shall apply only to the Basic One (1) Year Limited Warranty for such vehicle. Any surety bond related to the sale of a vehicle shall not apply to any other warranties that are included within this bid (OEM or otherwise) or to the warranties (if any) of any third party of any part, component, attachment or accessory that is incorporated into or attached to the vehicle. In the event of any contradiction or inconsistency between this provision and any other document or assertion, this provision shall prevail.		
23.	**PERFORMANCE BOND** Notwithstanding any document or assertion to the contrary, any surety bond related to the sale of a vehicle shall apply only to the Basic One (1) Year Limited Warranty for such vehicle. Any surety bond related to the sale of a vehicle shall not apply to any other warranties that are included within this bid (OEM or otherwise) or to the warranties (if any) of any third party of any part, component, attachment or accessory that is incorporated into or attached to the vehicle. In the event of any contradiction or inconsistency between this provision and any other document or assertion, this provision shall prevail.		

24.	**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.		
25.	**ELECTRICAL WIRING DIAGRAMS** Two (2) electrical wiring diagrams, prepared for the body as it interfaces with the commercial chassis, shall be provided.		
26.	**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.		
27.	**MAXIMUM OVERALL HEIGHT** The maximum overall height of the apparatus shall be approximately11' 9".		
28.	**MAXIMUM OVERALL LENGTH** The maximum overall length of the apparatus shall be approximately 39' 11".		
29.	**WHEELBASE** The wheelbase of the vehicle shall be approximately 233.50".		
30.	**GVW RATING** The gross vehicle weight rating shall be approximately 57,500 lbs.		
31.	**FRAME**		
A	The chassis frame shall be built with two (2) steel channels bolted to five (5) cross members or more, depending on other options of the apparatus.		
B	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.		
C	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 an rbm of 2,275,200 in-lb. over the rear axle.		
D	The frame rails shall be constructed of 120,000 psi yield strength heat-treated 0.38" thick steel with 3.50" wide flanges.		
32.	**FRAME REINFORCEMENT** In addition, a full-length mainframe internal "C" liner shall be provided. The liner shall be an internal "C" design that steps to a smaller internal "C" design over the rear axle. It shall be heat-treated steel measuring 12.50" x 3.00" x 0.25" through the front "C" portion of the liner, stepping to 9.38" x 3.00" x 0.25" through the rear "C" 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 857,462 in-lb. Total rbm at wheelbase center shall be 4,391,869 in-lb. The frame liner shall be mounted inside of the chassis frame rail and extend the full length of the frame.		
33.	**FRONT NON-DRIVE AXLE** The front axle shall be designed with a ground rating of 24,000 lb. The turning angle shall be minimum 45 degrees.		
34.	**FRONT SUSPENSION** Front suspension shall be provided with a minimum ground rating of 24,000 lb.		
35.	**FRONT SHOCK ABSORBERS** Heavy-duty telescoping shock absorbers shall be provided on the front suspension.		

36.	**FRONT OIL SEALS** Oil seals with viewing window shall be provided on the front axle.		
37.	**FRONT TIRES**		
A	Front tires shall be 445/65R22.50, 20 ply tread, rated for 24,600 lb. maximum axle load and 75 mph maximum speed.		
B	The tires shall be mounted on 22.50" x 13.00" polished aluminum disc type wheels with a ten (10) stud, 11.25" bolt circle.		
38.	**REAR AXLE(s)** The rear axle(s) shall have a capacity of approximately 33,500 lb.		
39.	**TOP SPEED OF VEHICLE**		
A	NFPA 1901, 2009 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.		
B	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.		
C	**A rear axle ratio shall be furnished to allow the vehicle to reach an approximate top speed of 75 MPH.**		
40.	**REAR SUSPENSION**		
A	The rear suspension shall be designed to handle the total weight supported by the apparatus and be of a semi-elliptical leaf spring design. The spring hangers shall be castings.		
B	The two (2) top leaves shall wrap the forward spring hanger pin, and the rear of the spring shall be a slipper style end that shall ride in a rear slipper hanger. To reduce bending stress due to acceleration and braking, the front eye shall be a berlin eye that shall place the front spring pin in the horizontal plane within the main leaf.		
C	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.		
41.	**REAR OIL SEALS** Oil seals shall be provided on the rear axle.		
42.	**REAR TIRES** Rear tires shall be four (4) 315/80R22.50 radials, load range L, all-position, rated for 35,396 lb maximum axle load and 75 mph maximum speed. The tires shall be mounted on 22.50" x 9.00" polished aluminum disc wheels with a ten (10) stud 11.25" bolt circle.		
43.	**TIRE BALANCE** All tires shall be balanced with balancing beads. The beads shall be inserted into the tire and eliminate the need for wheel weights.		
44.	**TIRE PRESSURE MANAGEMENT**		
A	There shall be a LED tire alert pressure management system provided, that shall monitor each tire's pressure. A sensor shall be provided on the valve stem of each tire for a total of six (6) tires.		

B	The sensor shall calibrate to 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.		
C	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.		
45.	**FRONT HUB COVERS** Stainless steel hub covers shall be provided on the front axle. An oil level viewing window shall be provided.		
46.	**REAR HUB COVERS** A pair of stainless steel high hat hub covers shall be provided on rear axle hubs.		
47.	**CHROME LUG NUT COVERS** Chrome lug nut covers shall be supplied on front and rear wheels.		
48.	**MUD FLAPS** Mud flaps shall be installed behind the front and rear wheels of the apparatus.		
49.	**WHEEL CHOCKS**		
A	There shall be one (1) pair of Zico wheel chocks provided.		
B	Heavy Duty, large molded aluminum wheel chock with solid bottom, yellow powder coat finish.		
50.	**WHEEL CHOCK BRACKETS** There shall be one (1) pair of mounting wheel chock brackets provided. The brackets shall be mounted behind left rear wheels.		
51.	**ELECTRONIC STABILITY CONTROL** A vehicle control system shall be provided as an integral part of the ABS brake system from		
A	Meritor Wabco.		
B	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.		
C	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.		
52.	**ANTI-LOCK BRAKE SYSTEM** The vehicle shall be equipped with a Wabco anti-lock braking system (ABS). The ABS shall provide a four (4) channel anti-lock braking control on both the front and rear wheels. A digitally controlled system that utilizes microprocessor technology shall control the anti-lock braking system. Each wheel shall be monitored by the system. 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		

53.	**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. A "mud/snow" switch shall be provided on the instrument panel. Activation of the switch shall allow additional tire slip to let the truck climb out and get on top of deep snow or mud.		
54.	**BRAKES**		
A	The service brake system shall be full air type. The front brakes shall be 17.00" disc type.		
B	The rear brakes shall be 16.50" x 8.63" cam operated with automatic slack adjusters. Dust shields cannot be provided.		
55.	**BRAKE SYSTEM AIR COMPRESSOR** The air compressor shall have 18.7 cubic feet per minute output.		
56.	**BRAKE SYSTEM**		
A	The brake system shall include:		
	• Dual brake treadle valve		
	• Heated automatic moisture ejector on air dryer		
	• Total air system capacity of 5,198 cubic inches		
	• Two (2) air pressure gauges with a red warning light and an audible alarm 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, 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 valve on each air tank		
B	The air tank shall be primed and painted to meet a minimum 750 hour salt spray test.		
C	To reduce the effects of corrosion, the air tank shall be mounted with stainless steel brackets (no exceptions).		
57.	**BRAKE SYSTEM AIR DRYER** The Meritor Wabco System Saver 1200 air dryer shall be properly sized for the brake system with spin-on coalescing filter cartridge and 100 watt heater.		
58.	**BRAKE LINES** Color-coded nylon brake lines shall be provided. The lines shall be wrapped in a heat protective loom where necessary in the chassis.		

59.	**AIR INLET/OUTLET**		
A	One (1) air inlet/outlet shall be installed with the female coupling located on the driver side pump panel. This system shall tie into the "wet" tank of the brake system and include a check valve in the inlet line and an 85 psi pressure protection valve in the outlet line. The air outlet shall be controlled by a needle valve.		
B	A matching male fitting shall be provided with the loose equipment.		
C	The air inlet shall allow a shoreline air hose to be connected to the vehicle. This shall allow station air to be supplied to the brake system of the vehicle to ensure constant air pressure.		
60.	**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.		
61.	**ENGINE**		
A	The chassis shall be powered by an electronically controlled engine as described below:		
	• Power: 505 hp at 1800 rpm		
	• Torque: 1850 lb.- ft. at 1200 rpm		
	• Governed Speed: 2200 rpm		
	• Emissions Level: EPA 2017		
	• Fuel: Diesel		
	• Cylinders: Six (6)		
	• Displacement: 912 cubic inches (14.9L)		
	• Starter: Heavy duty		
	• Frame mounted spin-on style primary filter with water separator and water-in-fuel sensor. Engine mounted secondary spin-on style filter.		
	• Coolant Filter: Spin-on style with shut off valves on the supply and return line		
B	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.		
62.	**HIGH IDLE**		
A	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.		
B	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."		
63.	**ENGINE BRAKE**		
A	An engine brake is to be installed with the controls located on the instrument panel within easy reach of the driver.		
B	The driver shall be able to turn the engine brake system on/off and have a high, medium and low setting.		
C	The engine brake shall activate when the system is on and the throttle is released.		
D	The high setting of the brake application shall activate and work simultaneously with the variable geometry turbo (VGT) provided on the engine.		
E	The engine brake shall be installed in such a manner that when the engine brake is slowing the vehicle the brake lights are activated.		

F	The ABS system shall automatically disengage the auxiliary braking device, when required.		
64.	**CLUTCH FAN** A fan clutch shall be provided. The fan clutch shall be automatic when the pump transmission is in "Road" position, and fully engaged in "Pump" position.		
65.	**ENGINE AIR INTAKE**		
A	An air intake with an ember separator (to prevent road dirt, burning embers, and recirculating hot air from entering the engine) shall be mounted at the front of the apparatus, on the passenger side of the engine.		
B	The ember separator shall be mounted in the air intake with flame retardant, roto-molded polyethylene housing. It shall be easily accessible by the hinged access panel at the front of the vehicle.		
66.	**EXHAUST SYSTEM** The exhaust system shall include an after treatment device to meet current EPA standards. The exhaust system shall be stainless steel from the turbo to the inlet of the after treatment device, and shall be 5.00" in diameter. An insulation wrap shall be provided on all exhaust pipes between the turbo and after treatment device to minimize the heat loss to the after treatment 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.		
67.	**RADIATOR**		
A	The radiator and the complete cooling system shall meet or exceed NFPA and engine manufacturer cooling system standards.		
B	For maximum corrosion resistance and cooling performance, the entire radiator core shall be constructed using long life aluminum alloy. The core shall be made of aluminum fins, having a serpentine design, brazed to aluminum tubes. The tubes shall be brazed to aluminum headers. No solder joints or leaded material of any kind shall be acceptable in the core assembly. The radiator core shall have a minimum frontal area of 1434 square inches. Supply tank made of glass-reinforced nylon and a return tank of cast aluminum alloy shall be crimped on to the core assembly using header tabs and a compression gasket to complete the radiator core assembly. The radiator shall be compatible with commercial antifreeze solutions.		
C	There shall be a full steel frame around the entire radiator core assembly. The radiator core assembly shall be isolated within the steel frame by rubber inserts to enhance cooling system durability and reliability. The radiator shall be mounted in such a manner as to prevent the development of leaks caused by twisting or straining when the apparatus operates over uneven ground. The radiator assembly shall be isolated from the chassis frame rails with rubber isolators.		
D	The radiator assembly shall include an integral de-aeration tank permanently mounted to the top of the radiator framework, with a readily accessible remote-mounted overflow tank. For visual coolant level inspection, the radiator shall have a built-in sight glass. The radiator shall be equipped with a 15 psi pressure relief cap.		
E	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.		
F	A heavy-duty fan shall draw in fresh, cool air through the radiator. Shields or baffles shall be provided to prevent recirculation of hot air to the inlet side of the radiator.		
68.	**COOLANT LINES**		
A	Silicone hoses shall be used for all engine/heater coolant lines installed by the chassis manufacturer.		
B	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.		

69.	**FUEL TANK**		
A	A 65 gallon (minimum) fuel tank shall be provided and mounted at the rear of the chassis. The tank shall be constructed of 12-gauge, hot rolled steel. 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).		
B	A 0.75" drain plug shall be provided in a low point of the tank for drainage.		
C	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."		
D	A 0.50" diameter vent shall be provided running from top of tank to just below fuel fill inlet.		
E	The tank shall meet all FHWA 393.67 requirements including a fill capacity of 95 % of tank volume.		
F.	All fuel lines shall be provided as recommended by the engine manufacturer.		
70.	**DIESEL EXHAUST FLUID TANK**		
A	A 4.5 gallon (minimum) diesel exhaust fluid (DEF) tank shall be provided and mounted in the driver's side body forward of the rear axle.		
B	A 0.50" drain plug shall be provided in a low point of the tank for drainage.		
C	A fill inlet shall be located on the driver's side of the body and be covered with a hinged, spring loaded, brushed stainless steel door that is marked "Diesel Exhaust Fluid Only".		
D	The tank shall meet the engine manufacturer's requirement for 10 % expansion space in the event of tank freezing.		
E	The tank shall include an integrated heater unit that utilizes engine coolant to thaw the DEF in the event of freezing.		
71.	**FUEL SHUTOFF** A fuel line shutoff valve shall be installed on both the inlet and outlet of the primary fuel filter.		
72.	**FUEL COOLER** An air to fuel cooler shall be installed in the engine fuel return line.		
73.	**TRANSMISSION**		
A	An electronic torque converting automatic transmission shall be provided.		
B	The transmission shall be equipped with prognostics to monitor oil life, filter life, and transmission health. An icon on the shift selector's digital display shall indicate when service is due.		
C	Two (2) PTO openings shall be located on left side and top of converter housing (positions 8 o'clock and 1 o'clock).		
D	A transmission temperature gauge with red light and buzzer shall be installed on the cab instrument panel.		
74.	**TRANSMISSION SHIFTER**		
A	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.		
B	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		

75.	**TRANSMISSION COOLER** A plate and fin transmission oil cooler shall be provided using engine coolant to control the transmission oil temperature.		
76.	**DOWNSHIFT MODE (w/engine brake)** The transmission shall be provided with an aggressive downshift mode. This shall provide earlier transmission downshifts to 2nd gear from 6th gear, resulting in improved engine braking performance.		
77.	**DRIVELINE**		
A	Drivelines shall be a heavy-duty metal tube and be equipped with universal joints.		
B	The shafts shall be dynamically balanced before installation.		
C	A splined slip joint shall be provided in each driveshaft.		
78.	**STEERING**		
A	Dual steering gears, with integral heavy-duty power steering, shall be provided. For reduced system temperatures, the power steering shall incorporate an air to oil cooler and a hydraulic pump with integral pressure and flow control. All power steering lines shall have wire braded lines with crimped fittings. Steering will have a minimum 45 degree cramp angle and turning radius of approximately 35' curb to curb.		
B	A tilt and telescopic steering column shall be provided to improve fit for a broader range of driver configurations.		
79.	**STEERING WHEEL** The steering wheel shall be 18.00" in diameter, have tilting and telescoping capabilities, and a 4-spoke design		
80.	**LOGO AND CUSTOMER DESIGNATION ON DASH** The dash panel shall have an emblem containing the fire apparatus manufacturer's logo and customer name. The emblem shall have three (3) rows of text for the customer's department name. There shall be a maximum of eight (8) characters in the first row, eleven (11) characters in the second row and eleven (11) characters in the third row. • The first row of text shall be: blank • The second row of text shall be: SCFD #1 The third row of text shall be: blank		
81.	**BUMPER**		
A	A one (1) piece bumper manufactured from 0.25" formed steel with a 0.38" bend radius shall be provided. The bumper shall be a minimum of 10.00" high with a 1.50" top and bottom flange, and shall extend 19.00 " from the face of the cab. The bumper shall be 102.00" wide with 45 degree corners and side plates. The bumper shall be metal finished and painted job color.		
B	To provide adequate support strength, the bumper shall be mounted directly to the front of the C channel frame. The frame shall be a bolted modular extension frame constructed of 50,000 psi tensile steel.		
82.	**GRAVEL PAN**		
A	A gravel pan, constructed of bright aluminum treadplate, shall be furnished between the bumper and the cab face. The pan shall be properly supported from the underside to prevent flexing and vibration.		
B	Documentation shall be provided, upon request, to show that the options selected have been engineered for fit-up and approval for this modular bumper extension. A chart shall be provided to indicate the option locations and shall include, but not be limited to, the following options: air horns, mechanical sirens, speakers, hose trays (with hose capacities), winches, lights, discharge, and suction connections.		
83.	**CENTER HOSE TRAY**		
A	A hose tray, constructed of aluminum, shall be placed in the center of the bumper extension.		

B	The tray shall have a capacity of 150' of 1.50" double jacket cotton-polyester hose.		
C	Black rubber grating shall be provided at the bottom of the tray. Drain holes shall be provided.		
84.	**CENTER HOSE TRAY COVER**		
A	A bright aluminum treadplate cover shall be provided over the center hose tray.		
B	The cover shall be "notched" allowing the hose to be pre-connected to hose connection.		
C	The cover shall be attached with a stainless steel hinge.		
D	A D-ring latch shall secure the cover in the closed position and a no stay arm device shall hold the cover in the open position.		
85.	**LIFT AND TOW MOUNTS**		
A	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.		
B	The lift and tow mounts with eyes shall be painted the same color as the frame.		
86.	**TOW HOOKS** Two (2) chromed steel tow hooks shall be installed under the bumper and attached to the front frame members. The tow hooks shall be designed and positioned to allow up to a 6,000 lb. straight horizontal pull in line with the centerline of the vehicle. The tow hooks shall not be used for lifting of the apparatus.		
87.	**FRONT BUMPER COATING**		
A	Protective black abrasive resistant coating shall be provided on the outside exterior of the top front bumper flange. It shall not be sprayed on the underside of the flange.		
B	The lining shall be properly installed by an authorized dealer.		
88.	**CAB**		
A	The cab shall be designed specifically for the fire service and shall be manufactured by the chassis builder.		
B	To provide quality at the source and single source customer support, the cab shall be built by the apparatus manufacturer in a facility located on the manufacturer's premises (no exception).		
C	For reasons of structural integrity and enhanced occupant protection, the cab shall be of heavy duty design, constructed to the following minimal standards.		
D	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 0.25" heavy wall extrusions joined by a solid A356-T6 aluminum joint casting. The B-pillar and C-pillar shall also be constructed from 0.25" heavy wall extrusions. The rear wall shall be constructed of two (2) 4.00" x 2.00" outer aluminum extrusions and two (2) 3.00" x 2.00" inner aluminum extrusions. All main vertical structural members shall run from the floor to 7.50" x 3.50" x 0.125" thick roof extrusions to provide a cage-like structure with the A-pillar and roof extrusions being welded into a 0.75" thick corner casting at each of the front corners of the roof assembly.		
E	The front of the cab shall be constructed of a 0.25" thick firewall, covered with a 0.125" front skin (for a total thickness of 0.38"), and reinforced with 24.50" wide x 10.00" deep x 0.50" thick supports on each side of the engine tunnel. The cross-cab support shall be welded to the A-pillar, 0.25" firewall, and engine tunnel, on the left and right sides.		
F	The cab floors shall be constructed of 0.1875" thick aluminum plate and reinforced at the firewall with an additional 0.25" thick cross-floor support providing a total thickness of 0.44" of structural material at the front floor area. The front floor area shall also be supported with three (3) 0.50" plates bolted together that also provides the mounting point for the cab lift. This tubing shall run from the front of the cab to the 0.1875" thick engine tunnel, creating the structure to support the forces created when lifting the cab.		

G	The cab shall be a full-tilt style. A 3-point cab mount system with rubber isolators shall improve ride quality by isolating chassis vibrations from the cab.		
H	The crew cab shall be a totally enclosed design with the interior area completely open to improve visibility and verbal communication between the occupants.		
I	The forward cab section shall have an overall height (from the cab roof to the ground) of approximately 102.00". The crew cab section shall have a 10.00" raised roof, with an overall cab height of approximately 112.00". The raised portion shall start at the most forward point of the B-pillar and continue rearward to the back of the cab. The overall height listed shall be calculated based on a truck configuration with the lowest suspension weight ratings, the smallest diameter tires for the suspension, no water weight, no loose equipment weight, and no personnel weight. Larger tires, wheels, and suspension shall increase the overall height listed.		
J	The raised roof section of the crew cab shall have a 58.00" wide x 10.00" high square notch in the center section of the roof. This shall allow the aerial device to be bedded in the same location as a non-raised roof.		
K	The cab shall have an interior width of not less than 93.50". The driver and passenger seating positions shall have a minimum 24.00" clear width at knee level.		
L	To reduce injuries to occupants in the seated positions, proper head clearance shall be provided. The floor-to-ceiling height inside the forward cab shall be no less than 60.25". The floor-to-ceiling height inside the crew cab shall be no less than 52.95" in the center position and 68.75" in the outboard positions.		
M	The crew cab shall measure a minimum of 57.50" from the rear wall to the backside of the engine tunnel (knee level) for optimal occupant legroom.		
89.	**INTERIOR CAB INSULATION** The cab walls, ceiling and engine tunnel shall be insulated in all strategic locations to maximize acoustic absorption and thermal insulation. The cab shall be insulated with 2.00" insulation in the rear wall, 3.00" insulation in the side walls, and 1.50" insulation in the ceiling		
90.	**FENDER LINERS** Full-circular, aluminum inner-fender liners in the wheel wells shall be provided.		
91.	**WINDSHIELD** A one or two piece safety glass windshield(s) with more than 2,600 square inches of clear viewing area shall be provided. The windshield shall be full width and shall provide the occupants with a panoramic view. The windshield shall consist of three (3) layers: the outer light, the middle safety laminate, and the inner light. The thick 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. A custom frit pattern shall be applied on the outside perimeter of the windshield for a finished automotive appearance.		
92.	**WINDSHIELD WIPERS**		
A	Two (2) minimum electric windshield wipers with a washer(s), in conformance with FMVSS and SAE requirements, shall be provided. The wiper blades shall be approximately 21" long and together shall clear the windshield for maximum visibility in inclement weather.		
B	The windshield washer fluid reservoir shall be located at the front of the vehicle and be accessible for simple maintenance.		

93.	**FAST SERVICE ACCESS FRONT TILT HOOD**		
A	A full-width access hood shall be provided for convenient access to engine coolant, steering fluid, wiper fluid, cab lift controls, headlight power modules, and ember separator. The hood shall also provide complete access to the windshield wiper motor and components. The hood shall be contoured to provide a sleek, automotive appearance. The hood shall be constructed of two (2) fiberglass panels bonded together and shall include reinforcing ribs for structural integrity. The hood shall include air cylinders to hold the hood in open and closed positions, and a heavy duty latch system that shall meet FMVSS 113 (Hood Latch System). The spring-loaded hood latch shall be located at the center of the hood with a double-action release lever located behind the upper grille.		
B	The two (2)-step release requires the lever first be pulled to the driver side until the hood releases from the first latch (primary latch) then to the passenger side to fully release the hood (secondary latch).		
94.	**ENGINE TUNNEL**		
A	To provide structural strength, the engine tunnel sidewalls shall be constructed of 0.50" aluminum plate that is welded to both the 0.25" firewall and 0.38" heavy wall extrusion under the crew cab floor. To maximize occupant space, the top edges shall be tapered.		
B	The engine tunnel shall be insulated on both sides for thermal and acoustic absorption. The underside of the tunnel shall be covered with 1.00" thick polyether foam that is reinforced with an aluminized face. Thermal rating for this insulation shall be -40 degrees Fahrenheit to 300 degrees Fahrenheit. The insulation shall keep noise (db) levels at or lower than the specifications in the current edition of the NFPA 1901 standards.		
95.	**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.		
96.	**CAB LIFT**		
A	A hydraulic cab lift system shall be provided, consisting of an electric-powered hydraulic pump, fluid reservoir, dual lift cylinders, remote cab lift controls and all necessary hoses and valves. The hydraulic pump shall have a backup manual override, for use in the event of an electrical failure.		
B	The cab lift controls shall be located at the driver side front of the cab, easily accessible under the full width front access hood. The controls shall include a permanently mounted raise/lower switch. For enhanced visibility during cab tilt operations, a remote control tether with on/off switch shall be supplied on a coiled cord that shall extend from 2.00' (coiled) to 6.00' (extended).		
C	The cab shall be capable of tilting 42 degrees and 80 degrees with crane assist to accommodate engine maintenance and removal. The cab pivots shall be located 46.00" apart to provide stability while tilting the cab.		
D	The rear of the cab shall be locked down by a two (2)-point, automatic, hydraulic, double hook mechanism that fully engages after the cab has been lowered (self-locking). The dual 2.25" diameter hydraulic cylinders shall be equipped with a velocity fuse that protects the cab from accidentally descending when the cab is in the tilt position.		
E	For increased safety, a redundant mechanical stay arm shall be provided that must be manually put in place on the driver side between the chassis and cab frame when cab is in the raised position. This device shall be manually stowed to its original position before the cab can be lowered.		
97.	**CAB LIFT INTERLOCK** The cab lift safety 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.		

98.	**GRILLE** A bright finished aluminum mesh grille screen, inserted behind a formed bright finished grille surround, shall be provided on the front center of the cab, and shall serve as an air intake to the radiator.		
99.	**DOOR JAMB SCUFFPLATES** All cab door jambs shall be furnished with a polished stainless steel scuffplate, mounted on the striker side of the jamb.		
100.	**FRONT CAB TRIM**		
A	A band of 22 gauge polished stainless steel trim shall be installed across the front of the cab, from door hinge to door hinge. The trim band shall be centered on the head lights and applied with two (2)-sided tape. A 0.625" self-adhesive trim strip shall be applied around the perimeter of the trim band.		
B	There shall be polished stainless steel corner covers provided over the painted cab corner where the cab turn signals are located.		
101.	**SIDE OF CAB MOLDING** Chrome molding shall be provided on both sides of cab.		
102.	**MIRRORS** A 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.		
103.	**CAB DOORS**		
A	To enhance entry and egress to the cab, the forward cab doors shall be a minimum of 43.59" wide x 76.46" 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 doors shall measure approximately 38" wide x 85" high.		
B	The forward cab and crew cab doors shall be constructed of extruded aluminum with a nominal material thickness of 0.125".		
C	The forward cab door windows shall include a 7.50" high x 10.00" wide drop area at the front to enhance visibility.		
D	A customized, vertical, pull-down type door handle shall be provided on the exterior of each cab door. 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. 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.		
E	The cab doors shall be provided with both interior (rotary knob) and exterior (keyed) locks exceeding FMVSS standards. 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.		
F	A 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.		
G	A chrome grab handle shall be provided on the inside of each cab and crew cab door.		
H	A red webbed grab handle shall be installed on the crew cab door stop strap. The grab handles shall be securely mounted.		
I	The cab steps at each cab door location shall be located inside the cab doors to protect the steps from weather elements.		
104.	**CAB DOOR PANELS** The inner cab door panels shall be constructed out of brushed stainless steel. The cab door panels shall be removable.		

105.	**RECESSED POCKET WITH ELASTIC COVER** To provide organized storage (clutter control) in the cab for miscellaneous equipment, the cab interior shall be provided with recessed storage pockets. The pockets shall be 5.63" wide x 2.00" high x 4.00" deep. The pockets shall be provided with a perforated elastic material cover to secure the equipment in the pocket. The pockets shall be installed in all available mounting locations of the overhead console.		
106.	**ELECTRIC WINDOW CONTROLS**		
A	Each cab entry door shall be equipped with an electrically-operated tempered glass window. A window control panel shall be located on the door panel within easy reach of the respective occupant. Each switch shall allow intermittent or auto down operation for ease of use. Auto down operation shall be actuated by holding the window down switch for approximately 1 second. The driver control panel shall contain a control switch for each cab door's window. All other door control panels shall contain a single switch to operate the window within that door.		
B	The window switches shall be connected directly to the battery power. This allows the windows to be raised and lowered when the battery switch is in the off position.		
107.	**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 31.00" wide, and the crew cab steps shall be 24.25" wide with an 8.00" minimum depth. The inside cab steps shall not exceed 18.00" in height and be limited to two (2) steps. Three (3) step entrance designs shall not be acceptable due to safety concerns. A slip-resistant handrail shall be provided adjacent to each cab door opening to assist during cab ingress and egress.		
108.	**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.		
109.	**STIRRUP STEPS**		
A	A stirrup step shall be provided below each cab and crew cab door. The steps shall be designed with a grip pattern punched into bright aluminum treadplate material providing support, slip resistance, and drainage. The steps shall be a bolt-on design and provide an 18.50" wide x 5.00" deep stepping surface. Each step shall provide a step height of 8.25" from the top of the stirrup step to the first step of the cab.		
B	The stirrup step shall be lit by a white 12 volt DC LED light provided on the step.		
C	The step light shall be activated automatically when the battery switch is on and the exit doors are opened or by the same means as the body step lights.		
110.	**STEP LIGHTS**		
A	For reduced overall maintenance costs compared to incandescent lighting, there shall be four (4) white LED step lights provided. The lights shall be installed at each cab and crew cab door, one (1) per step. The lights shall be located in the driver side front doorstep, driver side crew cab doorstep, passenger side front doorstep and passenger side crew cab doorstep.		
B	In order to ensure exceptional illumination, each light shall provide a minimum of 25 foot-candles (fc) covering an entire 15.00" x 15.00" square placed 10.00" below the light and a minimum of 1.5 fc covering an entire 30.00" x 30.00" square at the same 10.00" distance below the light.		
C	The lights shall be activated when the adjacent door is opened.		
111.	**FENDER CROWNS** Stainless steel fender crowns shall be installed at the cab wheel openings.		
112.	**WINDOWS, REAR** The rear wall of the crew cab shall have two (2) windows, each being 11.25" wide x 18.00" high.		

113.	**WINDOW INTERIOR TRIM** For improved aesthetics, the cab rear wall windows shall include a vacuum formed ABS interior trim panel.		
114.	**CAB INTERIOR**		
A	With safety as the primary objective, the wrap-around style cab instrument panel shall be designed with unobstructed visibility to instrumentation. The dash layout shall provide the driver with a quick reference to gauges that allows more time to focus on the road.		
B	The center console shall be a high impact ABS polymer and shall be easily removable for access to the defroster. The center console shall include louvers strategically located for optimal air flow and defrost capability to the windshield.		
C	The passenger side dashboard shall be constructed of painted aluminum for durability and low maintenance. For enhanced versatility, the passenger side dash shall include a flat working surface.		
D	To provide optional (service-friendly) control panels, switches and storage modules, a painted aluminum overhead console shall also be provided.		
E	To complete the cab front interior design, painted aluminum modesty panels shall be provided under the dash on both sides of the cab. The driver side modesty panel shall provide mounting for the battery switch and diagnostic connectors, while the passenger side modesty panel provides a glove box, and ground access to the main electrical distribution panel via quick quarter turn fasteners.		
F	To provide a deluxe automotive interior, the engine tunnel shall be covered by leather grain vinyl that is resistant to oil, grease, and mildew. For durability and ease of maintenance, the cab interior side walls shall be painted aluminum. The rear wall shall be painted aluminum.		
G	The headliner shall be installed in both forward and rear cab sections. The headliner panel shall be a composition of an aluminum panel covered with a sound barrier and upholstery.		
H	The cab structure shall include designated raceways for electrical harness routing from the front of the cab to the rear upper portion of the cab. Raceways shall be extruded in the forward door frame, floor, walls and overhead in the area where the walls meet the ceiling. The raceways located in the floor shall be covered by aluminum extrusion, while the vertical and overhead raceways shall be covered by painted aluminum covers. The raceways shall improve harness integrity by providing a continuous harness path that eliminates wire chafing and abrasion associated with exposed wiring or routing through drilled metal holes. Harnesses shall be laid in place. Routing through holes in tubing shall not be accepted due to chaffing that installation causes.		
115.	**CAB INTERIOR UPHOLSTERY** The cab interior upholstery shall be dark charcoal black. All cab interior materials shall meet FMVSS 302 (flammability of interior materials).		
116.	**CAB INTERIOR PAINT**		
A	The following metal surfaces shall be painted black, vinyl textured paint: • Modesty panel in front of driver • Vertical surface of dash in front of the officer (not applicable for recessed dash) • Glove box in front of the officer (if applicable) • Power distribution in front of the officer • Rear heater vent panels		
B	The remaining cab interior metal surfaces shall be painted with a fire-smoke gray, vinyl texture paint.		

117.	**CAB FLOOR** The cab and crew cab flooring shall be constructed with bright aluminum treadplate. The vertical surfaces at the top of the step wells and the vertical area where the center floor rises shall be covered with aluminum treadplate. The center floor and crew cab flat floor shall wrap down the vertical surface with a one (1) piece design floor covering. The front cab floor shall stop short of the wire raceway. The side of the raceway shall be made of treadplate, down the vertical surface for a one (1) piece design cover. The driver and passenger sides of the crew cab floor shall wrap down the vertical surface at the top of the step wells as one (1) piece.		
118.	**CAB DEFROSTER**		
A	To provide maximum defrost and heating performance, a 54,961 BTU heater-defroster unit with 558 SCFM of air flow shall be provided inside the cab. The defroster unit shall be strategically located under the center forward portion of the instrument panel. For easy access, a removable metal cover shall be installed over the defroster unit. The defroster shall include an integral aluminum frame air filter, high performance dual scroll blowers, and ducts designed to provide maximum defrosting capabilities for the 1-piece windshield. The defroster ventilation shall be built into the design of the cab dash instrument panel and shall be easily removable for maintenance. The defroster system shall meet or exceed SAE J382 requirements.		
B	A defrost fan shall be located on each side of the cab, recessed in the outboard overhead console. The fans shall use recirculated air from within the cab to blow air towards the driver and officer side windows for additional defrost capabilities.		
C	The defroster fan speed control shall also control the overhead defrost fans. When the defroster is set to low or medium, the overhead defroster fan speed shall be medium. When the defroster is set to high, the overhead defroster fan speed shall also be high.		
119.	**CAB/CREW CAB HEATER**		
A	Two (2) 36,700 BTU (minimum) auxiliary heaters with 270 (minimum) SCFM (each unit) of air flow shall be provided inside the crew cab, one (1) in each outboard rear facing seat riser. The heaters shall include high performance dual scroll blowers, one (1) for each unit. Outlets for the heaters shall be located below each rear facing seat riser and below the fronts of the driver and passenger seats, for efficient airflow. An extruded aluminum plenum shall be incorporated in the cab structure that shall transfer heat to the forward cab seating positions.		
B	The heater/defroster and crew cab heaters shall be controlled by an integral electronic control panel. The heater control panel shall allow the driver to control heat flow to the front and rear independently. The control panel shall include variable adjustment for temperature and fan control, and be conveniently located on the dash in clear view of the driver. The control panel shall include highly visible, progressive LED indicators for both fan speed and temperature.		
120.	**AIR CONDITIONING**		
A	A high-performance, customized air conditioning system shall be furnished inside the cab and crew cab. A 13.10 cubic inch compressor shall be installed on the engine.		
B	A roof-mounted condenser with a minimum 63,000 BTU output 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 and mounting legs to be painted white as provided by the A/C manufacturer.		
C	The evaporator unit shall be installed in the rear portion of the cab ceiling over the engine tunnel. The evaporator shall include two (2) high performance cores and plenums with multiple outlets, one (1) plenum directed to the front and one (1) plenum directed to the rear of the cab.		
D	There shall be a hinge on the forward edge of the filter cover and two (2) quarter turn fasteners with a knob on the rear edge to allow easy access.		
E	The evaporator unit shall have a 49,000 BTU (4.08 tons) rating that meets and exceeds the performance specifications.		

F	Adjustable air outlets shall be strategically located on the evaporator cover per the following:		
	• Four (4) shall be directed towards the drivers location		
	• Four (4) shall be directed towards the officers location		
	• Nine (9) shall be directed towards crew cab area		
G	The air conditioner refrigerant shall be R-134A and shall be installed by a certified technician.		
H	The air conditioner shall be controlled by dual zone integral electronic control panels for the heater, defroster and air conditioner. The cab control panel shall be located in the center console. For ease of operation, the control panels shall include variable adjustment for temperature and fan control.		
121.	**INTERIOR CAB INSULATION**		
A	The cab walls, ceiling, and engine tunnel shall be insulated in all strategic locations to maximize acoustic absorption and thermal insulation. The cab shall be insulated with 2.00" insulation in the rear wall, 3.00" insulation in the side walls, and 1.50" insulation in the ceiling. Headliners shall be constructed from a 0.20" high density polyethylene corrugated material. Each headliner shall be wrapped with a 0.25" thick foil faced poly damp low emissivity foam insulation barrier for acoustic and thermal control. For ease of installation and removal, all headliners shall be held in place by a dual lock fastening system. Headliner installation requiring removal of mechanical fasteners shall not be acceptable.		
B	Designed for maximum sound absorption and thermal insulation, the rear cab wall shall be insulated with a 1.50" thick open cell acoustical foam. The thermal protection of the foam shall provide and R-value of four (4) per 1.00" thickness.		
122.	**SPECIAL 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.		
123.	**SUN VISORS**		
A	Two (2) smoked polycarbonate sun visors provided. The sun visors shall be located above the windshield with one (1) mounted on each side of the cab.		
B	There shall be a black plastic thumb latch provided to help secure each sun visor in the stowed position.		
124.	**GRAB HANDLE**		
A	A black rubber covered grab handle shall be mounted on the door post of the driver side cab door to assist in entering the cab. The grab handle shall be securely mounted to the post area between the door and windshield.		
B	A long rubber grab handle shall be mounted on the dash board in front of the officer.		
125.	**ENGINE COMPARTMENT LIGHTS**		
A	There shall be one (1) 12 volt DC, 3.00" white LED light(s) with chrome flange kit(s) installed under the cab to be used as engine compartment illumination.		
B	These light(s) shall be activated automatically when the cab is raised.		
126.	**ACCESS TO ENGINE DIPSTICKS**		
A	For access to the engine oil and transmission fluid dipsticks, there shall be a door on the engine tunnel, inside the crew cab. The door shall be on the rear wall of the engine tunnel, on the vertical surface. The door shall be 17.75" wide x 12.75" high and be flush with the wall of the engine tunnel.		
B	The engine oil dipstick shall allow for checking only. The transmission dipstick shall allow for both checking and filling. An additional port shall be provided for filling the engine oil.		
C	The door shall have a rubber seal for thermal and acoustic insulation. One (1) flush latch shall be provided on the access door.		

127.	**CAB SAFETY SYSTEM** The cab shall be provided with a safety system designed to protect occupants in the event of a side roll or frontal impact, and shall include the following:		
	• A supplemental restraint system (SRS) sensor shall be installed on a structural cab member behind the instrument panel. The SRS sensor shall perform real time diagnostics of all critical subsystems and shall record sensory inputs immediately before and during a side roll or frontal impact event.		
	• A slave SRS sensor shall be installed in the cab to provide capacity for eight (8) crew cab seating positions.		
	• A fault-indicating light shall be provided on the vehicle's instrument panel allowing the driver to monitor the operational status of the SRS system.		
	• A driver side front air bag shall be mounted in the steering wheel and shall be designed to protect the head and upper torso of the occupant, when used in combination with the 3-point seat belt.		
	• A passenger side knee bolster air bag shall be mounted in the modesty panel below the dash panel and shall be designed to protect the legs of the occupant, when used in combination with the 3-point seat belt.		
	• Air curtains shall be provided in the outboard bolster of outboard seat backs to provide a cushion between occupant and the cab wall.		
	• Suspension seats shall be provided with devices to retract them to the lowest travel position during a side roll or frontal impact event.		
	• Seat belts shall be provided with pre-tensioners to remove slack from the seat belt during a side roll or frontal impact event.		
128.	**FRONTAL IMPACT PROTECTION**		
A	The SRS system shall provide protection during a frontal or oblique impact event. The system shall activate when the vehicle decelerates at a predetermined G force known to cause injury to the occupants. The cab and chassis shall have been subjected, via third party test facility, to a crash impact during frontal and oblique impact testing. Testing included all major chassis and cab components such as mounting straps for fuel and air tanks, suspension mounts, front suspension components, rear suspensions components, frame rail cross members, engine and transmission and their mounts, pump house and mounts, frame extensions and body mounts. The testing provided configuration specific information used to optimize the timing for firing the safety restraint system. The sensor shall activate the pyrotechnic devices when the correct crash algorithm, wave form, is detected (no exception).		
B	The SRS system shall deploy the following components in the event of a frontal or oblique impact event:		
	• Driver side front air bag		
	• Passenger side knee bolster air bag		
	• Air curtains mounted in the outboard bolster of outboard seat backs		
	• Suspension seats shall be retracted to the lowest travel position		
	• Seat belts shall be pre-tensioned to firmly hold the occupant in place		
129.	**SIDE ROLL PROTECTION** The SRS system shall provide protection during a fast or slow 90 degree roll to the side, in which the vehicle comes to rest on its side. The system shall analyze the vehicle's angle and rate of roll to determine the optimal activation of the advanced occupant restraints.		
	The SRS system shall deploy the following components in the event of a side roll:		
	• Air curtains mounted in the outboard bolster of outboard seat backs		
	• Suspension seats shall be retracted to the lowest travel position		
	• Seat belts shall be pre-tensioned to firmly hold the occupant in place		

130.	**SEATING CAPACITY** The seating capacity in the cab shall be five (5).		
131.	**DRIVER SEAT**		
A	A cam action seat with air suspension shall be provided in the cab for the driver. For increased convenience, the seat shall include electric controls to adjust the rake, height and horizontal position. Electric controls shall be located below the forward part of the seat cushion. To provide flexibility for multiple driver configurations, the seat shall be furnished with an adjustable reclining back. The seat back shall be a high back style with manual lumbar adjustment lever, for lower back support, and shall include minimum 7.50" deep side bolster pads for maximum support. For optimal comfort, the seat shall be provided with dual density foam cushions designed with EVC (elastomeric vibration control).		
B	The seat shall include the following features incorporated into the side roll protection system:		
	• Side air curtain shall be mounted integral to the outboard bolster of the seat back. The air curtain shall be covered by a decorative panel when in the stowed position.		
	• A suspension seat safety system shall be included. When activated, this system shall pretension the seat belt and retract the seat to its lowest travel position.		
C	The seat shall be furnished with a 3-point, shoulder type seat belt. The seat belt shall be furnished with dual automatic retractors that shall provide ease of operation in the normal seating position.		
132.	**OFFICER SEAT**		
A	A cam action seat with air suspension shall be provided in the cab for the passenger. For increased convenience, the seat shall include a manual control to adjust the horizontal position. The manual horizontal control shall be a towel-bar style located below the forward part of the seat cushion. For optimal comfort, the seat shall be provided with dual density foam cushions designed with EVC (elastomeric vibration control). To ensure safe operation, the seat shall be equipped with seat belt sensors in the seat cushion and belt receptacle that shall activate an alarm indicating a seat is occupied but not buckled.		
B	The seat shall include the following features incorporated into the side roll protection system:		
	• Side air curtain shall be mounted integral to the outboard bolster of the seat back. The air curtain shall be covered by a decorative panel when in the stowed position.		
	• A suspension seat safety system shall be included. When activated, this system shall pretension the seat belt, then retract the seat to its lowest travel position.		
C	The seat shall be furnished with a 3-point, shoulder type seat belt. The seat belt shall be furnished with dual automatic retractors that shall provide ease of operation in the normal seating position		
133.	**RADIO COMPARTMENT** A compartment for the radio amplifier shall be located on the floor of the cab behind the front passenger's seat. A lift-up door with a chrome plated lift and turn latch shall be provided for access. The compartment shall be constructed of smooth aluminum and painted to match the cab interior.		
134.	**REAR FACING LEFT SIDE CABINET**		
A	A rear facing cabinet shall be provided in the crew cab at the left side outboard position with interior and exterior access.		
B	The cabinet shall be 24.00" wide x 40.50" high x 30.50" deep with one (1) Amdor rollup door with anodized finish, non-locking. The frame to frame opening shall be 19.00" wide x 35.25" high. The minimum clear door opening shall be 16.25" wide x 29.37" high.		
C	The cabinet shall include one (1) infinitely adjustable shelf with a 0.75" up-turned lip painted to match the cab interior.		
D	The cabinet shall include no louvers.		

E	The cabinet shall also provide exterior access with one (1) double pan door painted to match the cab exterior with a locking D-ring latch with #751 key. A pneumatic stay arm shall be provided as a door stop. The clear door opening shall 19.75" wide x 38.00" high.		
F	The exterior access shall be provided with a polished stainless steel scuffplate on the lower door frame.		
G	The cabinet shall be constructed of smooth aluminum and painted to match the cab interior.		
135.	**CABINET LIGHT** There shall be LED lighting installed in the cabinet. The lights shall be controlled by an automatic door switch.		
136.	**REAR FACING RIGHT SIDE CABINET**		
A	A rear facing cabinet shall be provided in the crew cab at the right side outboard position.		
B	The cabinet shall be 21.50" wide x 40.50" high x 26.50" deep with one (1) Amdor rollup door with anodized finish, non-locking. The frame to frame opening shall be 16.50" wide x 35.25" high. The minimum clear door opening shall be 13.75" wide x 29.37" high.		
C	The cabinet shall include one (1) infinitely adjustable shelf with a 0.75" up-turned lippainted to match the cab interior.		
D	The cabinet shall include no louvers.		
E	The cabinet shall also provide access from outside the cab with one (1) double pan door painted to match the cab exterior with a locking D-ring latch with #751 key. A pneumatic stay arm shall be provided as a door stop. The exterior clear door opening shall be 16.00" wide x 38.00" high. The door shall be located on the side of the cab over the wheelwell.		
F	The exterior access shall be provided with a polished stainless steel scuffplate on the lower door frame.		
G	The compartment shall be constructed of smooth aluminum, and painted to match the cab interior.		
137.	**CABINET LIGHT** There shall be one (1) white LED strip light installed on the left side of the exterior cabinet door opening. The lights shall be controlled by an automatic door switch.		
138.	**FORWARD FACING DRIVER SIDE OUTBOARD SEAT**		
A	There shall be one (1) forward facing seat provided at the driver side outboard position in the crew cab. The seat back shall be a high back style with 7.5 degree fixed recline angle, and shall include minimum 7.50" deep side bolster pads for maximum support. For optimal comfort, the seat shall be provided with 17.00" deep dual density foam cushions designed with EVC (elastomeric vibration control). To ensure safe operation, the seat shall be equipped with seat belt sensors in the seat cushion and belt receptacle that shall activate an alarm indicating a seat is occupied but not buckled.		
B	The seat shall include the following features incorporated into the side roll protection system:		
	• Side air curtain shall be mounted integral to the outboard bolster of the seat back. The air curtain shall be covered by a decorative panel when in the stowed position.		
	• A seat safety system shall be included. When activated, this system shall pretension the seat belt around the occupant to firmly hold them in place in the event of a side roll.		
C	The seat shall be furnished with a 3-point, shoulder type seat belt. The seat belt shall be furnished with dual automatic retractors that shall provide ease of operation in the normal seating position.		

139.	**FORWARD FACING CENTER SEAT**		
A	There shall be one (1) forward facing seat provided at the center position in the crew cab. The seat back shall be a high back style with 7.5 degree fixed recline angle, and shall include minimum 7.50" deep side bolster pads for maximum support. For optimal comfort, the seat shall be provided with dual density foam cushions designed with EVC (elastomeric vibration control). To ensure safe operation, the seat shall be equipped with seat belt sensors in the seat cushion and belt receptacle that shall activate an alarm indicating a seat is occupied but not buckled.		
B	The seats shall include the following feature incorporated into the side roll protection system:		
	• A seat safety system shall be included. When activated, this system shall pretension the seat belts around the occupants to firmly hold them in place in the event of a side roll.		
C	The seats shall be furnished with 3-point, shoulder type seat belts. The seat belts shall be furnished with dual automatic retractors that shall provide ease of operation in the normal seating position.		
140.	**FORWARD FACING PASSENGER SIDE OUTBOARD SEAT**		
A	There shall be one (1) forward facing seat provided at the passenger side outboard position in the crew cab. The seat back shall be a high back style with 7.50 degree fixed recline angle, and shall include minimum 7.50" deep side bolster pads for maximum support. For optimal comfort, the seat shall be provided with dual density foam cushions designed with EVC (elastomeric vibration control). To ensure safe operation, the seat shall be equipped with seat belt sensors in the seat cushion and belt receptacle that shall activate an alarm indicating a seat is occupied but not buckled.		
B	The seat shall include the following features incorporated into the side roll protection system:		
	• Side air curtain shall be mounted integral to the outboard bolster of the seat back. The air curtain shall be covered by a decorative panel when in the stowed position.		
	• A seat safety system shall be included. When activated, this system shall pretension the seat belt around the occupant to firmly hold them in place in the event of a side roll.		
C	The seat shall be furnished with a 3-point, shoulder type seat belt. The seat belt shall be furnished with dual automatic retractors that shall provide ease of operation in the normal seating position.		
141.	**SEAT UPHOLSTERY** All seat upholstery shall be leather grain 36 oz. black vinyl resistant to oil, grease and mildew. The cab shall have five (5) seating positions.		
142.	**SEAT BELTS**		
A	All seating positions in the cab, crew cab and tiller cab (if applicable) shall have red seat belts.		
B	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.		
C	The 3-point shoulder type seat belts shall also include a D-loop assembly to the shoulder belt system. This feature adds an extender arm to the D-loop location placing the D-loop in a closer, easier to reach location.		
143.	**SHOULDER HARNESS HEIGHT ADJUSTMENT**		
A	All seating positions furnished with 3-point shoulder type seat belts shall include a height adjustment. This adjustment shall optimize the belts effectiveness and comfort for the seated firefighter.		
B	A total of six (6) seating positions shall have the adjustable shoulder harness.		
144.	**HELMET STORAGE, PROVIDED BY FIRE DEPARTMENT**		
A	NFPA 1901, 2009 edition, section 14.1.8.4.1 requires a location for helmet storage be provided.		

B	There is no helmet storage on the apparatus as manufactured. The fire department shall provide a location for storage of helmets.		
145.	**CAB DOME LIGHTS**		
A	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.		
B	The color of the LEDs shall be red and white.		
C	The white LEDs shall be controlled by the door switches and the lens switch.		
D	The color LEDs shall be controlled by the lens switch.		
E	In order 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.		
146.	**OVERHEAD MAP LIGHTS**		
A	There shall be two (2) white halogen, round adjustable map lights installed in the cab:		
	• One (1) overhead in front of the driving position.		
	• One (1) overhead in front of the passenger's position.		
B	Each light shall include a switch on the light housing.		
C	The light switches shall be connected directly to the battery switched power.		
147.	**HAND HELD LIGHT** There shall be four (4) Whelen LiFe hand lights provided with a vehicle mount with 12VDC direct wire charging rack and quick release buckle strap mounted Two (2) on driver side EMS cabinet top, One (1) on top of P/S EMS cabinet and One (1) in lower interior area of P/S EMS cabinet.		
148.	**CAB INSTRUMENTATION** The cab instrument panel shall consist of gauges, an LCD display, telltale indicator lights, alarms, control switches, and a diagnostic panel. The function of 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 directly forward of the driver. Gauge and switch panels shall be designed to be removable for ease of service and low cost of ownership.		
149.	**GAUGES**		
	The gauge panel shall include the following ten (10) gauges with chrome bezels to monitor vehicle performance:		
A.	Voltmeter gauge (Volts)		
	• Low volts (11.8 VDC)		
	○ Amber indicator on gauge assembly with alarm		
	• High volts (15 VDC)		
	○ Amber indicator on gauge assembly with alarm		
	• Very low volts (11.3 VDC)		
	○ Amber indicator on gauge assembly with alarm		
	• Very high volts (16 VDC)		
	○ Amber indicator on gauge assembly with alarm		
	• Tachometer (RPM)		
	• Speedometer (Primary (outside) MPH, Secondary (inside) Km/H)		
	• Fuel level gauge (Empty - Full in fractions)		
	• Engine oil pressure gauge (PSI)		
	• Front air pressure gauge (PSI)		

	• Rear air pressure gauge (PSI)		
	• Transmission oil temperature gauge (Fahrenheit)		
	• Engine coolant temperature gauge (Fahrenheit)		
	• Diesel Exhaust Fluid Level Gauge (Empty - Full in fractions)		
B	• All gauges and gauge indicators shall be capable of approve out at initial power-up to ensure proper performance.		
150.	**INDICATOR LAMPS**		
A	To promote safety, the following telltale indicator lamps shall be integral to the gauge assembly and are located above and below the center gauges. The indicator lamps shall be "dead-front" design that is only visible when active. The colored indicator lights shall have descriptive text or symbols.		
B	The following amber telltale lamps shall be present:		
	• Low coolant		
	• Traction control (where applicable)		
	• Check engine		
	• Check trans (check transmission)		
	• Aux brake overheat (Auxiliary brake overheat)		
	• Air rest (air restriction)		
	• Caution (triangle symbol)		
	• Water in fuel		
	• DPF (engine diesel particulate filter regeneration)		
	• 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)		
	• SRS (supplemental restraint system) fault (where applicable)		
	• DEF (low diesel exhaust fluid level)		
C	The following red telltale lamps shall be present:		
	• Warning (stop sign symbol)		
	• Seat belt		
	• Parking brake		
	• Stop engine		
	• Rack down		
D	The following green telltale lamps shall be provided:		
	• Left turn		
	• Right turn		
	• Battery on		
E	The following blue telltale lamp shall be provided:		
	• High beam		

151.	**ALARMS**		
A	Audible steady tone warning alarm: A steady audible tone alarm shall be provided whenever a warning message is present.		
B	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.		
C	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.		
152.	**INDICATOR LAMP AND ALARM PROVE-OUT** Telltale indicators and alarms shall perform prove-out at initial power-up to ensure proper performance.		
153.	**CONTROL SWITCHES**		
A	For ease of use, the following controls shall be provided immediately adjacent to the cab instrument panel within easy reach of the driver.		
B	Emergency master switch: A molded plastic push button switch with integral indicator lamp shall be provided. Pressing the switch shall activate emergency response lights and siren control. A green lamp on the switch provides indication that the emergency master mode is active. Pressing the switch again disables the emergency master mode.		
C	Headlight / Parking light switch: A three (3)-position maintained rocker switch shall be provided. The first switch position shall deactivate all parking lights and the headlights. The second switch position shall activate the parking lights. The third switch position shall activate the headlights.		
D	Panel backlighting intensity control switch: A three (3)-position momentary rocker switch shall be provided. The first switch position decreases the panel backlighting intensity to a minimum level as the switch is held. The second switch position is the default position that does not affect the backlighting intensity. The third switch position increases the panel backlighting intensity to a maximum level as the switch is held.		
E	The following standard controls shall be integral to the gauge assembly and are located below the right hand gauges. All switches have backlit labels for low light applications.		
F	High idle engagement switch: A two (2)-position momentary rocker switch with integral indicator lamp shall be provided. The first switch position is the default switch position. The second switch position shall activate and deactivate the high idle function when pressed and released. 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.		
G	"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.		
H	The following standard controls shall be provided adjacent to the cab gauge assembly within easy reach of the driver. All switches shall have backlit labels for low light applications.		
I	Ignition switch: A three (3)-position maintained/momentary rocker switch shall be provided. The first switch position shall deactivate vehicle ignition. The second switch position shall activate vehicle ignition. The third momentary position shall disable the Command Zone audible alarm if held for three (3) to five (5) seconds. A green indicator lamp shall be activated with vehicle ignition.		
J	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.		

K	4-way hazard switch: A two (2)-position maintained rocker switch shall be provided. The first switch position shall deactivate the 4-way hazard switch function. The second switch position shall activate the 4-way hazard function. The switch actuator shall be red and includes the international 4-way hazard symbol.		
L	Heater, defroster, and optional air conditioning control panel: A control panel with membrane switches shall be provided to control heater/defroster temperature and heater, defroster, and air conditioning fan speeds. A green LED status bar shall indicate the relative temperature and fan speed settings.		
M	Turn signal arm: A self-canceling turn signal with high beam headlight and windshield wiper/washer controls shall be provided. The windshield wiper control shall have high, low, and intermittent modes.		
N	Parking brake control: An air actuated push/pull park brake control valve shall be provided.		
O	Chassis horn control: Activation of the chassis horn control shall be provided through the center of the steering wheel.		
154.	**CUSTOM SWITCH PANELS** 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 overhead console on the driver's side, up to four (4) switch panels in the engine tunnel console facing the driver, up to four (4) switch panels in the overhead console on the officer's side and up to two (2) switch panels in the engine tunnel console facing the officer. All switches shall have backlit labels for low light applications.		
155.	**DIAGNOSTIC PANEL**		
A	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		
	• SRS diagnostic port (where applicable)		
	• Multiplexing 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)		
156.	**CAB LCD DISPLAY**		
A	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.		
B	The upper right section shall display, along with other configuration specific information:		
	• Odometer		
	• Trip mileage		
	• PTO hours		
	• Fuel consumption		
	• Engine hours		
C	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.		

157.	**AIR RESTRICTION INDICATOR** A high air restriction warning indicator light LCD message with amber warning indicator and audible alarm shall be provided.		
158.	**"DO NOT MOVE APPARATUS" INDICATOR**		
A	There shall be a flashing red LED indicator light located in the driving compartment. The light shall be illuminated automatically per the current NFPA requirements and labeled "Do Not Move Apparatus If Light Is On".		
B	The same circuit that activates the Do Not Move Apparatus indicator shall activate a steady tone alarm when the parking brake is released.		
159.	**DO NOT MOVE TRUCK MESSAGES**		
A	Messages shall be displayed on the 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 disengaged).		
B	The following messages shall be displayed (where applicable):		
	• Do Not Move Truck		
	• DS Cab Door Open (Driver Side Cab Door Open)		
	• PS Cab Door Open (Passenger's Side Cab Door Open)		
	• DS Crew Cab Door Open (Driver Side Crew Cab Door Open)		
	• PS Crew Cab Door Open (Passenger's Side Crew Cab Door Open)		
	• DS Body Door Open (Driver Side Body Door Open)		
	• PS Body Door Open (Passenger's Side Body Door Open)		
	• Rear Body Door Open		
	• DS Ladder Rack Down (Driver Side Ladder Rack Down)		
	• PS Ladder Rack Down (Passenger Side Ladder Rack Down)		
	• Deck Gun Not Stowed		
	• Lt Tower Not Stowed (Light Tower Not Stowed)		
	• Fold Tank Not Stowed (Fold-A-Tank Not Stowed)		
	• Aerial Not Stowed (Aerial Device Not Stowed)		
	• Stabilizer Not Stowed		
	• Steps Not Stowed		
	• Handrail Not Stowed		
C	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 disengaged.		
160.	**SWITCH PANELS**		
A	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. Panels containing less than eight (8) switch assignments shall include non-functioning black appliqués. Documentation shall be provided by the manufacturer indicating the rated cycle life of the switches. The switch panel(s) shall be located in the overhead position above the windshield on the driver side overhead to allow for easy access.		
B	Additional switch panel(s) shall be located in the overhead position(s) above the windshield or in designated locations on the lower instrument panel layout.		
C	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 label 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.		

161.	**WIPER CONTROL**		
	For simple operation and easy reach, the windshield wiper control shall be an integral part of the directional light lever located on the steering column. The wiper control shall include high and low wiper speed settings, a one (1)-speed intermittent wiper control and windshield washer switch. The control shall have a "return to park" provision, which allows the wipers to return to the stored position when the wipers are not in use.		
162.	**HOURMETER - AERIAL DEVICE** An hour meter for the aerial device shall be provided and located within the cab display or instrument panel.		
163.	**AERIAL MASTER**		
	There shall be a master switch for the aerial operating electrical system provided.		
164.	**AERIAL PTO SWITCH** A PTO switch for the aerial with indicator light shall be provided.		
165.	**SPARE CIRCUIT**		
A	There shall be four (4) pair of wires, including a positive and a negative, installed on the apparatus.		
B	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 in EMS compartment(s) and on the rear wall of the crew cab, centered		
	• Termination shall be with a 10-place bus bar with screws and removable cover.		
	• Wires shall be sized to 125% of the protection.		
C	This circuit(s) may be load managed when the parking brake is set.		
166.	**SPARE CIRCUIT**		
A	There shall be one (1) pair of wires, including a positive and a negative, installed on the apparatus.		
B	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		
	• Termination shall be with 15 amp, power point plug with rubber cover		
	• Wires shall be sized to 125 % of the protection		
C	The circuit(s) may be load managed when the parking brake is set.		
167.	**SPARE CIRCUIT**		
A	There shall be one (1) pair of wires, including a positive and a negative, installed on the apparatus.		
B	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 P3 ON FRONT WALL BELOW SHELF AT TRANSITION.		
	• Termination shall be with a 10-place bus bar with screws and removable cover		

	• Wires shall be sized to 125% of the protection		
C	This circuit(s) may be load managed when the parking brake is set.		
168.	**SPARE CIRCUIT**		
A	There shall be two (2) pair of wires, including a positive and a negative, installed on the apparatus.		
B	• 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		
	• Wires shall be sized to 125 % of the protection		
C	The circuit(s) may be load managed when the parking brake is set.		
169.	**STEREO RADIO**		
A	A heavy duty AM/FM/CD/Weatherband stereo radio, with front auxiliary input shall be installed per switch panel layout. There shall be two pair of 5.25" speakers installed one (1) pair of 5.25" speakers in the cab and one (1) pair of 5.25" speakers in the crew cab. The antenna shall be a roof-mounted rubber antenna located in an open space, on the cab roof.		
B	The following features shall be included:		
	• CD Player with Electronic Skip Protection (ESP)		
	• Full 7-Channel NOAA Weatherband Tuner with SAME technology		
	• Built-in Clock		
	• Audio CD, CD-R, R/W, MP3 CD compatible		
	• Radio Broadcast Data System Text Display		
	• Front panel USB input		
	• Front and Rear Auxiliary Audio Input		
	• Receives audio (A2DP/AVRCP) from Bluetooth enabled device		
	• Supports Bluetooth HFP to receive phone calls from BT-enabled phones		
	• Low battery alert (<10.8Vdc)		
	• Heavy Duty design with Conformal Coated Circuit Boards for maximum durability under all conditions		
170.	**INFORMATION CENTER**		
A	An information center employing a 7.00" diagonal touch screen color LCD display shall be encased in an ABS plastic housing.		
B	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		

171.	**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.		
A			
B	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) have 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.		
172.	**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		
173.	**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		
174.	**VIRTUAL BUTTONS** There shall be four (4) virtual switch panel screens that match the overhead and lower lighting and HVAC switch panels.		

175. A	**PAGE SCREEN** The page screen shall display the following and allow the user to progress into other screens for further functionality:		
	• Diagnostic		
	o Faults		
	▪ Listed by order of occurrence		
	▪ Allows to sort by system		
	o Interlock		
	▪ Throttle Interlocks		
	▪ Pump Interlocks (if equipped)		
	▪ Aerial Interlocks (if equipped)		
	▪ PTO Interlocks (if equipped)		
	o 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.		
	o Systems		
	• 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)		
	o Live Data		
	▪ General Truck Data		
	• Maintenance		
	o Engine oil and filter		
	o Transmission oil and filter		
	o Pump oil (if equipped)		
	o Foam (if equipped)		
	o Aerial (if equipped)		
	• Setup		
	o Clock Setup		
	o Date & Time		
	▪ 12 or 24 hour format		
	▪ Set time and date		
	o Backlight		

	▪ Daytime		
	▪ Night time		
	▪ Sensitivity		
	o Unit Selection		
	o Home Screen		
	o Virtual Button Setup		
	o On Scene Screen Setup		
	o Configure Video Mode		
	▪ Set Video Contrast		
	▪ Set Video Color		
	▪ Set Video Tint		
	• Do Not Move		
	o 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 indicate:		
	▪ 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		
	o 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)		
	• Aerial Set Up Confirmation (if equipped)		
B	Button functions and button labels may change with each screen.		
176.	**INFORMATION CENTER**		
A	There shall be one (1) information center(s) each employing a 7.00" diagonal touch screen color LCD display located at the pump operator's panel.		
B	The information center(s) 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		
177.	**GENERAL SCREEN DESIGN**		
A	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.		
B	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) have 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.		
178.	**HOME/TRANSIT SCREEN** This screen shall display the following:		
	• Vehicle Mitigation (if equipped)		
	• Water Level (if equipped)		
	• Foam Level (if equipped)		
	• Seat Belt Monitoring Screen		
	• Tire Pressure Monitoring (if equipped)		
	• Digital Speedometer		
	• Active Alarms		
179.	**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		
180.	**VIRTUAL BUTTONS** There shall be four (4) virtual switch panel screens that match the overhead and lower lighting and HVAC switch panels.		
181.	**PAGE SCREEN**		
A	The page screen shall display the following and allow the user to progress into other screens for further functionality:		
	• Diagnostics		
	o Faults		
	▪ Listed by order of occurrence		
	▪ Allows to sort by system		
	o Interlock		
	▪ Throttle Interlocks		
	▪ Pump Interlocks (if equipped)		
	▪ Aerial Interlocks (if equipped)		
	▪ PTO Interlocks (if equipped)		
	o 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.		
	o Systems		
	▪ Multiplexing		
	• 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)		
	o Live Data		
	▪ General Truck Data		
	• Maintenance		
	o Engine oil and filter		
	o Transmission oil and filter		
	o Pump oil (if equipped)		
	o Foam (if equipped)		

	○ Aerial (if equipped)		
	• Setup		
	○ Clock Setup		
	○ Date & Time		
	▪ 12 or 24 hour format		
	▪ Set time and date		
	○ Backlight		
	▪ Daytime		
	▪ Night time		
	▪ 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 indicate		
	▪ 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)		

B	Button functions and button labels may change with each screen.		
182.	**VEHICLE DATA RECORDER**		
A	A vehicle data recorder (VDR) shall be provided. The VDR shall be capable of reading and storing vehicle information.		
B	The information stored on the VDR can be downloaded through a USB port mounted in a convenient location determined by cab model. A CD provided with the apparatus shall include the programming to download the information from the VDR. A USB cable can be used to connect the VDR to a laptop to retrieve required information.		
C	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		
	• Date - Year/Month/Day		
183.	**SEATBELT MONITORING SYSTEM**		
A	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		
B	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 are no other Do Not Move Apparatus conditions present. As soon as all Do Not Move Apparatus conditions are cleared, the SBMS shall be activated.		

184.	**INTERCOM SYSTEM (David Clark)** A six (6) position intercom with single radio transmit capability for the driver, officer, and pump operator shall be provided. Three (3) crew cab, at three (3) forward facing seats shall have radio listen / intercom only capability.		
185.	**RADIO / INTERCOM INTERFACE CABLE** The apparatus manufacturer shall supply and install the required radio interface cable before delivery of the vehicle.		
186.	**HEADSET** There shall be five (5), standard headset(s) provided Driver, Officer, and four (4) crew seats. Each headset shall feature:		
	• Coiled cord with single nickel coated plug		
	• Noise cancelling electret microphone with wind muff		
	• Flexible microphone boom rotates 180 degrees for left or right dress		
	• Gel filled ear seals		
	• Volume control		
	• 24 dB noise reduction		
187.	**HEADSET HANGERS** There shall be five (5) headset hanger(s) installed driver's seat, officer's seat, driver's side inboard forward facing seat, passenger's side inboard forward facing seat and passenger's side outboard forward facing seat. The hanger(s) shall meet NFPA 1901, Section 14.1.11, and requirement for equipment mounting.		
188.	**ANTENNA WHIP INTSTALLATION** There shall be one (1) customer supplied antenna whip(s) sent to the apparatus manufacturers preferred radio installer to be threaded onto the apparatus manufacturer's antenna mounts located on the right side. No tuning (VSWR) shall be provided. Specific shipping requirements shall be followed.		
189.	**TWO-WAY RADIO CABLE INSTALLATION**		
A	There shall be one (1) customer supplied two-way radio remote head cable(s) sent to the apparatus manufacturers preferred radio installer for installation. The cable shall be run FROM THE RADIO UNDER THE OFFICERS SEAT TO THE REMOTE HEAD AT LOCATION #9.		
B	Specific shipping requirements shall be followed.		
190.	**TWO WAY RADIO SPEAKER INSTALLATION**		
A	There shall be one (1) customer supplied two way radio speakers sent to the apparatus manufacturers preferred third party installer to be installed OFFICERS SIDE ON AREA JUST FORWARD OF LOCATION #9.		
B	Specific shipping requirements shall be followed.		

191.	**RADIO ANTENNA MOUNT** There shall be two (2) standard 1.125", 18 thread antenna-mounting base(s) installed one (1) on the left side and one (1) 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.		
192.	**VEHICLE CAMERA SYSTEM**		
A	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.		
	• One (1) camera located on the right side of the apparatus, pointing rearward, displayed automatically with the right side turn signal.		
	• One (1) camera located on the left side of the apparatus, pointing rearward, displayed automatically with the left side turn signal.		
B	The camera images shall be displayed on the driver's color touchscreen multiplex display. Audio from the microphone on the rear camera shall be not provided.		
193.	**VEHICLE CAMERA GUARD** There shall be one (1) aluminum treadplate guard(s) fastened over the vehicle camera(s) located rear center below turntable.		
194.	**ELECTRICAL POWER CONTROL SYSTEM**		
A	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.		
B	Distribution centers located throughout the vehicle shall contain battery powered studs for supplying customer installed equipment thus providing a lower cost of ownership.		
C	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 % of the maximum current for which the circuit is protected per NFPA.		
195.	**SOLID-STATE CONTROL SYSTEM**		
A	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 located near their point of use to reduce harness lengths and improve reliability. The control system shall comply with SAE J1939-11 recommended practices.		
B	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.		
C	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 re programmable to accommodate changes to the vehicle's operating parameters.		
	• Complete operating and troubleshooting manuals		
	• USB connection to the main control module for advanced troubleshooting		
D	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 -40C to +70C		
	• Storage temperature from -40C to +70C		
	• Vibration to 50g		
E	IP67 rated enclosure (Totally protected against dust and also protected against the effect of temporary immersion between 15 centimeters and one (1) meter)		
F	Operating voltage from eight (8) volts to 16 volts DC		
G	The main controller shall activate status indicators and audible alarms designed to provide warning of problems before they become critical.		
196.	**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.		
197.	**ON-BOARD ADVANCED/VISUAL ELECTRICAL SYSTEM DIAGNOSTICS**		
A	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		
B	All control system modules, with the exception of the main control module, shall contain on-board visual diagnostic LEDs that assist in troubleshooting. The LEDs shall be enclosed within the sealed, transparent module housing near the face of the module. One LED for each input or output shall be provided and shall illuminate whenever the respective input or output is active. Color-coded labels within the modules shall encompass the LEDs for ease of identification. The LED indicator lights shall provide point of use information for reduced troubleshooting time without the need for an additional computer.		
198.	**TECH MODULE WITH WIFI**		
A	An in cab module will provide Wi-Fi wireless interface and data logging capability. The Wi-Fi interface will comply with IEEE 802.11 b/g/n capabilities while communicating at 2.4 Gigahertz. The module will provide an external antenna connection allowing a line of site communication range of up to 300 feet with a roof mounted antenna.		
B	The module will 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 will allow vehicle monitoring of the vehicle and firefighting systems on the apparatus. The technician level will allow diagnostic access to inputs and outputs installed on the control and information system.		
C	The data logging capability will record faults from the engine, transmission, ABS and control and information systems as they occur. No other data will be recorded at the time the fault occurs. The data logger will provide up to 2 Gigabytes of data storage.		

D	A USB connection will be provided on the Tech Module. It will provide a means to download data logger information and update software in the device.		
199.	**PROGNOSTICS**		
A	A software based vehicle tool shall be provided to predict remaining life of the vehicles critical fluid and events (no exception).		
B	The system shall send automatic indications to the color display and/or wireless enabled device to proactively alert of upcoming service intervals.		
C	Prognostics shall include:		
	• Engine oil and filter		
	• Transmission oil and filter		
	• Pump oil (if equipped)		
	• Foam oil (if equipped)		
	• Aerial oil and filter (if equipped)		
200.	**ADVANCED DIAGNOSTICS**		
A	An advanced, Windows-based, diagnostic software program shall be provided for this control system. The software shall provide troubleshooting tools to service technicians equipped with a Windows-based computer or wireless enabled device.		
B	The service and maintenance software shall be easy to understand and use and have the ability to view system input/output (I/O) information.		
201.	**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.		
202.	**VOLTAGE MONITOR SYSTEM**		
A	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.		
B	The alarm shall activate if the system falls below 11.8 volts DC for more than two (2) minutes.		
203.	**DEDICATED RADIO EQUIPMENT CONNECTION POINTS**		
A	There shall be three (3) studs provided in the primary power distribution center located in front of the officer for two-way radio equipment.		
B	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		
C	There shall also be a 12-volt 100-amp ground stud located in or adjacent to the power distribution center.		
204.	**ENHANCED SOFTWARE** The solid-state control system shall include the following software enhancements:		
	• All perimeter lights and scene lights (where applicable) shall be deactivated when the parking brake is released.		
	• Cab and crew cab dome lights shall remain on for ten (10) seconds for improved visibility after the doors close. The dome lights shall dim after ten (10) seconds or immediately if the vehicle is put into gear.		
	• Cab and crew cab perimeter lights shall remain on for ten (10) seconds for improved visibility after the doors close. The dome lights shall dim after ten (10) seconds or immediately if the vehicle is put into gear.		
205.	**EMI/RFI PROTECTION**		
A	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.		
B	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.		
C	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.		
206.	**ELECTRICAL**		
A	All 12-volt electrical equipment installed by the apparatus manufacturer shall conform to modern automotive practices. All wiring shall be 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. 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.		
B	Electrical wiring and equipment shall be installed utilizing the following guidelines:		
	1. All holes made in the roof shall be caulked with silicon, rope caulk is not acceptable. Large fender washers, liberally caulked, shall be used when fastening equipment to the underside of the cab roof.		
	2. Any electrical component that is installed in an exposed area shall be mounted in a manner that shall not allow moisture to accumulate in it. Exposed area shall be defined as any location outside of the cab or body.		
	3. Electrical components designed to be removed for maintenance shall not be fastened with nuts and bolts. Metal screws shall be used in mounting these devices. Also a coil of wire shall be provided behind the appliance to allow them to be pulled away from mounting area for inspection and service work.		
	4. Corrosion preventative compound shall be applied to all terminal plugs located outside of the cab or body. All non-waterproof connections shall require this compound in the plug to prevent corrosion and for easy separation (of the plug).		
	5. All lights that have their sockets in a weather exposed area shall have corrosion preventative compound added to the socket terminal area.		
	6. All electrical terminals in exposed areas shall have silicon (1890) applied completely over the metal portion of the terminal.		
C	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.		
D	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.		
E	The results of the tests shall be recorded and provided to the purchaser at time of delivery.		
207.	**BATTERY SYSTEM**		
A	There shall be four (4) 12 volt batteries that include the following features shall be provided:		

	• 950 CCA, cold cranking amps		
	• 190 amp reserve capacity		
	• High cycle		
	• Group 31		
	• Rating of 3800 CCA at 0 degrees Fahrenheit		
	• 760 minutes of reserve capacity		
	• Threaded stainless steel studs		
B	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.		
C	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.		
208.	**STARTING SYSTEM** There shall be a single starting system with an ignition switch and starter button provided and located on the cab instrument panel.		
209.	**MASTER BATTERY SWITCH**		
A	There shall be a master battery switch provided within the cab within easy reach of the driver to activate the battery system.		
B	An indicator light shall be provided on the instrument panel to notify the driver of the status of the battery system.		
210.	**BATTERY COMPARTMENTS** The 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 3/16" steel plate and be designed to accommodate a maximum of three (3) group 31 batteries in each compartment. The compartments shall include formed fit heavy-duty roto-molded polyethylene battery tray inserts with drains on each side of the frame rails. The batteries shall be mounted inside of the roto-molded trays.		
211.	**JUMPER STUDS** One (1) set of battery jumper studs with plastic color-coded covers shall be installed on the battery box on the driver's side. This shall allow enough room for easy jumper cable access.		
212.	**BATTERY CHARGER/ AIR COMPRESSOR**		
A	There shall be a 40 amp single output battery charger/air compressor with watertight digital display provided. The color of the charge indicator shall be red.		
B	There shall be a 120-volt AC 125 psi air compressor with auto drain installed to maintain the air system pressure when the 120 volt AC shoreline is energized.		
C	The battery charger and air compressor shall be wired to the AC shoreline inlet through a junction box located near the components.		
D	Battery charger/compressor shall be located in the crew cab seat riser.		
E	The battery charger indicator shall be located on the driver's side rear body bulkhead.		
213.	**AUTO EJECT FOR SHORELINE**		
A	There shall be one (1) 20 amp 120 volt AC shoreline inlet(s) provided to operate the dedicated 120 volt AC circuits on the apparatus.		
B	The shoreline inlet(s) shall include red weatherproof flip up cover(s).		
C	There shall be a release solenoid wired to the vehicle's starter to eject the AC connector when the engine is starting.		
D	The shoreline(s) shall be connected to the battery charger.		
E	There shall be a mating connector body supplied with the loose equipment.		
F	There shall be a label installed near the inlet(s) that state the following:		
	• Line Voltage		
	• Current Ratting (amps)		
	• Phase		

	• Frequency		
G	The shoreline receptacle shall be located on the driver side rear bulkhead of body.		
214.	**SHORELINE INLET POWERED** A green indicator light, remote mounted next to the shoreline inlet shall be provided. The light shall indicate when the shoreline inlet has been powered with 120 VAC.		
215.	**ALTERNATOR** An alternator shall be provided that has 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.		
216.	**ELECTRONIC LOAD MANAGER**		
A	An electronic load management (ELM) system shall be provided that 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.		
B	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.		
C	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.		
D	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:		
	○ ON = not shed		
	○ SHED = shed		
217.	**SEQUENCER**		
A	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.		
B	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.		
C	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.		

D	When the emergency master switch is deactivated, the sequencer shall deactivate the warning light loads in the reverse order.		
E	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)		
218.	**HEADLIGHTS**		
A	There shall be four (4) 4" x 6" rectangular LED lights mounted in the front quad style, chrome housing on each side of the cab grille:		
	• The outside light on each side shall contain a low beam module.		
	• The inside light on each side shall contain a high beam module.		
	• the headlight to include chrome bezels		
B	The low beam lights shall be activated when the headlight switch is on.		
C	The high beam and low beam lights shall be activated when the headlight switch and the high beam switch is activated.		
219.	**DIRECTIONAL LIGHTS**		
A	There shall be two (2) LED combination directional/marker lights provided. The lights shall be located on the outside cab corners, next to the headlights.		
B	The color of the lenses shall be the same color as the LED's.		
220.	**ADDITIONAL DIRECTIONAL LIGHTS**		
A	There shall be two (2) amber LED arrow directional lights provided on the exterior back of the cab, one (1) on each side. The lens color(s) to be the same as the LEDs.		
B	These lights shall be mounted low on the back wall of the crew cab in 15 degree recessed angle brackets.		
221.	**INTERMEDIATE LIGHT** There shall be two (2) 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.		
222.	**CAB CLEARANCE/MARKER/ID LIGHTS** There shall be seven (7) amber LED lights provided to indicate the presence and overall width of the vehicle in the following locations:		
	• 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.		
	• Two (2) amber LED marker lights shall be installed, one (1) on each side above the cab doors.		
223.	**REAR CLEARANCE/MARKER/ID LIGHTING**		
A	There shall be three (3) LED identification lights located at the rear installed per the following:		
	• As close as practical to the vertical centerline		
	• Centers spaced not less than 6.00" or more than 12.00" apart		
	• Red in color		
	• All at the same height		
B	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		
C	The lights shall be mounted with no guard.		
D	There shall be two (2) red reflectors located on the rear of the truck facing to 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.		
E	There shall be two (2) red reflectors located on the side of the truck facing to 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		
F	Per FMVSS 108 and CMVSS 108 requirements		
224.	**MARKER LIGHTS**		
A	There shall be one (1) pair of amber and red LED marker lights with rubber arm, located on rear of truck corner each side. The amber lens shall face the front and the red lens shall face the rear of the truck.		
B	These lights shall be activated with the running lights of the vehicle.		
225.	**REAR FMVSS LIGHTING**		
A	The rear stop/tail and directional LED lighting shall consist of the following:		
	• Two (2) red LED stop/tail lights		
	• Two (2) amber LED arrow turn lights		
B	The lights shall be provided with color lenses.		
C	The lights shall be mounted in a polished combination housing.		
D	There shall be two (2) LED backup lights provided in the tail light housing.		
226.	**LICENSE PLATE BRACKET**		
A	There shall be one (1) license plate bracket mounted left.		
B	There shall be a 1.00 high x .78" deep x 1.87" long white 12 volt DC LED light with 45 degree chrome housing provided to illuminate the license plate.		
227.	**LIGHTING BEZEL** There shall be two (2) four (4) place chromed ABS housings provided for the rear stop/tail, directional, back up, scene lights or warning lights.		
228.	**BACK-UP ALARM** A 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) db above surrounding environmental noise levels.		
229.	**CAB PERIMETER SCENE LIGHTS**		
A	There shall be four (4) 20.00" white LED strip lights provided, one (1) for each cab door.		
B	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.		
230.	**PUMP HOUSE PERIMETER LIGHTS**		
A	There shall be one (1) 20.00" LED weatherproof strip light with bracket provided under the passenger's side pump panel running board.		
B	If the combination of options in the vehicle does not permit clearance for a 20.00" light, a 12.00" version of the light shall be installed.		
C	The light shall be activated when the battery switch is on, and controlled by the same means as the body perimeter lights.		

231.	**BODY PERIMETER SCENE LIGHTS**		
A	There shall be two (2) 350 lumens, 20.00" long, with white LED's, 12 volt lights provided.		
B	The lights shall be mounted in the following locations:		
	• One (1) light under the driver's side turntable access steps		
	• One (1) light under the passenger's side turntable access steps		
C	The perimeter scene lights shall be activated when the parking brake is applied.		

232.	**STEP LIGHTS**		
A	Two (2) LED step lights shall be provided, one (1) on each side of the front body.		
B	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.		
C	The lights shall be actuated with the pump panel light switch.		
D	All other steps on the apparatus shall be illuminated per the current edition of NFPA 1901.		
233.	**12 VOLT LIGHT BRACKET** There shall be four (4) aluminum treadplate bracket(s) installed Two (2) each side of body AS SHOWN ON DRAWING for the recessed flood light. The bracket(s) shall have all wiring totally enclosed.		
234.	**DECK LIGHTS**		
A	There shall be two (2) 12 volt DC LED floodlights with swivel mount provided at the rear of the hose bed, one (1) each side.		
B	The lights shall be activated by a control from a driver's side and officer's side overhead switch and a cup switch at the driver's side rear body bulkhead.		
235.	**12 VOLT LIGHTING**		
A	There shall one (1) 17,750 lumens 12 volt DC LED light(s) with a combination of flood and spot optics installed on the apparatus located, high and centered on passenger side of body.		
B	The painted parts of this light assembly to be red number 106		
C	The light(s) to be installed in a 15 degree vertical recessed chrome trim.		
D	The lights shall be controlled by a switch at the driver's side switch panel, by a switch at the driver's side pump panel and by a switch at the passenger's side switch panel.		
E	The light(s) may be load managed when the parking brake is applied.		
236.	**12 VOLT LIGHTING**		
A	There shall one (1) 17,750 lumens 12 volt DC LED light(s) with a combination of flood and spot optics installed on the apparatus located, high and centered on driver side body.		
B	The painted parts of this light assembly to be red number 106		
C	The light(s) to be installed in a 15 degree vertical recessed chrome trim.		
D	The lights shall be controlled by a switch at the driver's side switch panel and by a switch at the driver's side pump panel.		
E	The light(s) may be load managed when the parking brake is applied.		
237.	**12 VOLT LIGHTING**		
A	There shall be one (1) 12 volt surface mounted LED combination spot/flood light(s) located Passenger side of cab up high behind crew cab doors. The lights shall be mounted with chrome flange(s).		
B	The light(s) selected above shall be controlled by the following:		
	• a switch at the driver's side switch panel		
	• a switch at the passenger's side switch panel		
	• a switch at the driver's side pump panel		
	• no additional switch location		

C	These light(s) may be load managed when the parking brake is applied.		
238.	**12 VOLT LIGHTING**		
A	There shall be one (1) 12 volt surface mounted LED combination spot/flood light(s) located Driver side of cab up high behind crew cab doors. The lights shall be mounted with chrome flange(s).		
B	The light(s) selected above shall be controlled by the following:		
	• a switch at the driver's side switch panel		
	• a switch at the passenger's side switch panel		
	• a switch at the driver's side pump panel		
	• no additional switch location		
C	These light(s) may be load managed when the parking brake is applied.		
239.	**12 VOLT LIGHTING**		
A	There shall be two (2) 8,875 lumens 12 volt DC LED light(s) with a combination of flood and spot optics provided on the front visor, one (1) on the driver's side and one (1) on the passenger's side with 15 degree outward bracket.		
B	The housing(s) painted parts of this light assembly to be red number 106.		
C	The light(s) shall be controlled by a switch at the driver's side switch panel, by a switch at the driver's side pump panel and by a switch at the passenger's side switch panel.		
D	These light(s) may be load managed when the parking brake is applied.		
240.	**WALKING SURFACE LIGHT**		
A	There shall be 4" round black 12 volt DC LED floodlight(s) with bolt mount provided to illuminate the entire designated walking surface on top of the body.		
B	The light(s) shall be activated when the body step lights are on.		
241.	**WATER TANK (UPF)**		
A	The water tank shall have a minimum capacity of 500 gallons and shall be constructed of polypropylene plastic in a rectangular shape and be manufactured by UPF.		
B	The joints and seams shall be nitrogen welded inside and out.		
C	The tank shall be baffled in accordance with current NFPA 1901 requirements.		
D	The baffles shall have vent openings at both the top and bottom of each baffle to permit movement of air and water between compartments.		
E	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.		
F	The transverse partitions extend from 4.00" off the bottom to the underside of the top cover.		
G	All partitions interlock and shall be welded to the tank bottom and sides.		
H	The tank top shall be constructed of 0.50" polypropylene.		
I	It shall be recessed 0.38" and shall be welded to the tank sides and the longitudinal partitions.		
J	It shall be supported to keep it rigid during fast filling conditions.		
K	Construction shall include 2.00" polypropylene dowels spaced no more than 30.00" apart and welded to the transverse partitions.		
L	Two of the dowels shall be drilled and tapped (0.50" diameter, 13.00" deep) to accommodate lifting eyes.		
M	A sump shall be provided at the bottom of the water tank. The sump shall include a drain plug and the tank outlet.		
N	Tank shall be installed in a fabricated "cradle" assembly constructed of structural steel.		
O	Sufficient cross members are provided to properly support bottom of tank.		
P	Cross members are constructed of steel bar channel or rectangular tubing.		
Q	Tank "floats" in cradle to avoid torsional stress caused by chassis frame flexing.		

R	Rubber cushions, 0.50" thick x 3.00" wide, shall be placed on all horizontal surfaces that the tank rests on.		
S	Stops are provided to prevent an empty tank from bouncing excessively while moving vehicle.		
T	Tank mounting system is approved by the manufacturer.		
U	Fill tower shall be constructed of .50" polypropylene and shall be a minimum of 8.00" wide x 14.00" long.		
V	Fill tower shall be furnished with a .25" thick polypropylene screen and a hinged cover.		
W	An overflow pipe, constructed of 4.00" schedule 40 polypropylene, shall be installed approximately halfway down the fill tower and extend through the water tank and exit to the rear of the rear axle.		
242.	**HOSE BED**		
A	The hose bed shall be fabricated of 0.125" 5052-H32 aluminum with a tensile strength range of 31,000 to 38,000 psi.		
B	The sides of the hose bed shall not form any portion of the fender compartments.		
C	The upper and rear edges of the hose bed side panels shall have a double break for rigidity.		
D	The hose bed shall be located ahead of the ladder turntable.		
E	There shall be a hose chute to the side and rear of the hose bed on both the driver and passenger side to allow for payout/removal of the hose.		
F	The hose bed flooring shall consist of removable aluminum grating with a top surface that is perforated to aid in hose aeration.		
G	Hose capacity shall be a minimum of 1000' of 5.00" large diameter hose.		
243.	**HOSEBED HOSE RESTRAINT** A black hose bed cover shall be furnished with Velcro with snaps fasteners at the front and Velcro with jacket snaps in each corner fasteners on the sides.		
244.	**RUNNING BOARDS**		
A	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.		
B	Running boards shall be 13.00" deep and are spaced away from the body 0.50".		
C	A splash guard shall be provided to keep road dirt or water from splashing up onto the pump panels.		
D	The running boards shall have a riser on the body to protect the painted surface from damage by stepping on the running boards.		
E	The entire surface of the running boards shall be covered with bright aluminum treadplate.		
245.	**TURNTABLE STEPS**		
A	Access to the turntable shall be provided by a set of swing-down steps, one on the driver side and one on the passenger side of the truck.		
B	The access steps shall be located rearward of the compartmentation.		
C	All steps shall have a height no greater than 14.00" from top surface to top surface.		
D	The swing down step mechanism shall be constructed of brushed aluminum with bright aluminum steps with Morton Cass inserts.		
E	The stepwell shall be lined with bright aluminum treadplate to act as scuffplates.		
F	A handrail shall be provided on each side of the access steps.		
G	Holes shall be provided in each side step plate for hand holds.		
H	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.		
I	The steps shall be connected to the "Do Not Move Truck" indicator in the cab.		

246.	**STEP LIGHTS**		
A	There shall be three (3) LED step lights provided for each set of aerial turntable access steps.		
B	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.		
C	The step lights shall be actuated by the aerial master switch in the cab.		
247.	**SMOOTH ALUMINUM REAR WALL** The rear wall shall be smooth aluminum.		
248.	**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.		
249.	**RUNNING BOARD HOSE RESTRAINT** A pair of 2.00" wide black nylon straps with Velcro fasteners shall be provided for each hose tray to secure the hose during travel. There shall be One (1) hose tray located in the passenger side running board.		
250.	**HOSE TRAY**		
A	One (1) hose tray shall be recessed in the passenger side running board.		
B	Capacity of the tray shall be 25' of 5.00" hose.		
C	Rubber matting shall be installed on the floor of the tray to provide proper ventilation.		
251.	**COMPARTMENTATION**		
A	Compartmentation shall be fabricated of 0.125" 5052 aluminum.		
B	Side compartments shall be an integral assembly with the rear fenders.		
C	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.		
D	Compartment flooring shall be of the sweep out design with the floor higher than the compartment door lip.		
E	Drip protection shall be provided above the doors by means of bright aluminum extrusion, formed bright aluminum treadplate or polished stainless steel.		
F	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.		
G	Side compartment covers shall be separate from the compartment tops.		
H	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.		
252.	**UNDERBODY SUPPORT SYSTEM**		
A	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.		
B	An aluminum body structure shall be mounted to the aerial torque box at three (3) points to create a floating substructure which shall result in an 800 lbs. equipment support rating per lower compartment and provide up to 0.31" accumulative floor thickness.		
C	The three (3) point body mounting system shall consist of two (2) points in the front and one (1) in the rear. The front mounts shall attach to the top of the stabilizer H-box, and the rear mount shall attach to the rear of the torque box at the chassis centerline.		
D	The body structure shall be mounted with neoprene elastomer isolators. These isolators shall have a broad load range, proven viability in vehicular applications, be of a fail-safe design and allow for all necessary movement in three (3) transitional and rotational modes.		
E	The combination of the three (3) point mounting system and elastomer isolators allow the chassis and torque box to flex without driving loads into the body.		

253.	**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.		
254.	**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.		
255.	**TESTING OF BODY DESIGN**		
A	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.		
B	The body shall be tested while loaded to its greatest in-service weight.		
C	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.		
D	Evidence of the actual testing techniques shall be made available upon request.		
256.	**LEFT SIDE COMPARTMENTATION**		
A	The full height roll-up door compartment ahead of the rear wheels shall be 39.19" wide x 63.00" high x 26.00" deep inside the lower 25.50" and 12.00" deep inside the upper portion with a clear door opening of 36.44" wide x 56.00" high.		
B	There shall be one (1) roll-up door compartment above the wheel well and stabilizer. The compartment shall be 83.88" wide x 25.25" high x 12.00" deep inside with a clear door opening of 81.12" wide x 19.75" high.		
C	All compartments shall include a drip pan below the roll of the door.		
D	The full height roll-up door compartment behind the rear wheel shall be 45.12" wide x 57.00" high x 26.00" deep inside the lower 25.50" and 12.00" deep in the upper portion with a clear door opening of 43.38" wide x 50.00" high.		
E	The compartment shall include a drip pan below the roll of the door.		
257.	**RIGHT SIDE COMPARTMENTATION**		
A	The full height roll-up door compartment ahead of the rear wheels shall be 39.19" wide x 64.00" high x 26.00" deep inside the lower 25.50" and 12.00" deep inside the upper portion with a clear door opening of 36.44" wide x 57.00" high.		
B	There shall be one (1) roll-up door compartment above the wheel well and stabilizer. The compartment shall be 83.88" wide x 25.25" high x 12.00" deep inside with a clear door opening of 81.12" wide x 19.75" high.		
C	All compartments shall include a drip pan below the roll of the door.		
D	The full height roll-up door compartment behind the rear wheel shall be 45.12" wide x 57.00" high x 26.00" deep inside the lower 25.50" and 12.00" deep in the upper portion with a clear door opening of 43.38" wide x 50.00" high.		
E	The compartment shall include a drip pan below the roll of the door.		
258.	**REAR COMPARTMENT**		
A	A compartment shall be provided at the rear of the unit.		
B	Compartment shall be 27.75" wide x 35.00" high x 26.25" deep with a clear door opening of 25.00" wide x 29.50" high.		
C	The compartment shall be furnished with an anodized satin finish roll-up door. A stainless steel lift bar to be provided for opening the door and located at the bottom of each door with		

	latches on the outer extrusion of the door frame. A ledge to be supplied over lift bar for additional area to aid in closing the door.		
259.	**SIDE COMPARTMENT ROLL-UP DOORS**		
A	There shall be six (6) compartment doors installed on the side compartments, double faced, aluminum construction and painted one (1) color to match the lower portion of the body.		
B	Every slat shall have interlocking end shoes to prevent slat from moving side-to-side and binding the door.		
C	Slats shall have interlocking joints with a folding locking flange to provide security and prevent penetration by sharp objects.		
D	Slats shall be double-wall extrusion 1.366" high by .315" thick.		
E	Between each slat shall be a co-extruded PVC inner seal to prevent metal-to-metal contact and to repel moisture. This inner seal is not visible to detract from appearance of door.		
F	Mounting and adjusting the curtain shall be done with a clip system that connects the curtain slats to the operator drum allowing for easy tension adjustment without tools.		
G	A non-locking lift bar to be provided for each roll-up door. The lift bar shall be located at the bottom of the door and have latches on the outer extrusion of the door frame. A ledge shall be supplied over the lift bar as additional area to aid in closing the door.		
H	Each door shall be constructed from an aluminum box section. The exterior surface of each slat shall be flat. The interior surfaces shall be concave to provide strength and prevent loose equipment from jamming the door from inside.		
I	Each roll-up door shall have a 4.00” diameter balancer/tensioner drum to assist in lifting the door. A garage door style shall not acceptable.		
J	The header for the roll-up door assembly shall not exceed 4.00".		
K	A heavy-duty magnetic switch shall be used for control of open compartment door warning lights.		
260.	**REAR BUMPER** An aluminum rub rail shall be provided at the rear of the unit. It shall extend the full width of the body.		
261.	**COMPARTMENT LIGHTING**		
A	There shall be seven (7) compartment(s) with two (2) 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 compartment(s): All body compartments.		
B	Any remaining compartments without light strips shall have a 6.00" diameter light.		
C	Opening the compartment door shall automatically turn the compartment lighting on.		
262.	**MOUNTING TRACKS**		
A	There shall be recessed tracks installed vertically to support the adjustable shelf(s).		
B	Tracks shall not protrude into any compartment in order to provide the greatest compartment space and widest shelves possible.		
C	The tracks shall be provided in each compartment except for the one that contains the pump operator's panel.		
263.	**ADJUSTABLE SHELVES**		
A	There shall be seven (7) shelves, with a capacity of 500 lb provided. The shelf construction shall consist of 0.188" thick aluminum with 2.00" sides. Each shelf shall be infinitely adjustable by means of a threaded fastener, which slides in a track.		
B	Each shelf shall be infinitely adjustable by means of a threaded fastener, which slides in a track.		
C	The shelves shall be held in place by 0.12" thick stamped plated brackets and bolts.		

D	The location(s) shall be in LS1 at the depth transition point, in RS1 at the transition point, in RS3 at the transition point, in LS2 centered between the floor and ceiling, in LS1 in the upper third, in LS3 at the depth transition point and in RS2 centered between the floor and the ceiling to the left of the partition.		
264.	**SLIDE-OUT FLOOR MOUNTED TRAY**		
A	There shall be two (2) floor mounted slide-out tray with 2.00" sides provided D1, D3. 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 to match compartment interior.		
B	The tray(s) shall be designed for maximum compartment width and depth.		
C	Slides shall be equipped with ball bearings for ease of operation and years of dependable service. The slides shall be located on the sides of the tray so that the tray can be located as close to the compartment floor as possible.		
D	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.		
265.	**SWING OUT TOOLBOARD**		
A	A swing out aluminum tool board shall be provided.		
B	It shall be a minimum of .188" thick with .203" diameter holes in a pegboard pattern with 1.00" centers between holes.		
C	A 1.00" x 1.00" aluminum tube frame shall be welded to the edge of the pegboard.		
D	The board shall be mounted on a pivoting device at the front of the compartment on the top and bottom to allow easy movement in and out of the compartment. The maximum tool load shall be 400 lb.		
E	The board shall have positive lock in the stowed and extended position.		
F	The board shall be mounted on adjustable tracks from front to back within the compartment.		
G	There shall be One (1) tool board(s) provided. The tool board(s) shall be spatter gray painted and installed in RS2.		
266.	**SCBA HOLDER**		
A	A total of three (3) SCBA holder bracket. This bracket shall include a back plate, two seats, a footplate and the model LLS ("Load & Lock") strap to hold the bottle in the bracket. The bracket seats shall be a "one size fits all" style seat and shall accommodate SCBA cylinders from the high pressure 30-minute to the high pressure 60-minute.		
B	The brackets shall be mounted One (1) in D3 and two (2) in P3 high and forward on tank wall in upper shallow portion.		
267.	**COMPARTMENT GRATING**		
A	Vinyl grating shall be provided in one (1) compartments. The locations are, IN THE BOX ON THE AERIAL TURNTABLE.		
B	The vinyl grating shall be .50" thick and be cross bonded by .25" diameter ribbed sections spaced for aeration.		
268.	**VERTICAL COMPARTMENT PARTITION**		
A	One (1) partition shall be provided.		
B	The partition construction shall consist of body material painted spatter gray. Each partition shall be the full vertical height of the compartment.		
C	The location(s) shall be in RS2, 50.00" from the forward door frame.		
269.	**RUB RAIL**		
A	Bottom edge of the side compartments shall be trimmed with a bright aluminum extruded rub rail.		
B	Trim shall be 3.12" high with 1.50" flanges turned outward for rigidity.		

C	The rub rails shall not be an integral part of the body construction, which allows replacement in the event of damage.		
270.	**BODY FENDER CROWNS**		
A	Polished stainless steel fender crowns shall be provided around the rear wheel openings.		
B	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.		
C	A dielectric barrier shall be provided between the fender crown fasteners (screws) and the fender sheet metal to prevent corrosion.		
D	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.		
271.	**HARD SUCTION HOSE** Two (2) lengths of 6.00" clear corrugated hard suction hose, reinforced with a black spiral helix, 10' in length, shall be provided. The hose shall be equipped with a long handle female coupling on one (1) end and a rocker lug male coupling on the other end. Couplings shall be black anodized hard coated aluminum.		
272.	**HOSE TROUGHS**		
A.	Hard suction hose shall be carried in two (2) V-shaped troughs, one (1) each side, and held in place by Velcro straps.		
B.	Troughs shall be constructed of aluminum and painted job color.		
273.	**HANDRAILS**		
A	The handrails shall be 1.25" diameter anodized aluminum extrusion, with a ribbed design, to provide a positive gripping surface.		
B	Chrome plated end stanchions shall support the handrail. Plastic gaskets shall be used between end stanchions and any painted surfaces.		
C	Drain holes shall be provided in the bottom of all vertically mounted handrails.		
D	Handrails shall be provided to meet NFPA 1901 section 15.8 requirements. The handrails shall be installed as noted on the sales drawing.		
274.	**AIR BOTTLE STORAGE** A total of one (1) air bottle compartment shall be provided and located on the left side behind the rear wheel. The air bottle compartment shall be 15.00" wide x 7.50" tall x 26.00" deep. A polished stainless steel door with a Southco raised trigger C2 chrome lever latch shall be provided to contain the air bottle. The triangular shaped door shall cover the air bottle opening and the fuel fill below it. 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.		
275.	**AIR BOTTLE STORAGE** A total of two (2) air bottle compartments shall be provided and located on the right side ahead of the rear wheel and on the right side behind the rear wheel. The air bottle compartment shall be a minimum of 15.00" wide x 7.50" tall x 26.00" deep. A polished stainless steel door with a Southco raised trigger C2 chrome lever latch shall be provided to contain the air bottle. A dielectric barrier shall be provided between the door hinge, hinge fasteners and the body sheet metal. Inside the compartment, black rubber matting shall be provided.		

276.	**AIR BOTTLE STORAGE** A total of one (1) air bottle compartment shall be provided and located on the left side ahead of the rear wheel. The air bottle compartment shall be 15.00" wide x 7.50" tall x 26.00" deep. A polished stainless steel door with a Southco raised trigger C2 chrome lever latch shall be provided to contain the air bottle. The triangular shaped door shall cover the air bottle opening and the DEF tank below it. 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.		
277.	**EXTENSION LADDER** There shall be a 35' two (2) section aluminum extension ladder provided.		
278.	**AERIAL EXTENSION LADDERS** There shall be one (1) 24' two (2) section aluminum extension ladder(s) provided and located in the ladder storage compartment.		
279.	**ROOF LADDER** There shall be two (2) 16' aluminum roof ladder(s) provided.		
280.	**ADDED ROOF LADDER** There shall be one (1) 18' aluminum roof ladder with double roof hooks provided.		
281.	**AERIAL FOLDING LADDER** There shall be one (1) 10' aluminum folding ladder(s) provided and located in the ladder storage compartment.		
282.	**GROUND LADDER STORAGE**		
A	Ladder tunnels shall be provided at the rear of the apparatus on either side of the turntable.		
B	Tunnels shall be capable of holding up to two (2) two-section pumper style ladders on each side not in excess of 22.00" wide or 5-13/16" in thickness.		
C	The ladders shall be held captive top and bottom by stainless steel tracks. A polyethylene wear plate shall be provided to prevent ladders from being scuffed by contacting metal parts. The plate shall be mounted to the bottom of the entrance area of the ladder tunnels.		
D	All ladders shall be removable individually without having to remove any other ladder.		
E	A hook and loop strap shall be provided to help contain the ladders.		
F	A smooth aluminum door shall be provided on each ladder tunnel.		
283.	**LADDER STORAGE LIGHTING**		
A	There shall be one (1) 4.00" white LED lights with grommets used to illuminate the torque box ladder storage compartment. One (1) located to the side in each ladder storage compartment to illuminate the door opening area.		
B	The lights shall be activated when the ladder storage compartment door is opened.		
284.	**12' PIKE POLE** There shall be two (2) 12' pike pole(s) with fiberglass handles provided. The pike pole(s) shall be stored in tubular holders located in the ground ladder storage compartment.		
285.	**8' PIKE POLE** There shall be two (2) 8' pike pole(s) with fiberglass handle provided. The pike pole(s) shall be stored in tubular holders located in the ground ladder storage compartment.		
286.	**6' PIKE POLE** There shall be two (2) 6' pike pole(s) with fiberglass handle provided. The pike pole(s) shall be stored in tubular holders located in the ground ladder storage compartment.		
287.	**4' PIKE POLE** There shall be two (2) 4' dry-wall Hook(s) with fiberglass pole and D-ring handles provided.		
288.	**PIKE POLE STORAGE IN TORQUE BOX/LADDER STORAGE** There shall be ABS tubing provided in the torque box/ladder storage area for a total of six (6) pike poles. If the head of a pike pole can come into contact with a painted surface, a stainless steel scuff plate shall be provided.		

289.	**STEPS**		
A	A folding step shall be provided on the front of each fender compartment for access to the hose bed. The step shall be bright finished, non-skid with a black coating. The step shall incorporate an LED light to illuminate the stepping surface. The step can be used as a hand hold with two openings wide enough for a gloved hand.		
B	Four (4) additional folding steps shall be located two (2) on the driver side front bulkhead and two (2) on the passenger side front bulkhead. The step(s) shall be bright finished, non-skid with a black coating. Each step shall incorporate an LED light to illuminate the stepping surface. The step(s) can be used as a hand hold with two openings wide enough for a gloved hand.		
290.	**PUMP (WATEROUS)**		
A	Pump shall be a Waterous 2000 gpm single (1) stage midship mounted centrifugal type.		
B	Pump shall be the class "A" type.		
C	Pump shall deliver the percentage of rated discharge at pressures indicated below:		
	• 100% of rated capacity at 150 psi net pump pressure.		
	• 70% of rated capacity at 200 psi net pump pressure.		
	• 50% of rated capacity at 250 psi net pump pressure.		
D	Pump body shall be close-grained gray iron, bronze fitted, and horizontally split in two (2) sections for easy removal of the entire impeller shaft assembly (including wear rings).		
E	Pump shall be designed for complete servicing from the bottom of the truck, without disturbing the pump setting or apparatus piping.		
F	Pump case halves shall be bolted together on a single horizontal face to minimize a chance of leakage and facilitate ease of reassembly. No end flanges shall be used.		
G	Discharge manifold of the pump shall be cast as an integral part of the pump body assembly and shall provide a minimum of three (3) 3.50" openings for flexibility in providing various discharge outlets for maximum efficiency.		
H	The three (3) 3.50" openings shall be located as follows: one (1) outlet to the right of the pump, one (1) outlet to the left of the pump, and one (1) outlet directly on top of the discharge manifold.		
I	Impeller shaft shall be stainless steel, accurately ground to size. It shall be supported at each end by sealed, anti-friction ball bearings for rigid precise support. Impeller shall have flame plated hubs assuring maximum pump life and efficiency despite any presence of abrasive matter in the water supply.		
J	Bearings shall be protected from water and sediment by suitable stuffing boxes, flinger rings, and oil seals. No special or sleeve type bearings shall be used.		
K	Pump shall be equipped with a self-adjusting, maintenance-free, mechanical shaft seal.		
L	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.		
M	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.		
N	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.		
291.	**PUMP TRANSMISSION**		
A	The pump transmission shall be made of a three (3) piece, aluminum, horizontally split casing. Power transfer to pump shall be through a high strength Morse HY-VO silent drive chain. By the use of a chain rather than gears, 50% of the sprocket shall be accepting or transmitting torque, compared to two (2) or three (3) teeth doing all the work.		

B	Drive shafts shall be 2.35" diameter hardened and ground alloy steel and supported by ball bearings. The case shall be designed to eliminate the need for water cooling.		
292.	**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 stationary pumping only.		
293.	**AIR PUMP SHIFT**		
A	Pump shift engagement shall be made by a two (2) position sliding collar, actuated pneumatically (by air pressure), with a three (3) position air control switch located in the cab. A manual back-up shift control shall also be located on the pump operator's pump panel.		
B	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".		
C	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.		
D	The pump shift control in the cab shall be illuminated to meet NFPA requirements.		
294.	**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.		
295.	**AUXILIARY COOLING SYSTEM** A supplementary heat exchange cooling system shall be provided to allow the use of water from the discharge side of the pump for cooling the engine water. Heat exchanger shall be cylindrical type and shall be a separate unit. It shall be installed in the pump or engine compartment with the control located on the pump operator's control panel. Exchanger shall be plumbed to the master drain valve.		
296.	**INTAKE RELIEF VALVE - PUMP**		
A	A relief valve shall be installed on the suction side of the pump preset at 125 psig.		
B	Relief valve shall have a working range of 50 psig to 250 psig.		
C	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.		
D	The relief valve pressure control shall be located behind the right side pump panel with a stainless steel access door.		
297.	**PRESSURE GOVERNOR**		
A	This apparatus shall be equipped with a Class1 TPG+ Pressure Governor engine/pump governor/throttle system that is connected directly to the Electronic Control Module (ECM) mounted on the engine. The pressure governor is to operate as a pressure sensor (regulating) governor (PSG).		
B	A special preset feature shall permit a predetermined pressure of RPM to be set. The preset pressure or RPM will be displayed on the message display of the "pressure governor". The preset shall be easily adjustable by the operator.		
C	The pressure sensor governor system shall be operable only after the vehicle parking brake has been set, the transmission is the pumping mode, and the fire pump has been engaged.		
D	The pressure sensor governor system shall have two (2) modes of operation: pressure mode or rpm mode.		
E	When in the pressure mode, the PSG system shall automatically maintain the discharge pressure set by the operator regardless of flow (within engine/pump operating capabilities).		
F	In the rpm mode, the PSG system shall automatically maintain a set engine speed, regardless of engine load (within engine operation capabilities).		
G	A pump cavitation protection feature shall be provided which shall return the engine to idle should the pump cavitate.		

H	The pressure controller shall incorporate monitoring for engine coolant temperature, oil pressure, and battery voltage.		
298.	**PRIMER SYSTEM**		
A	An electric pump priming system conforming to standards outlined in the current edition of NFPA 1901 shall be furnished with the apparatus.		
B	One (1) electric motor driven rotary vane primer shall be provided.		
C	Two (2) vacuum activated priming valves shall be provided, one plumbed to the main pump and one plumbed to the front suction piping.		
D	Two (2) momentary push-button controls shall be located at the pump operator's panel.		
E	The push button control system control shall operate an electric priming motor and the priming valve shall automatically open during priming and close when the primer is deactivated.		
299.	**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.		
300.	**PLUMBING, STAINLESS STEEL AND HOSE**		
A	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 hose's shall be equipped with brass or stainless steel couplings. All stainless steel hard plumbing shall be a minimum of a schedule 10 wall thickness.		
B	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.		
C	Plumbing manifold bodies shall be ductile cast iron or stainless steel.		
D	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.		
E	All water carrying gauge lines shall be of flexible polypropylene tubing.		
F	All piping, hose and fittings shall have a minimum of a 500 PSI hydrodynamic pressure rating.		
301.	**FOAM SYSTEM PLUMBING** All piping that is in contact with the foam concentrate or foam/water solution shall be stainless steel. The fittings shall be stainless steel or brass. Cast iron pump manifolds will be allowed.		
302.	**MAIN PUMP INLETS** A 6.00" pump manifold inlet shall be provided on each side of the vehicle. The suction inlets shall include screens that are designed to provide cathodic protection for the pump, thus reducing corrosion in the pump.		
303.	**MAIN PUMP INLET CAP**		
A	The main pump inlets shall have National Standard Threads with a long handle chrome cap.		
B	The cap shall incorporate a thread design to automatically relieve stored pressure in the line when disconnected (no exception).		
304.	**INLET VALVES WITH INTAKE RELIEF VALVE**		
A	There shall be Two (2)7982 (30 degree swivel inlet) manually operated aluminum ball intake valve(s) provided both side 6" intakes.		
B	The inlet connection shall be 5.0" Storz with a cap and the outlet connection shall be 6.0" FNST swivel long handle.		
C	A 12.5" diameter hand wheel shall be included to operate valve open and close functions. A position indicator shall be included to indicate position of the ball.		

D	The ball intake valve shall be equipped with an adjustable pressure relief valve. The relief valve shall have a working range of 50 PSI to 250 PSI.		
E	A 3/4" bleeder/drain valve shall be provided on the ball intake valve to exhaust excess air or water from the valve.		
F	The Intake Valve shall be constructed of lightweight, corrosion-resistant, hard-anodized aluminum and stainless steel. To protect against corrosion, the casting shall be coated with a powder coat finish and all components on the wet side of the valve shall be constructed from stainless steel.		
305.	**LEFT SIDE INLET**		
A	There shall be one (1) auxiliary inlet with a 2.50" valve at the left side pump panel, terminating with a 2.50" (F) National Standard hose thread adapter.		
B	The auxiliary inlet shall be provided with a strainer, chrome swivel and plug.		
306.	**RIGHT SIDE INLET**		
A	There shall be one (1) auxiliary inlet with a 2.50" valve at the right side pump panel, terminating with a 2.50" (F) National Standard hose thread adapter.		
B	The auxiliary inlet shall be provided with a strainer, chrome swivel and plug.		
C	The location of the valve for the two (2) inlets shall be recessed behind the pump panel.		
307.	**INLET CONTROL** The side auxiliary inlet(s) shall incorporate a quarter-turn ball valve with the control located at the inlet valve. The valve operating mechanism shall indicate the position of the valve.		
308.	**FRONT INLET**		
A	A 6.00" inlet front inlet with die cast zinc screens shall be provided using 5.00" stainless steel pipe and a 5.00" butterfly valve. Only radiused elbows shall be used in the piping, no mitered joints.		
B	Drains are furnished in all the low points of piping and have .75" valves with swing handle.		
C	A bleeder valve shall be located at the threaded connection.		
D	The front suction shall be located on the right side of the bumper extension.		
309.	**FRONT INLET CONTROL**		
A	The front inlet shall be gated with the control located at the pump operator's panel. The valve operating mechanism shall indicate the position of the valve or an indicator shall be provided to show when the valve is closed.		
B	There shall be an electric valve controller provided. The control shall be momentary to allow the valve to be gated for ease of operation. Indicator lights shall be provided to show if the valve is open or closed.		
310.	**FRONT INLET INTAKE RELIEF VALVE**		
A	An intake pressure relief valve shall be provided on the inlet side of the valve preset at 125 psig.		
B	The pressure relief valve shall be adjustable from 50 to 250 psi.		
C	The outlet shall be 2.50" National Standard hose thread and terminate below the frame rails and shall have a "do not cap" warning tag near the discharge outlet.		
311.	**FRONT INLET CAP**		
A	The front inlet shall have National Standard hose threads with a long handle cap.		
B	The cap shall incorporate a thread design to automatically relieve stored pressure in the line when disconnected (no exception).		
C	The cap shall be fabricated from brass material.		
312.	**FRONT INLET ELBOW**		
A	The front inlet shall have a 6.00" swivel with National Standard hose threads and a long handle chromed plated cap.		
B	The swivel shall have a smooth surface chrome finish.		

C	A quarter-turn style of bleeder shall be provided on the front inlet elbow.		
313.	**6.00" STORZ ADAPTER** There shall be a 6.00" FNST x 5.00" Storz rigid adapter with a Storz blind cap, provided on the front inlet plumbing.		
314.	**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 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.		
315.	**TANK TO PUMP**		
A	The booster tank shall be connected to the intake side of the pump with heavy duty piping and a quarter turn 3.00" full flow line valve with the control remotely located at the operator's panel. Tank to pump line shall run straight (no elbows) from the pump into the front face of the water tank and angle down into the tank sump. A rubber coupling shall be included in this line to prevent damage from vibration or chassis flexing.		
B	A check valve shall be provided in the tank to pump supply line to prevent the possibility of "back filling" the water tank.		
316.	**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.		
317.	**LEFT SIDE DISCHARGE OUTLETS** There shall be two (2) discharge outlets with a 2.50" valve on the left side of the apparatus, terminating with a 2.50" (M) National Standard hose thread adapter.		
318.	**RIGHT SIDE DISCHARGE OUTLETS** There shall be three (3) discharge outlets with a 2.50" valve on the right side of the apparatus, terminating with a 2.50" (M) National Standard hose thread adapter.		
319.	**LARGE DIAMETER DISCHARGE OUTLET**		
A	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 hand wheel control at the pump operator's control panel.		
B	An indicator shall be provided to show when the valve is in the closed position.		
320.	**FRONT DISCHARGE OUTLET**		
A	There shall be one (1) 1.50" discharge outlet piped to the front of the apparatus and located on the top of the right side of the front bumper.		
B	Plumbing shall consist of 2.00" piping and flexible hose with a 2.00" ball valve with control at the pump operator's panel. A fabricated weldment made of stainless steel pipe shall be used in the plumbing where appropriate. The piping shall terminate with a 1.50" NST with 90 degree stainless steel swivel.		
C	There shall be automatic drains provided at all low points of the piping.		
321.	**REAR DISCHARGE OUTLET** There shall be One (1) discharge outlet piped to the rear of the hose bed, on left side, installed so proper clearance is provided for spanner wrenches or adapters. Plumbing shall consist of 3.00" piping along with a 3.00" full flow ball valve with the control from the pump operator's panel. The One (1) discharge outlet shall terminate with a 2.50" male National Standard hose thread adapter.		
322.	**DISCHARGE CAPS/INLET PLUGS**		
A	Chrome plated, rocker lug, caps with vinyl covered cables shall be furnished for all discharge outlets 1.00" thru 3.00" in size, besides the pre-connected hose outlets.		

B	Chrome plated, rocker lug, plugs with vinyl covered cables shall be furnished for all auxiliary inlets 1.00" thru 3.00" in size.		
C	The caps and plugs shall incorporate a thread design to automatically relieve stored pressure in the line when disconnected (no exception).		
323.	**OUTLET BLEEDER VALVE**		
A	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.		
B	The valves shall be located behind the panel with a swing style handle control extended to the outside of the side pump panel. The handles shall be chrome plated and provide a visual indication of valve position. The swing handle shall provide an ergonomic position for operating the valve without twisting the wrist and provides excellent leverage. Bleeders shall be located at the bottom of the pump panel. They shall be properly labeled identifying the discharge they are plumbed in to. The water discharged by the bleeders shall be routed below the chassis frame rails.		
324.	**LEFT SIDE OUTLET ELBOWS**		
A	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.		
B	The elbow shall incorporate a thread design to automatically relieve stored pressure in the line when disconnected (no exception).		
325.	**RIGHT SIDE OUTLET ELBOWS**		
A	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.		
B	The elbow shall incorporate a thread design to automatically relieve stored pressure in the line when disconnected (no exception).		
326.	**REAR OUTLET ELBOWS**		
A	The 2.50" discharge outlets located at the rear of the apparatus 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.		
B	The elbow shall incorporate a thread design to automatically relieve stored pressure in the line when disconnected (no exception).		
327.	**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.		
328.	**DISCHARGE OUTLET CONTROLS**		
A	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.		
B	If a hand wheel control valve is used, the control shall be a minimum of a 3.9" diameter stainless steel hand wheel with a dial position indicator built in to the center of the hand wheel.		
329.	**AERIAL OUTLET**		
A	The aerial waterway shall be plumbed from the pump to the water tower line with 5.00" pipe and a 4.00" valve. The hand wheel control for the waterway valve shall be located at the pump operator's panel.		
B	An indicator shall be provided to show the position of the valve.		
330.	**CROSSLAY HOSE BEDS**		
A	Two (2) cross lays with 1.50" outlets shall be provided. Each bed to be capable of carrying 200' 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.		
B	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.		

C	The cross lay controls shall be at the pump operator's panel.		
D	The center cross lay 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.		
E	Vertical scuff plates constructed of stainless steel shall be provided at the front and rear ends of the bed on each side of vehicle.		
F	Cross lay bed flooring shall consist of removable perforated brushed aluminum.		
331.	**2.50" CROSSLAY HOSE BED**		
A	One (1) cross lay with 2.50" outlets shall be provided. This bed to be capable of carrying 200' 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.		
B	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.		
C	The cross lay control shall be at the pump operator's panel.		
D	The center cross lay 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. The remainder of the cross lay bed shall be painted job color.		
E	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.		
F	Cross lay bed flooring shall consist of removable perforated brushed aluminum.		
332.	**CROSSLAY HOSE RESTRAINT** A 2.00" black nylon webbing design restraint shall be provided at each of the ends of three (3) crosslay(s) to secure the hose during travel. The webbing assembly is to be attached at the bottom of the crosslays, with footman loops and a permanent attachment, while the top outside corners are attached with seat belt buckles, and a small piece of hinge, keeping the buckles beneath the height of the crosslays and avoiding a tripping hazard. The female end of the seat buckle shall be permanently attached at the top, inboard forward and rearward, corners of the opening facing outboard. A nylon strap shall be attached to the female seat belt buckles to allow a center pull for releasing the buckles on the webbing.		
333.	**CROSSLAY COVER** A bi-fold .19" aluminum treadplate cover shall be installed over the crosslay hose beds. It shall include a latch at each end of the cover to hold it securely in place, a chrome grab handle at each end for opening and closing the cover and a foam rubber gasket where the cover comes into contact to a painted surface.		
334.	**FOAM CONCENTRATE PROPORTIONING SYSTEM**		
A	An electronic direct injection foam system shall be provided as the means for the proportioning of foam concentrate into the water stream. An electronic, fully automatic, variable speed, direct injection, discharge side foam proportioning system shall be provided.		
B	This system shall be a dual agent system capable of handling both Class A foam and Class B foam concentrates.		
C	The foam system shall be plumbed to four (4) discharges. The discharges capable of dispensing foam shall be front and three crosslays.		
D	The foam proportioning system operation shall be based on a direct measurement of water flows, and remain consistent within the specified flow and pressure. The system shall be equipped with a digital electronic control display on the pump panel. Incorporated within the control display shall be a microprocessor, which receives input from the system flow meter while also monitoring the foam concentrate pump output. The microprocessor shall compare the values of the water flow versus the foam flow, to ensure the proportion rate is accurate.		
E	One (1) paddle wheel shall be installed to monitor all foam discharges.		
F	Push button control for the form proportioning rate shall allow a ratio from .1% to 3% in .1% increments.		

G	The rated capacity of this system shall be 160 gpm at 3% and 1000 gpm at .5 %.		
H	A 5 gpm minimum capacity positive displacement foam pump powered by a 12 volts dc electric motor shall be provided. The maximum current draw allowable for the electric motor is 60 amperes @ 12vdc.		
I	One (1) check valve shall be installed in the plumbing to prevent foam from contaminating the water pump. The check valve shall be approved by the foam system manufacturer.		
J	A tank selector control shall be mounted at the pump operator's panel.		
335.	**FOAM TANK** The foam tank shall be an integral portion of the polypropylene water tank. The cell shall have a capacity of 20 gallons of foam with the intended use of Class A foam. The foam cell shall not reduce the capacity of the water tank. The foam cell shall have a screen in the fill dome and a breather in the lid.		
336.	**FOAM CELL** The foam cell shall be an integral portion of the polypropylene water tank. The cell shall have a capacity of 25 gallons of foam with the intended use of Class B foam. The brand of foam stored in this cell shall be to be stated with approval drawings. The foam cell shall not reduce the capacity of the water tank. The foam cell shall have a screen in the fill dome and a breather in the lid.		
337.	**FOAM TANK DRAIN**		
A	The foam tank drain shall be a 1.00" drain valve located inside the pump compartment accessible through a door on the right side pump panel.		
B	The following drawing(s) shall be provided for approval by the customer. The drawing(s) shall be made for up Two (02) Truck apparatus and/or similar job number.		
338.	**PUMP OPERATOR'S PANEL DRAWING** A detailed drawing to scale of the pump operator's panel shall be provided for the customer to review. The drawing shall include all of the gauges, controls, switching, etc.., and located on the pump operator's panel. The customer will be allowed to make changes and/or mark-ups to this approval drawing. The fire apparatus manufacturer shall make revisions (If needed) to the drawing per the customer changes and/or mark-ups as long as the changes are physically possible within a specific product line.		
A	The finalized and signed customer approved pump operator's panel drawing shall become part of the contract documents.		
B	Due to the way drain(s), bleeder(s), operational/maintenance tag(s) and NFPA required warning tag(s) are placed on pump panel(s), these items will NOT be shown on any pump panel approval drawing(s). These item(s) will be placed on pump panel(s) at the fire apparatus manufacturer discretion.		
339.	**COLOR CODED TAGS**		
A	A detailed drawing/chart of the colors used on all of the inlet(s) and outlet(s) shall be provided for the customer to review. The customer will be allowed to make changes and/or mark-ups to this approval drawing/chart. The fire apparatus manufacturer shall make revisions (If needed) to the drawing per the customer changes and/or mark-ups as long as the changes are physically possible within a specific product line.		
B	The finalized and signed customer approved drawing/chart of the colors shall become part of the contract documents.		
340.	**SPECIAL TEXT/VERBIAGE TAGS**		
A	A detailed drawing/chart of the text/verbiage used on all of the inlet(s) and outlet(s) shall be provided for the customer to review. The customer will be allowed to make changes and/or mark-ups to this approval drawing/chart. The fire apparatus manufacturer shall make revisions (If needed) to the drawing per the customer changes and/or mark-ups as long as the changes are physically possible within a specific product line.		
B	The finalized and signed customer approved drawing/chart of the text/verbiage shall become part of the contract documents.		

341.	**PUMP COMPARTMENT**		
A	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.		
B	The pump compartment substructure shall be a fabricated assembly of steel tubing, angles and channels which supports both the fire pump and the side running boards.		
C	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.		
D	Pump compartment, pump, plumbing and gauge panels shall be removable from the chassis in a single assembly.		
342.	**PUMP MOUNTING** Pump shall be mounted to a substructure which shall be mounted to the chassis frame rail using rubber isolators. The mounting shall allow chassis frame rails to flex independently without damage to the fire pump.		
343.	**LEFT SIDE PUMP CONTROL PANELS**		
A	All pump controls and gauges shall be located at the left (driver's) side of the apparatus and properly identified.		
B	Layout of the pump control panel shall be ergonomically efficient and systematically organized.		
C	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.		
D	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.		
344.	**IDENTIFICATION TAGS**		
A	The identification tag for each valve control shall be recessed in the face of the tee handle.		
B	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.		
C	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.		
D	All remaining identification tags shall be mounted on the pump panel in chrome plated bezels.		
E	The pump panel on the right (passenger's) side shall be removable with lift and turn type fasteners		
F	Trim rings shall be installed around all inlets and outlets.		
345.	**PUMP PANEL CONFIGURATION** The pump panel configuration shall be arranged and installed in an organized manner that shall provide user-friendly operation.		
346.	**PUMP OPERATOR'S PLATFORM**		
A	A pull out, flip down platform shall be provided at the pump operator's control panel.		

B	The front edge and the top surface of the platform shall be made of DA finished aluminum with a Morton Cass insert.		
C	The platform shall be approximately 13.75" deep when in the stowed position and approximately 22.00" deep when extended. The platform shall be 35.00" wide. The platform shall lock in the retracted and the extended position.		
D	The platform shall be wired to the "step not stowed" indicator in the cab.		
347.	**PUMP OPERATOR'S PLATFORM PERIMETER LIGHT** There shall be a 20.00" white 12 volt DC LED strip light provided to illuminate the ground area.		
348.	**PUMP AND GAUGE PANEL** The pump and gauge panels shall be constructed of aluminum with a painted FormCoat black finish. A polished aluminum trim molding shall be provided around each panel.		
349.	**RIGHT SIDE PANEL**		
A	The right side upper pump panel shall have a top mounted horizontally hinged access panel. Gas shocks shall be provided to hold the panel in the open position. The panel shall be made as large as possible without removing any elbows or fittings off inlets or discharges while meeting NFPA 1901 chapter 15.6 standards.		
B	The panel shall include push button/trigger type latches.		
C	The lower portion/balance of the right panel(s) shall be secured using screws and/or lift and turn latches		
350.	**FRONT OF PUMPHOUSE**		
A	On the front of the pump house structure, provisions shall be provided for access to the pump.		
B	There shall be a switch accessible through a door on the pump panel included with this installation.		
351.	**PUMP COMPARTMENT LIGHT**		
A	There shall be one (1) 3.00" white 12 volt DC LED light(s) with flange(s) installed in the pump compartment.		
B	There shall be a switch accessible through a door on the pump panel included with this installation.		
352.	**PUMP PANEL GAUGES AND CONTROLS**		
A	Engine gauge shall be incorporated with the vehicle information center display.		
B	Also provided at the pump panel shall be the following:		
	• Master Pump Drain Control		
353.	**OK TO PUMP INDICATOR LIGHT** There shall be a green indicator light installed on the pump operator's panel that is activated when the pump is in OK to Pump mode.		
354.	**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 and put within easy reach of the operator.		
355.	**VACUUM AND PRESSURE GAUGES**		
A	The pump vacuum and pressure gauges shall be liquid filled.		
B	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#.		
C	Gauge construction shall include a Zytel nylon case with adhesive mounting gasket and threaded retaining nut.		
D	The pump pressure and vacuum gauges shall be installed adjacent to each other at the pump operator's control panel.		
E	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.		

F	This gauge shall include a 10 year warranty against leakage, pointer defect, and defective bourdon tube.		
356.	**PRESSURE GAUGES**		
A	The individual "line" pressure gauges for the discharges shall be interlube filled.		
B	They shall be a minimum of 2.00" in diameter and shall have white faces with black lettering.		
C	Gauge construction shall include a Zytel nylon case with adhesive mounting gasket and threaded retaining nut.		
D	Gauges shall have a pressure range of 30"-0-400#.		
E	The individual pressure gauge shall be installed as close to the outlet control as practical.		
F	This gauge shall include a 10 year warranty against leakage, pointer defect, and defective bourdon tube.		
357.	**WATER LEVEL GAUGE**		
A	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 through 180 degrees. The water level indicators shall be as follows:		
	• 100 % = Green		
	• 75 % = Yellow		
	• 50 % = Yellow		
	• 25 % = Yellow		
	• Refill = Red		
B	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.		
C	The level measurement shall be based on the sensing of head pressure of the fluid in the tank.		
D	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.		
358.	**FOAM LEVEL GAUGE (Class1)**		
A	An electronic foam level gauge shall be provided on the operator's panel for each foam tank that registers foam level by means of five colored LED lights. The lights shall be durable, ultra-bright five LED design viewable through 180 degrees. The foam level indicators shall be as follows:		
	• 100 % = Green		
	• 75 % = Yellow		
	• 50 % = Yellow		
	• 25 % = Yellow		
	• Refill = Red		
B	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 foam tank is empty.		
C	The level measurement shall be based on the sensing of head pressure of the fluid in the tank.		
D	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 foam 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.		

359.	**LIGHT SHIELD**		
A	There shall be a polished, 16 gauge stainless steel light shield installed over the pump operator's panel.		
	• There shall be 12 volt DC white LED lights installed under the stainless steel light shield to illuminate the controls, switches, essential instructions, gauges, and instruments necessary for the operation of the apparatus. These lights shall be activated by the pump panel light switch. Additional lights shall be included every 18.00" depending on the size of the pump house.		
	• One (1) pump panel light shall come on when the pump is in ok to pump mode.		
B	There shall be a light activated above the pump panel light switch when the parking brake is set. This is to afford the operator some illumination when first approaching the control panel.		
360.	**AIR HORN SYSTEM** Two (2) air horns, 24.00" long, shall be provided and located in the front bumper, recessed One (1) each side of bumper tray. The horn system shall be piped to the air brake system wet tank utilizing .38" tubing. A pressure protection valve shall be installed in-line to prevent loss of air in the air brake system.		
361.	**AIR HORN CONTROL** The air horns shall be actuated by a push button located on officer side instrument panel and by the horn button in the steering wheel. The driver shall have the option to control the air horns or the chassis horns from the horn button by means of a selector switch located on the instrument panel.		
362.	**ELECTRONIC SIREN**		
A	An electronic siren with noise canceling microphone shall be provided.		
B	This siren to be active when the battery switch is on and that emergency master switch is on.		
C	Electronic siren head shall be recessed in the driver side inside switch panel.		
D	The electronic siren shall be controlled on the siren head only. No horn button or foot switches shall be required		
363.	**SPEAKER**		
A	There shall be two (2) 100-watt, flange mount speakers with a chrome plated ABS grille provided. Each speaker shall be connected to the siren amplifier.		
B	There shall be one (1) speaker recessed in the passenger side and one (1) speaker recessed in the driver side of the front bumper. The speakers shall be located in the angled corner area of the bumper.		
364.	**AUXILIARY MECHANICAL SIREN**		
A	A mechanical siren shall be furnished.		
B	The control solenoid shall be powered up after the emergency master switch is activated.		
C	The mechanical siren shall be mounted on the bumper deck plate. It shall be mounted on the left side. A reinforcement plate shall be furnished to support the siren.		
D	The mechanical siren shall be actuated by two (2) foot switches, one (1) located on the officer's side and one (1) on the driver's side.		
	A momentary red switch shall be included in the left side overhead switch panel to activate the siren brake.		
E	A second siren brake switch shall be installed on the passenger side.		
365.	**FRONT ZONE UPPER WARNING LIGHTS**		
A	There shall be two (2) 21.50" lightbars mounted on the cab roof, one (1) on each side above the driver's and passenger's door at a 30 degree outward angle from the front of the cab.		
B	The driver's 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) white flashing LED module in the 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.		
C	The passenger's 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 front position.		
	• One (1) white 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.		
D	There shall be clear lenses included on the lightbar.		
E	There shall be a switch in the cab on the switch panel to control the lightbars.		
F	The white LED's shall be disabled when the parking brake is applied.		
G	The two (2) red flashing LED modules in the inside front corner positions may be load managed when the parking brake is applied.		
366.	**CAB FACE WARNING LIGHTS**		
A	There shall be four (4) LED flashing warning lights installed on the cab face, above the headlights, mounted in a common bezel.		
	• The driver's side front outside warning light to be red.		
	• The driver's side front inside warning light to be blue.		
	• The passenger's side front inside warning light to be red.		
	• The passenger's side front outside warning light to be blue.		
B	All four (4) lights shall include a clear lens.		
C	There shall be a switch located in the cab, on the switch panel, to control the four (4) lights.		
D	The inside lights may be load managed if colored or disabled if white, when the parking brake is set.		
367.	**HEADLIGHT FLASHER**		
A	The high beam headlights shall flash alternately between the left and right side.		
B	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.		
C	The flashing shall automatically cancel when the hi-beam headlight switch is activated or when the parking brake is set.		
368.	**SIDE ZONE LOWER LIGHTING**		
A	There shall be six (6) flashing LED warning lights with chrome trim installed per the following:		
	• Two (2) lights, one (1) each side on the bumper extension. The driver's side front light to be red and the passenger's side front light to be blue.		
	• Two (2) lights, one (1) each side of cab rearward of crew cab doors. The side middle lights to be blue.		
	• Two (2) lights, one (1) each side above rear wheels. The side rear lights to be red.		
	• The lights shall include clear lenses.		
B	There shall be a switch in the cab on the switch panel to control the lights.		
369.	**INTERIOR CAB DOOR WARNING LIGHTS**		
A	There shall be four (4) amber 12 volt DC LED flashing strip lights provided.		
	• One (1) light on the driver's side cab door over the window.		
	• One (1) light on the passenger's side cab door over the window.		
	• One (1) light on the passenger's side crew cab door over the window.		
	• One (1) light on the driver's side crew cab door over the window.		

B	Each light shall be activated when the battery switch is on and the adjacent door is opened.		
C	Each light shall be installed so the flash pattern directs traffic away from the doors.		
370.	**SIDE WARNING LIGHTS**		
A	There shall be two (2) LED flashing warning light(s) with bezel(s) provided One (1) each side above EMS cabinets.		
B	The color of the lights shall be red.		
C	All of these lights shall include a clear lens.		
D	These lights shall be activated with the Side Zone Lower warning lights.		
371.	**REAR ZONE LOWER LIGHTING**		
A	There shall be two (2) 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 blue		
B	Both lights shall include a lens that is clear.		
C	There shall be a switch located in the cab on the switch panel to control the lights.		
372.	**REAR WARNING LIGHTS**		
A	There shall be two (2) LED flashing warning light(s) with bezel(s) provided each side high on rear compartment bulkheads.		
B	The color of these light(s) shall be one (1) blue light on the right and one (1) red light on the left.		
C	These light(s) shall be controlled with the rear upper warning switch.		
D	These light(s) shall include a lens that is clear.		
373.	**REAR/SIDE ZONE UPPER WARNING LIGHTS**		
A	There shall be two (2) 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.		
B	The color of the lights shall be red LEDs with both domes clear.		
374.	**TRAFFIC DIRECTING LIGHT**		
A	There shall be one (1) 36.00" long x 2.87" high x 2.25" deep, amber LED traffic directing light installed at the rear of the apparatus.		
B	The Whelen, Model TACTL5, control head shall be included with this installation.		
C	The controller shall be energized when the battery switch is on.		
D	The auxiliary flash not activated.		
E	This traffic directing light shall be mounted on top of the body below the turntable with a treadplate box at the rear of the apparatus.		
F	The traffic directing light control head shall be located in the driver side overhead switch panel in the right panel position.		
375.	**ELECTRICAL SYSTEM GENERAL DESIGN for ALTERNATING CURRENT** The following guidelines shall apply to the 120/240 VAC system installation:		
A	**GENERAL**		
B	Any fixed line voltage power source producing alternating current (ac) line voltage shall produce electric power at 60 cycles plus or minus 3 cycles.		
C	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.		

376.	**GROUNDING**		
A	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.		
B	An equipment grounding means shall be provided in accordance with Section 250-91 (Grounding Conductor Material) of the NEC.		
C	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.		
D	In addition to the bonding required for the low voltage return current, each body and driving or crew compartment enclosure shall be bonded to the vehicle frame by a copper conductor. This conductor shall have a minimum amperage rating of 115% of the nameplate current rating of the power source specification label as defined in 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.		
E	All power source system mechanical and electrical components shall be sized to support the continuous duty nameplate rating of the power source.		
377.	**OPERATION**		
A	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.		
B	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.		
C	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		
D	Direct drive (PTO) and portable generator installations shall comply with Article 445 (Generators) of the NEC.		
378.	**OVERCURRENT PROTECTION**		
A	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.		
B	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).		
C	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).		
379.	**WIRING METHODS**		
A	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)		
B	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		
C	Electrical cord or conduit shall be supported within 6.00" (152 mm) of any junction box 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.		
380.	**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.		
381.	**WET LOCATIONS**		
A	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.		
B	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.		
C	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.		
382.	**DRY LOCATIONS**		
A	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.		
B	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.		
383.	**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.		
384.	**ELECTICAL SYSTEM TESTING**		
A	The wiring and associated equipment shall be tested by the apparatus manufacturer or the installer of the line voltage system.		
B	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.		
C	Electrical polarity verification shall be made of all permanently wired equipment and receptacles to determine that connections have been properly made.		

385.	**OPERATIONAL TEST per CURRENT NFPA 1901 STANDARD**		
A	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.		
B	The prime mover shall be started from a cold start condition and the line voltage electrical system loaded to 100% of the nameplate rating.		
C	The power source shall be operated at 100% of its nameplate voltage for a minimum of two (2) hours unless the system meets category certification as defined in the current NFPA 1901 standard.		
D	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.		
386.	**GENERATOR (ONAN)** The apparatus shall be equipped with a complete electrical power system. The generator shall be a 10.0 kW Hydraulic unit with electronic control. The wiring and generator installation shall conform to the present National Electrical Codes Standards of the National Fire Protection Association. The installation shall be designed for continuous operation without overheating and undue stress on components.		
387.	**GENERATOR PERFORMANCE**		
	• Continuous Duty Rating: 10,000 watts		
	• Nominal Volts: 120/240		
	• Amperage: 83.3 @ 120volts, 41.6 @ 240 volts		
	• Phase: Single		
	• Cycles: 60 hertz		
	• Engine Speed at Engagement: Idle		
	• RPM range: 750 to 3,300		
388.	**GENERATOR DIMENSIONS**		
	• Length: 32.0 inches		
	• Width: 15.8 inches		
	• Height: 13.70 inches		
	• Weight: 191 pounds (generator only)		
A	The output of the generator shall be controlled by an internal hydraulic system. An electrical instrument gauge panel shall be provided for the operator to monitor and control all electrical operations and output.		
B	The generator shall be driven by an engine transmission power take off unit, through a hydraulic pump and motor.		
C	The generator shall include an electrical control inside the cab. The hydraulic engagement supply shall be operational at any time (no interlocks).		
D	An electric/hydraulic valve shall supply hydraulic fluid to the clutch engagement unit provided on the chassis PTO drive.		
E	The generator hydraulic circuit shall include a soft start valve to protect the generator components during PTO engagement.		
389.	**GENERATOR INSTURMENTS and CONTROLS**		
A	To properly monitor the generator performance a digital meter panel shall be furnished and mounted near the circuit breaker panel.		
	• Voltage		
	• Amperage for both lines		

	• Frequency		
	• Generator run hours		
	• Over current indication		
	• Over temperature indication		
	• Service required indication		
	• "PTO" engagement indication		
	• "Power On" indication		
	• Two (2) fuse holders with two (2) amp fuses (for indicator light protection)		
B	The meter and indicators shall be installed near eye level in the compartment. Instruments shall be flush mounted in an appropriate sized weatherproof electrical enclosure. All instruments used shall be accurate within +/- Two (2) percent.		
390.	**GENERATOR WIRING** The system shall be installed by highly qualified electrical technicians to assure the required level of safety and protection to the fire apparatus operators. The wiring, electrical fixtures and components shall be to the highest industry quality standards available on the domestic market. The equipment shall be the type as designed for mobile type installations subject to vibration, moisture and severe continuous usage. The following electrical components shall be the minimum acceptable quality standards for this apparatus.		
391.	**WIRING** All electrical wiring shall be fine stranded copper type. The wire shall be sized to the load and circuit breaker rating; ten (10) gauge on 30 amp circuits, 12 gauge on 20 amp circuits and 14 gauge on 15 amp circuits. The cable shall be run in corner areas and extruded aluminum pathways built into the body for easy access.		
392.	**LOAD CENTER** The main load center shall be provided with circuit breakers rated to load demand.		
393.	**CIRCUIT BREAKERS** Individual breakers shall be provided for all on-line equipment to isolate a tripped breaker from affecting any other on-line equipment.		
394.	**GENERATOR LOCATION** The generator shall be mounted in the in the area over the pump on the left side. The flooring in this area shall be either reinforced or constructed in such a manner that it shall handle the additional weight of the generator.		
395.	**GENERATOR START** There shall be a switch provided on the cab instrument panel to engage the generator.		
396.	**GENERATOR REMOTE START** There shall be a generator remote start/stop switch with indicator light located Pump panel.		
397.	**CIRCUIT BREAKER PANEL** The circuit breaker panel shall be located high on the forward wall of compartment D3.		
398.	**ELECTRIC CORD REEL**		
A	Furnished with the 120-volt AC electrical system shall be a cord reel. The reel shall be provided with a 12-volt electric rewind switch that is guarded to prevent accidental operation and labeled for its intended use. The switch shall be protected with a fuse and installed at a height not to exceed 72.00" above the operators standing position.		
B	The exterior finish of the reel(s) shall be powder coated silver from the reel manufacturer.		
C	A captive roller assembly to be provided to aid in the payout and loading of the reel. A ball stop shall be provided to prevent the cord from being wound on the reel.		
D	A label shall be provided in a readily visible location adjacent to the reel. The label shall indicate current rating, current type, phase, voltage and total cable length.		

E	A total of one (1) cord reel shall be provided one (1) above the pump area on the right side.		
F	The cord reel should be configured with three (3) conductors.		
399.	**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.		
400.	**PORTABLE JUNCTION BOX**		
A	There shall be one (1) electric junction box(es) provided.		
B	There shall be a cable strain relief and direct connection, no plug provided for each box.		
C	Each box shall be provided with the following receptacles:		
	• Four (4) 120 vac, 15 amp straight blade duplex (household) receptacles		
	• a 120 volt AC light inside the box		
401.	**ROLLER GUIDE**		
A	A captive roller assembly shall be installed in a body sheet to aid in the payout of the cord from a reel mounted in a compartment. There shall be one (1) for each reel for a total two (2) roller guides.		
B	Right side of pump panel.		
402.	**JUNCTION BOX HOLDER** There shall be an aluminum junction box holder installed adjacent to the cord reel. A total of two (2) shall be mounted at pick-up.		
403.	**POWER OUTLET STRIP**		
A	There shall be two (2) receptacle strip(s) with seven (7) 15 amp 120 volt AC straight blade receptacles at 90 degrees with a 12' power cord and surge protective metal housing provided One (1) in each EMS cabinet in cab.		
B	The strip(s) selected shall be powered from the shoreline inlet through a receptacle located adjacent to the strip(s).		
C	There shall be a label installed near the strip(s) that state the following:		
	• Line Voltage		
	• Current Ratting (amps)		
	• Phase		
	• Frequency		
	• Power Source		
404.	**FOUR (4)-SECTION 107' AERIAL LADDER**		
405.	**CONSTRUCTION STANDARDS**		
A	The ladder shall be constructed to meet all of the requirements as described in the current NFPA 1901 standards. There shall be a tow eye welded on to each side of the egress.		
B	The aerial device shall be a true ladder type device; therefore ladders attached to booms shall not be considered.		
C	These capabilities shall be established in an unsupported configuration.		
D	All structural load supporting elements of the aerial device that are made of a ductile material shall have a design stress of not more than 50% of the minimum yield strength of the material based on the combination of the live load and the dead load. This 2:1 structural safety factor meets the current NFPA 1901 standard.		
E	All structural load supporting elements of the aerial device that are made of non-ductile material shall have a design stress of not more than 20% of the minimum ultimate strength of the material, based on the combination of the rated capacity and the dead load. This 5:1 safety factor meets the current 1901 NFPA standard.		

F	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.		
G	The aerial base pivot bearings shall be maintenance free type bearings and require no external lubrication.		
H	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.		
I	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.		
J	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.		
K	All welding of aerial components, including the aerial ladder sections, turntable, pedestal, and outriggers, shall be in compliance with the American Welding Society standards. All welding personnel shall be certified, as qualified under AWS welding codes.		
L	The aerial device shall be capable of operating with the maximum rated tip load in either of the two (2) following conditions:		
	• Conditions of high wind up to 35 mph		
	• Conditions of icing, up to a coating of 0.25" over the entire aerial structure		
M	All of the design criteria must be supported by the following test data (no exception):		
	• Strain gage testing of the complete aerial device		
	• Analysis of deflection data taken while the aerial device was under test load		
N	The following standards for materials are to be used in the design of the aerial device:		
	• Materials are to be certified by the mill that manufactured the material		
	• Materials that are certified or recertified by vendors other than the mill shall not be acceptable		
	• Material testing that is performed after the mill test shall be for verification only and not with the intent of changing the classification		
	• All welded structural components for the ladder shall be traceable to their mill lots		
406.	**LADDER CONSTRUCTION**		
A	The ladder shall be comprised of four sections.		
B	The ladder shall have the capability to support a minimum of 750 pounds at the tip in the unsupported configuration, based upon 360 degree rotation, up to full extension and from -10 degrees to +77 degrees.		
C	The ladder (handrails, base rails, trusses, K-braces and rungs) shall be constructed of high strength low alloy steel, minimum 100,000 pounds per square inch yield, with full traceability on all structural members (no exception).		
D	Each section shall be trussed diagonally, vertically and horizontally using steel or aluminum tubing.		
E	All ladder rungs shall utilize "K" bracing for torsional rigidity.		
F	The inside width dimensions of the ladder shall be approximately:		
	• Base Section 41.87"		

	• Inner-Mid Section 34.88"		
	• Outer-Mid Section 27.87"		
	• Fly Section 21.63"		
G	The height of the handrails above the centerline of the rungs shall be approximately:		
	• Base Section 26.28"		
	• Inner-Mid Section 22.68"		
	• Outer-Mid Section 20.06"		
	• Fly Section 17.32"		
H	The ladder shall be designed to provide continuous egress for firefighters and civilians from an elevated position to the ground. The end of the fly section shall be constructed in a manner that aids personnel in climbing off the ladder.		
I	The egress section shall be designed to maintain the rated load of the aerial device. It shall be bolted on for easy replacement. There shall be a tow eye welded on to each side of the egress.		
407.	**VERTICAL HEIGHT** The ladder shall extend to a minimum height of 100' above the ground at full extension and elevation. The measurement of height shall be consistent with NFPA standards.		
408.	**HORIZONTAL REACH** The rated horizontal reach shall be a minimum of 93'. The measurement of horizontal reach shall be consistent with NFPA standards.		
409.	**TURNTABLE**		
A	The upper turntable assembly shall connect the aerial ladder to the turntable bearing. The steel structure shall have a mounting position for the aerial elevation cylinders, ladder connecting pins, and upper turntable operator's position.		
B	The turntable shall be a 0.375" thick aluminum plate, coated with a non-skid, chemical resistant material in the walking areas. The stepping surfaces shall meet the skid-resistance requirements of the current NFPA 1901 standard.		
C	The turntable shall be modified at the passenger side to allow for easier access to the hose bed for hose loading. The portion of the turntable outboard of the rotational motor shall be omitted, and the handrails shall be modified as required.		
D	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 aluminum and have a slip resistant knurled surface.		
410.	**ELEVATION SYSTEM**		
A	Dual 5.50" diameter elevating cylinders shall be mounted on the underside of the base section of the ladder. Two (2) 2.25" diameter stainless steel pins shall fasten the cylinder to the turntable and fasten to the ladder. The pins shall have 125,000 psi minimum yield strength and shall be secured with 0.50" Grade 8 bolts with castle nut and cotter pin. The bolts are to ensure that the pins do not walk out of the mounting brackets on the turntable and base section.		
B	The elevating cylinders shall be mounted utilizing maintenance-free spherical bearings on both ends of the cylinders (no exception). The aerial base pivot bearings shall be maintenance-free type bearings with no external lubrication required (no exception). The cylinders shall function only to elevate the ladder and not as a structural member to stabilize the ladder side movement. The elevating cylinders shall be provided with pilot-operated check valves on the barrel and rod side of the piston to prevent movement of the ladder in case of a loss of hydraulic pressure.		
C	The operation envelope shall be 10 degrees below horizontal to 77 degrees above horizontal.		
D	The elevation system shall be designed following NFPA standards. The elevation hydraulic cylinders shall incorporate cushions on the upper limit of travel.		

E	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.		
F	The elevation system shall be controlled by the microprocessor. Linear transducers shall measure the extension of the elevation cylinder. 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 at the limits of travel.		
411.	**EXTENSION/RETRACTION SYSTEM**		
A	A hydraulically powered, extension and retraction system shall be provided through dual hydraulic cylinders and wire ropes. 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.		
B	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 for increased flexibility. The wire rope shall be galvanized to reduce corrosion.		
C	The extension/retraction system shall be controlled by the microprocessor. Linear transducers shall measure the ladder extension. The microprocessor shall provide the following features:		
	• Automatic deceleration at the end of stroke, in maximum extend and retract positions		
D	All sheaves shall require lubrication. They shall have bronze bushings and grease zerks.		
412.	**MANUAL OVERRIDE CONTROLS** Manual override controls shall be provided for all aerial and stabilizer functions.		
413.	**LADDER SLIDE MECHANISM** UHMW polyethylene wear pads shall be used between the telescoping ladder sections, to provide greater bearing surface area for load transfer. Adjustable slide pads shall be used to control side play between the ladder sections.		
414.	**ROTATION SYSTEM**		
A	The aerial shall be supplied with a powered rotation system as outlined in NFPA standards. The hydraulic rotation motor shall provide continuous rotation under all rated conditions and be supplied with a brake to prevent unintentional rotation. One (1) hydraulically driven, planetary gear box with drive speed reducers shall be used to provide infinite and minute rotation control throughout the entire rotational travel. One (1) spring applied, hydraulically released disc type swing brake shall be furnished to provide positive braking of the turntable assembly. Provisions shall be made for emergency operation of the rotation system should complete loss of normal hydraulic power occur. The hydraulic system shall be equipped with pressure relief valves which shall limit the rotational torque to a nondestructive power. The gearbox shall have a minimum continuous torque rating of 80,000 in. lbs. and a minimum intermittent rating of 160,000 in. lbs. The turntable bearing, ring gear teeth, pinion gear, planetary gearbox, and output shaft shall be certified by the manufacturer of the components for the application.		

<table>
<tr><td>B</td><td>The rotation system shall be controlled by the microprocessor. The microprocessor shall provide the following features:</td><td></td><td></td></tr>
<tr><td></td><td>• Collision avoidance to prevent accidental body damage</td><td></td><td></td></tr>
<tr><td></td><td>• Prevent the aerial from being rotated into an unstable condition.</td><td></td><td></td></tr>
<tr><td>415.</td><td><u>ROTATION INTERLOCK</u>
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.</td><td></td><td></td></tr>
<tr><td>416.</td><td><u>LADDER CRADLE INTERLOCK SYSTEM</u>
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.</td><td></td><td></td></tr>
<tr><td>417.</td><td rowspan="2"><u>AERIAL TORQUE BOX/PEDESTAL</u>
The pedestal assembly shall be a welded assembly made of high strength 0.25" plate. The vertical member shall be a 0.375" reinforced wall cylinder with a 28.00" outside diameter and shall connect the rotation bearing mounting plate to the lower substructure.</td><td></td><td></td></tr>
<tr><td>A</td><td></td><td></td></tr>
<tr><td>B</td><td>The pedestal assembly shall be bolted to the chassis frame with 0.88" diameter Grade 8 bolts, and shall be utilized to mount the outrigger jacks and reservoir for the aerial hydraulic system.</td><td></td><td></td></tr>
<tr><td>418.</td><td rowspan="2"><u>LOAD CAPACITIES</u>
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.</td><td></td><td></td></tr>
<tr><td>A</td><td></td><td></td></tr>
<tr><td>B</td><td>Capacities shall be based upon full 360 degree rotation with ladder extended to operational limits at 0 degrees elevation.</td><td></td><td></td></tr>
<tr><td>C</td><td>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).</td><td></td><td></td></tr>
<tr><td>D</td><td><u>35 MPH WIND CONDITIONS/WATERWAY DRY</u>
<table>
<tr><td>Degrees of Elevation</td><td>-10 to 9</td><td>10 to 19</td><td>20 to 29</td><td>30 to 39</td><td>40 to 49</td><td>50 to 59</td><td>60 to 69</td><td>70 to 77</td></tr>
<tr><td>Egress</td><td>750</td><td>750</td><td>750</td><td>750</td><td>750</td><td>750</td><td>750</td><td>750</td></tr>
<tr><td>Fly</td><td>-</td><td>-</td><td>-</td><td>-</td><td>250</td><td>250</td><td>500</td><td>750</td></tr>
<tr><td>Upper Mid</td><td>-</td><td>-</td><td>-</td><td>-</td><td>250</td><td>500</td><td>1000</td><td>1000</td></tr>
<tr><td>Lower Mid</td><td>-</td><td>-</td><td>-</td><td>500</td><td>500</td><td>750</td><td>1000</td><td>1000</td></tr>
<tr><td>Base</td><td>-</td><td>-</td><td>500</td><td>500</td><td>500</td><td>1000</td><td>1000</td><td>1000</td></tr>
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<table>
<tr><td>E</td><td><u>35 MPH WIND CONDITIONS/WATERWAY CHARGED</u>
<table>
<tr><td>Degrees of Elevation</td><td>-10 to 9</td><td>10 to 19</td><td>20 to 29</td><td>30 to 39</td><td>40 to 49</td><td>50 to 59</td><td>60 to 69</td><td>70 to 77</td></tr>
<tr><td>Egress</td><td>500</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>250</td><td>500</td><td>500</td></tr>
<tr><td>Upper Mid</td><td>-</td><td>-</td><td>-</td><td>250</td><td>500</td><td>500</td><td>750</td><td>1000</td></tr>
<tr><td>Lower Mid</td><td>-</td><td>-</td><td>-</td><td>250</td><td>500</td><td>750</td><td>1000</td><td>1000</td></tr>
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</table></td><td></td><td></td></tr>
<tr><td>F</td><td>Reduced loads at the tip can be redistributed in 250 lb. increments to the fly, mid, or base sections as needed.</td><td></td><td></td></tr>
<tr><td>G</td><td>The tip capacity shall be reduced to zero when flowing water with the nozzle above the waterway centerline.</td><td></td><td></td></tr>
<tr><td>419.</td><td><u>BOOM SUPPORT</u>
A heavy duty boom support shall be provided for support of the ladder in the travel position. On the base section of the ladder, a stainless steel scuffplate shall be provided where the ladder comes into contact with the boom support.</td><td></td><td></td></tr>
<tr><td>420.</td><td rowspan="2"><u>AERIAL BOOM SUPPORT LIGHT</u>
There shall be one (1) 190 lumen, 12" long, white LED strip light mounted on the boom support cradle. This light shall be activated when the aerial master switch is activated.</td><td></td><td></td></tr>
<tr><td>A</td><td></td><td></td></tr>
<tr><td>B</td><td>The boom support shall be located just to the rear of the chassis cab.</td><td></td><td></td></tr>
<tr><td>421.</td><td rowspan="2"><u>AERIAL BOOM PANEL</u>
There shall be one boom panel provided on each side of the aerial ladder base section. The boom panel shall be painted #90 red.</td><td></td><td></td></tr>
<tr><td>A</td><td></td><td></td></tr>
<tr><td>B</td><td>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.</td><td></td><td></td></tr>
<tr><td>422.</td><td><u>EXTENSION INDICATOR</u>
Extension markings and corresponding numerical indicators shall be provided along each inside and outside top rail of the base section of the aerial every 10'. They shall indicate various positions of extension up to full. Markings and indicators shall be clearly visible to the console operator. To aid in visibility during hours of darkness, the markings and numerical indicators shall be red reflective material.</td><td></td><td></td></tr>
<tr><td>423.</td><td><u>FOLDING STEPS</u>
One (1) set of folding steps shall be provided at the tip of the ladder. An additional set of folding steps shall be provided at the base of the fly section. The steps shall be bright finished, non-skid with a black coating.</td><td></td><td></td></tr>
<tr><td>424.</td><td rowspan="2"><u>AERIAL DEVICE RUNG COVERS</u>
Each rung shall be covered with a secure, heavy-duty, fiberglass pultrusion that incorporates an aggressive, no-slip coating.</td><td></td><td></td></tr>
<tr><td>A</td><td></td><td></td></tr>
<tr><td>B</td><td>The rung covers shall be glued to each rung, and shall be easily replaceable should the rung cover become damaged.</td><td></td><td></td></tr>
<tr><td>C</td><td>The center portion of each rung cover shall be black and the outside 2.00" edge at each side shall be photo luminescent to assist in providing a light source for each rung during low light conditions.</td><td></td><td></td></tr>
<tr><td>D</td><td>Under no circumstances shall the rung covers be fastened to the rungs using screws or rivets (no exception).</td><td></td><td></td></tr>
<tr><td>E</td><td>The rung covers shall have a 10-year, limited warranty.</td><td></td><td></td></tr>
<tr><td>425.</td><td rowspan="2"><u>PIKE POLE MOUNTING BRACKETS</u>
Mounting shall be provided near the end of the fly section of the aerial ladder for one (1) pike pole(s).</td><td></td><td></td></tr>
<tr><td>A</td><td></td><td></td></tr>
<tr><td>B</td><td>The bracket shall be sized to hold a Fire Hooks Unlimited 6' roof hook.</td><td></td><td></td></tr>
</table>

426.	**LADDER STORAGE MOUNTING BRACKETS**		
A	Mounting brackets for a single roof ladder shall be provided on the right side of the aerial device while viewed from the turntable. A total of one (1) roof ladder(s) shall be stored on the aerial base section. The bracket(s) shall be located inboard of the boom panel at the base section and include straps to secure the ladder(s).		
B	The mounting brackets shall accommodate a 18' Duo-Safety 875-A roof ladder as determined by the type of aerial device and the available space.		
427.	**AXE MOUNTING BRACKETS** Brackets shall be provided near the end of the fly section of the aerial ladder for mounting a fire axe. The mounting plates shall be D/A finished aluminum.		
428.	**LIGHTS FOR TURNTABLE WALKWAY** There shall be white LED lights 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.		
429.	**TURNTABLE CONSOLE LIGHTING** There shall be one (1), white LED light strip 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.		
430.	**INFORMATION CENTER** 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 a minimum 1000 units rated, color display. The LCD shall be sunlight readable, true digital operation, and shall have improved resolution. The LCD display shall be encased in an ABS, grey plastic housing with a gray decal. There shall be five (5), weather-resistant user interface switches provided. The LCD display can be changed to an available foreign language.		
431.	**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 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.		
432.	**GENERAL SCREEN DESIGN**		
A	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 black background color shall be used. If the information provided on a screen is not within acceptable limits, an amber background color shall indicate a caution condition and a red background color shall indicate a warning condition.		
B	Every screen in the information center shall include the time (12- or 24-hour mode) and a fault alert triangle symbol. The time shall be synchronized between all Command Zone color displays located on the vehicle. Once the fault alert triangle is selected, a text message 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.		
C	A label or symbol shall be provided for each button. The label or symbol shall indicate the function for each active button for each screen. If the button is not utilized on specific screens, it shall remain black.		

D	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.		
433.	**PAGE SCREENS**		
	The Information center shall include the following pages:		
A	The Aerial Main and Load Chart page shall indicate the following information:		
	• Rungs Aligned and Rungs Not Aligned shall be indicated with 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.		
	• If applicable, breathing air levels shall be indicated via an air bottle symbol and text indicating the percent (%) of air remaining. A green bar graph shown inside the bottle shall indicate oxygen levels above 20%. A red bar graph shall indicate oxygen levels at or below 20%. When oxygen levels are at or below 10%, the red bar graph shall flash.		
	• *At a Glance* color features shall be utilized on this screen. A fault alert triangle symbol in the lower right portion of the screen shall indicate any caution faults with 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.		
B	The Aerial Reach and Hydraulic Systems page shall indicate the following information:		
	• If applicable, aerial hydraulic oil temperature shall be indicated with symbol and text.		
	• Aerial Hydraulic Oil Pressure shall be indicated with a symbol and text.		
C	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 Angle indicating the angle from the vehicle which the device is at.		
	• *At a Glance* color features shall be utilized on this screen. A fault alert triangle symbol in the lower right portion of the screen shall indicate any caution faults with 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.		
D	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 dependent 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.		
E	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 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 features shall be utilized on this screen. A fault alert triangle symbol in the lower right portion of the screen shall indicate any caution faults with 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.		
F	The aerial operation envelope page shall indicate the following:		
	• A top view of the aerial operating envelope		
	• A side view of the aerial operating envelope		
434.	**MENU SCREENS**		
A	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 Calibrations 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.		
435.	**LOWER STABILIZER CONTROL STATIONS**		
A	A lower control station shall be located on each side of the rear wall 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 interlocks		
	• Emergency stop		
	• Emergency hydraulic power unit switch		
B	The stabilizer controls shall include the following:		
	• Leveling assist toggle switch		
	• Left and right side stabilizer beam in/out switches		
	• Left and right side stabilizer beam up/down switches		

	• Rear stabilizer up/down switch		
436.	**TURNTABLE CONTROL STATION**		
A	There shall be one (1) device control station located on the left side of the turntable so the operator may easily observe the ladder while operating the controls. All elevation, extension and rotation controls shall operate from this location. 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. Each control shall be equipped with a positive lock to hold the control in a neutral position preventing accidental activation. In addition to the neutral lock, 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 tip controls, if equipped, even if the ladder is being operated by the tip controls.		
B	The following items shall also be provided at the turntable control station, clearly identified and illuminated for nighttime operation and conveniently located for ease of operation and viewing:		
	• Intercom controls		
	• Tip tracking light switch		
	• Emergency stop switch		
	• Emergency power unit switch		
	• Operator's load chart		
	• Two (2) position switch for selecting aerial operational speed		
	• Ladder illumination switch (if equipped)		
	• Aerial monitor switches (if equipped)		
437.	**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.		
438.	**STABILIZERS**		
A	The vehicle shall come equipped with an out and down stabilization system. The system shall consist of two (2) hydraulically operated out and down style stabilizers mounted above the frame and a rear stabilizer jack that is attached directly to the center rear of the torque box.		
B	The stabilizers shall have a maximum spread of 18' from the centerline of the footpads when fully extended. The internal tubes shall be 8.00" x 10.00" with 1/2" thick top and bottom plates and 3/8" thick sides of 130,000 psi minimum yield strength steel and shall be extended out by hydraulic cylinders. The cylinders shall have pilot-operated check valves with thermal relief. This shall ensure that the beams shall be in the stowed during travel. The external tubes shall be 9-3/4" x 11-3/4" with 3/8" wall thickness. The internal jack tubes shall slide on permanently attached wear pads.		
C	The extension cylinders shall be totally enclosed within the extension beams. The horizontal extension cylinders shall be of the trombone type to eliminate wear and potential failure of hydraulic hoses (no exception).		
D	The stabilizers shall have a tip over safety margin of 1 1/2 times its rated load in any position the aerial device can be placed as outlined in the current edition of NFPA 1901. The aerial shall be able to sustain a 1 1/3 to 1 rated load on a 5 degree slope downward in the position most likely to cause overturning. The maximum ground slope the apparatus can be set up on is 12 %. On the 12 % slope, the apparatus can be leveled within a 6 % operating range with the apparatus cab facing uphill.		
E	The cylinders shall be supplied with dual pilot operated check valves on each stabilizer cylinder to hold the cylinder in the stowed or working position should a charged line be severed at any point in the hydraulic system. Stabilizers shall contain safety lock valves and shall require no mechanical pins to assure there shall be no "leak down" of stabilizer legs.		

F	Each stabilizer leg shall have attached to the end of the leg a 16 gauge polished stainless steel shield. The stainless steel shield shall be a maximum 13.00" wide to allow the extension of the stabilizer between parked cars. This plate shall serve as a protective guard and a mounting surface for warning lights. The top, forward, and rear edges shall be flanged back for added strength.		
G	The stabilizer cylinders shall be sized to maximize ground penetration. The lift cylinders shall be mounted on the end of the stabilizer tube and shall have the following dimensions:		
	• 4.00" bore		
	• 3.50" rod		
	• 23.38" stroke		
H	The stabilizer extension cylinders shall have the following dimensions:		
	• 1.75" bore		
	• 1.25" rod		
	• 64.00" stroke		
I	The rear stabilizer shall have the following dimensions:		
	• 4.50" bore		
	• 4.00" rod		
	• 29.00" stroke		
J	Each stabilizer that can be extended from the body shall be supplied with a red warning light as outlined in the current edition of NFPA. The stabilizers shall be connected to a warning light in the cab to warn the operator if the stabilizers are deployed.		
K	The ground contact area for each stabilizer shall be a 12.00" diameter circular stainless steel disc without the auxiliary pads and 24.00" x 24.00" with lightweight composite material pads deployed. The ground pressure shall not exceed 75 psi when the apparatus is fully loaded and the aerial device is carrying its rated capacity in every position. This shall be accomplished with the stabilizer pads deployed, as outlined in the current edition of NFPA 1901. There shall be one (1) pad located on each side of the apparatus in front of the stabilizers.		
L	The auxiliary jack pad for the rear stabilizer shall be integral to the stabilizer foot pad.		
439.	**STABILIZER CONTROLS**		
A	One (1) electric solenoid valve shall control the stabilizers. The control switches shall be located one (1) each side at the rear of the apparatus so the operator may observe the stabilizers during deployment.		
B	The stabilizer controls shall include the following:		
	• Leveling assist toggle switch: The outrigger control system shall incorporate a computerized self-leveling system in addition to the standard outrigger controls. The operator shall have the option to manually or automatically level the truck. The computerized system shall ensure full outrigger extension, proper jack penetration, and shall level the vehicle within 1/2 a degree of level for safe operation of the aerial device.		
	• One (1) electric toggle switch for the engaging the emergency power unit.		
	• Two (2) fully extended beams green indicator lights: these lights shall be illuminated when each of the respective stabilizer beams are fully extended.		
	• Three (3) firm on ground green indicator lights: each light shall be illuminated when its respective stabilizer shoe is in the load supporting condition.		
C	Each toggle switch shall activate the engine fast idle automatically.		
D	Manual override shall be supplied for each stabilizer control valve.		

E	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.		
440.	**STABILIZER CONTROL BOX SMOOTH ALUMINUM DOOR** A vertically hinged smooth aluminum door shall be provided over each stabilizer control box. The door shall be hinged outboard and be provided with a raised lift and turn latch.		
441.	**HYDRAULIC SYSTEM**		
A	All hose assemblies shall be assembled and crimped by the hose manufacturers certified technician.		
B	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.		
C	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.		
D	All hydraulic fittings and tubing shall be plated to minimize corrosion.		
E	The fitting shall use an O-ring seal where possible to minimize hydraulic leaks.		
F	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.		
G	The system shall meet the performance requirement of the current NFPA 1901 standard, which requires adequate cooling less than 2.5 hours of operations.		
H	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.		
I	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.		
J	All hydraulic hoses, tubes, and connections shall have a minimum burst strength of 4:1 per the current NFPA 1901 standard.		
K	A hydraulic oil sight gauge shall be supplied at the rear of the unit for easy fluid level verification.		
L	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 3,150psi. The hydraulic pump shall be solely dedicated to aerial operations (no exception).		
M	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.		
N	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.		
O	Each aerial shall include an oil sample port, identified with a yellow dust cap and a label, for subsequent customer testing.		
P	Ball valves shall be provided in the hydraulic suction lines to permit component servicing without draining the oil reservoir.		
Q	The aerial shall incorporate the use of trombone steel tubes inside the stabilizer beams to eliminate hydraulic hose wear and leaks.		
R	Hydraulic power to the ladder shall be transferred from the pedestal by a hydraulic swivel.		
S	The system hydraulic pressure shall be displayed on the turntable display.		

T	The hydraulic system shall be additionally protected from excessive pressure by a secondary pressure relief valve set at 3,150 psi. In the event the main hydraulic pump compensator malfunctions, the secondary relief shall prevent system damage.		
442.	**HYDRAULIC CYLINDERS**		
A	All cylinders used on the aerial device shall be produced by a manufacturer that specializes in the manufacture of hydraulic cylinders.		
B	Each cylinder shall include integral safety holding cartridges. No manifold or transfer tube mounted cartridge shall be acceptable.		
C	Each cylinder shall be designed to a minimum safety factor of 4:1 to failure.		
D	All safety holding cartridges shall be installed at the cylinder manufacturer, in a controlled clean environment to avoid possible contamination and or failure.		
443.	**POWER TAKEOFF/HYDRAULIC PUMP**		
A	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.		
B	An amber indicator light shall be installed on the cab instrument panel to notify the operator that the power takeoff is engaged.		
C	An interlock shall be provided that allows operation of the aerial power takeoff shift only after the chassis spring brake has been set and the chassis transmission has either been placed in the neutral position or drive position after the driveline has been disengaged from the rear axle.		
D	The hydraulic system shall be supplied by a variable displacement load and pressure compensating piston pump. The pump shall meet the demands of all three 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.		
444.	**EMERGENCY PUMP**		
A	The hydraulic system shall be designed with an auxiliary power unit meeting the guidelines of the current NFPA 1901 standard.		
B	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.		
445.	**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 in the control console with the handles oriented downward for manual operation. The activation handles shall be spaced a minimum of 3.50" for ease of operation. The valve spools shall be designed to bleed off downstream pressure, in the neutral position and allow proper sealing of any cylinder holding cartridge.		
446.	**OIL RESERVOIR**		
A	The oil reservoir shall have a minimum capacity of 20 gallons. The oil fill location shall be easily accessible and be labeled "Hydraulic Oil Only" and also indicate the grade of oil that is installed in the reservoir. The fill shall have a desiccant breather filter with a water capacity of 4 fluid ounces and a 5 micron rating.		
B	Two suction ports shall be provided, one for the main hydraulic pump and one for the emergency pump. The main suction shall be slightly elevated off the bottom of the reservoir. The emergency suction port shall be closer to the bottom of the reservoir to provide some reserve oil for emergency operation.		
C	A temperature sending unit in the reservoir shall provide indication of the oil temperature on an electronic display.		
D	The hydraulic oil reservoir shall be labeled per the current edition of NFPA 1901 standard.		

447.	The low pressure oil filter shall be integrated with the hydraulic manifold and designed to prevent oil loss during filter change. The system shall incorporate the following filter to provide dependable service:		
	• Return filter: beta 200 at 6 micron		
448.	**HYDRAULIC SWIVEL** The aerial ladder shall be equipped with a six (6) 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.		
449.	**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 28 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.		
450.	**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.		
451.	**13-BIT ABSOLUTE ENCODER**		
A	The aerial ladder shall be equipped with a 13-Bit Absolute Encoder, CAN-based, which provides 8192 counts per shaft turn for position and direction reference.		
B	The 13-Bit Absolute Encoder shall provide a unique binary word to reference each position and direction for all 360 degrees of rotation.		
C	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.		
D	The 13-Bit Absolute Encoder shall be an integral part of a micro-processor based control system.		
452.	**ELECTRICAL SYSTEM** The aerial device shall utilize a microprocessor-based control system. The system shall consist of the following components:		
A	**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		
B	**Ground matrix identification system**		
	The following control system modules shall be used:		
C	**Control Module**		
	• Main controller for the system		
	• USB connection allows for computer diagnostics		
D	**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)		
E	**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)		
F	**Input Module**		
	• 16 software selectable (digital or analog) inputs		
G	**Output Module**		
	• 16 digital outputs		
H	**Input/output Module**		
	• Eight (8) software selectable (digital or analog) inputs		
	• Eight (8) digital outputs		
453.	**SPOTLIGHTS**		
A	There shall be four (4) bail mount 12 volt DC LED lights furnished.		
	• One (1) shall be mounted on the driver's side of the base section of the ladder.		
	• One (1) shall be mounted on the passenger's side of the base section of the ladder.		
	• One (1) shall be mounted on the driver's side tip of aerial.		
	• One (1) shall be mounted on the passenger's side tip of aerial.		
B	The painted parts of this light assembly to be black.		
C	Power to the "tracking lights" shall be controlled by an on/off switch at the turntable control operator's position.		
D	The lights at the platform shall be controlled by platform/tip and turntable.		
454.	**LIGHTING ON AERIAL LADDER**		
A	There shall be LED rung lighting provided on both sides of the aerial ladder base, lower and upper mid, and fly sections. The lighting shall be located adjacent to the ladder rungs along the lower rail of the ladder sections and shall run the length of the ladder section.		
B	The color of the sections shall be:		
	• The base section of the ladder to be blue.		
	• The lower mid-section of the ladder to be white.		
	• The upper mid-section of the ladder to be white.		
	• The fly section of the ladder to be red.		
C	The LED rung lighting shall be activated when a switch at the turntable operator's panel is activated through the master battery switch.		
D	The lights may be load managed when the parking brake is applied.		
455.	**AERIAL LED LOCATOR LIGHT**		
A	There shall be two (2) 12 volt flashing LED lights installed at the aerial tip facing out when the aerial boom is in the stowed position. There shall be one (1) light on the driver's side and one (1) light on the passenger's side.		
B	The color of the LEDs shall be blue.		
C	The warning light lens color(s) to be clear.		
D	The light shall be activated when the aerial master switch is activated.		
456.	**STABILIZER WARNING LIGHTS**		
A	There shall be two (2) LED flashing warning lights with chrome flanges installed on the stabilizer cover panels, one (1) each side.		

B	• The LED lights shall be red.		
C	These warning lights shall be activated by the same switch as the side warning lights.		
457.	**STABILIZER BEAM WARNING LIGHTS**		
A	There shall be two (2) 2.00" round red LED flashing lights mounted on each out and down stabilizer, one (1) facing forward and one (1) facing rearward.		
B	The lights shall be recessed in the horizontal beam of the stabilizer.		
C	These warning lights shall be activated with the aerial master switch.		
458.	**STABILIZER SCENE LIGHTS** There shall be three (3) 190 lumens, 12.00" long, white LED strip lights installed to illuminate the area around the aerial stabilizers, one (1) light per stabilizer. The lights shall be activated by the aerial master switch.		
459.	**120-VOLT RECEPTACLE AT TIP** A 120-volt, 15 amp, three (3)-prong fire-power receptacle with weatherproof cover shall be provided at the tip of the aerial device.		
460.	**120 VOLT LIGHTING AT TIP**		
A	There shall be two (2) 7,500 lumens 120 volt AC LED light(s) with pedestal mounts provided at the tip of the ladder.		
B	The painted parts of this light assembly to be black.		
C	The light(s) shall be located on the driver and passenger side.		
D	Light(s) shall be switched at the platform/tip and turntable.		
461.	**2-WAY AERIAL COMMUNICATION SYSTEM**		
A	There shall be a two-way intercom system provided. The control module shall be located on the turntable operator console, provided there is room, and have an LED volume display and push-button volume control.		
B	A hands free module shall be located at the aerial tip or platform and constantly transmit to the other module unless the control module push-to-talk button is pressed.		
C	Each intercom unit shall be weatherproof.		
462.	**AERIAL PEDESTAL** The aerial pedestal shall accommodate the height of the cab.		
463.	**LIFTING EYE ASSEMBLY - ROPE RESCUE ATTACHMENT** A lifting eye assembly shall be provided that is designed to evenly distribute load at the tip of the aerial. The lift eye assembly is retained by two (2) locking pins, one (1) at each end outboard side of the egress. Leveling is maintained by the lifting eye assembly rotating within the egress mounting.		
464.	**AERIAL TURNTABLE SAFETY BARS** Safety bars shall be installed at the aerial turntable.		
465.	**WATER SYSTEM**		
A	A waterway system shall be provided consisting of the following components and features:		
	• A 5.00" pipe shall be connected to the water supply on one end and to a 5.00" internal diameter water swivel at the rotation point of the turntable. The water swivel shall permit 360 degree continuous rotation of the aerial device.		
	• The 5.00" waterway swivel is to be routed through the rotation point up to the heel pin swivel. The heel pin swivel shall allow the water to flow to the ladder pipe while elevating the aerial ladder from -10 degrees to 77 degrees. The heel pivot pin is not integral with the waterway swivel at any point. The design of the waterway shall allow complete servicing of the waterway swivel without disturbing the heel pivot pin.		
	• The integral telescopic water system shall consist of a 4.50" diameter tube in the base section, a 4.00" diameter tube in the mid-section and a 3.50" diameter tube in the fly section. The telescopic waterway shall be constructed of anodized aluminum pipe.		

	• The aerial shall be capable of discharging up to 1000 gpm at 100 psi parallel to the ladder and 90 degrees to each side of center while maintaining the rated tip load.		
	• The aerial shall be capable of discharging between 1001 and up to 1500 gallons per minute at 100 psi parallel to the ladder and 40 degrees to each side of center while maintaining the rated tip load.		
	• The master stream shall be capable of flow up to 30 degrees above horizontal.		
	• An adjustable pressure relief valve shall be furnished to protect the aerial waterway from a pressure surge.		
	• A 1.50" drain valve shall be located at the lowest point of the waterway system.		
466.	**WATERWAY SEALS**		
A	The waterway seals shall be of type-B PolyPak design, composed of nitroxile seal and a nitrile wiper, which together offer maximum stability and extrusion resistance on the waterway. The seal shall be capable of withstanding pressures up to 2000 psi, temperatures in excess of 250 degrees Fahrenheit and have resistance to all foam generating solutions. The seals shall be internally lubricated.		
B	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.		
467.	**AERIAL MONITOR**		
A	A monitor with stow and deploy shall be provided at the tip with an Akron 1500 gpm Model 5178. This monitor shall allow for an additional 30 degrees of travel above horizontal at the aerial tip.		
B	The monitor's functions shall be controlled electrically from two (2) separate locations. One (1) control shall be located at the control console and the other at the ladder tip.		
C	There shall be a courtesy light at the tip of the aerial to illuminate the controls.		
D	If the aerial has a quick-lock waterway, a limit switch shall be provided to disable the extended vertical travel when the monitor is locked to the lower ladder section.		
468.	**REMOTE AERIAL MONITOR CONTROL**		
A	A remote control shall be provided whereby all waterway monitor movements may be controlled at the pump operator's panel. This control shall be in addition to the controls supplied at the monitor and the pedestal control station.		
B	The monitor controls at the pump panel, turntable and aerial tip shall be wired in such a manner that the turntable controls shall override the pump panel and aerial tip controls; and the pump panel controls shall override the aerial tip controls.		
469.	**AERIAL WATERWAY FLOW METER** Waterway flow, including total water flowed, shall be monitored by the microprocessor. An LCD display shall be located at the turntable control station.		
470.	**REAR INLET** A 5.00" NST inlet to the aerial waterway shall be provided at the rear of the apparatus. The inlet shall have 5.00" aluminum plumbing. It shall be furnished with a 5.00" chrome plated adapter and a 5.00" chrome plated, long handle cap.		
471.	**WATERWAY LOCKING SYSTEM**		
A	The aerial ladder waterway monitor shall be capable of being positioned at either the fly section or at the next lower section of the ladder.		
B	The monitor location shall be changeable by the use of a single handle, located at the side of the ladder.		
C	The handle, attached to a cam bracket, shall simply be moved forward to lock the monitor at the fly section and back to lock it to the previous section.		
D	There shall be no pins to remove and reinstall.		
E	The monitor shall be operational at all times, regardless of its position, without connecting or disconnecting electrical lines.		

472.	**ADAPTER, STORZ INLET** There shall be one (1) Storz 5.00" FNST x 5.00" Storz 30 degree elbow(s) with blind cap provided REAR AERIAL INLET.		
473.	**TOOLS**		
A	The following tools shall be provided for re-torqueing of all specified bolts as recommended by the manufacturer:		
	• Torque Wrench		
	• All Required Extensions, Sockets and Adapters		
	• 4-to-1 Multiplier		
474.	**MANUALS** Two (2) operator maintenance manuals and two (2) wiring diagrams pertaining to the aerial device shall be provided with the apparatus at time of pick-up.		
475.	**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) days.		
476.	**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		
477.	**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.		
478.	**SOFT SUCTION HOSE PROVIDED BY FIRE DEPARTMENT**		
A	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.		
B	Hose is not on the apparatus as manufactured. The fire department shall provide suction or supply hose.		
479.	**STRAINER PROVIDED BY FIRE DEPARTMENT**		
A	NFPA 1901, 2016 edition, section 9.8.2.1.1 requires a suction strainer when suction hose is provided.		
B	The strainer is not on the apparatus as manufactured. The fire department shall provide the suction strainer.		
480.	**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.		
481.	**WATER EXTINGUISHER PROVIDED BY FIRE DEPARTMENT**		
A	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.		
B	The extinguisher is not on the apparatus as manufactured. The fire department shall provide and mount the extinguisher.		
482.	**FLATHEAD AXE PROVIDED BY FIRE DEPARTMENT**		
A	NFPA 1901, 2016 edition, Section 9.9.4 requires one (1) flathead axe mounted in a bracket fastened to the apparatus		
B	The axe is not on the apparatus as manufactured. The fire department shall provide and mount the axe.		

483.	**PICKHEAD AXE PROVIDED BY FIRE DEPARTMENT**		
A	NFPA 1901, 2016 edition, Section 9.9.4 requires one (1) pickhead axe mounted in a bracket fastened to the apparatus.		
B	The axe is not on the apparatus as manufactured. The fire department shall provide and mount the axe.		
484.	**PAINT**		
A	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 tread plate.		
	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. A final pure water rinse shall be applied to all metal surfaces.		
	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 the 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 smooth and provides excellent gloss hold out when top coated.		
	6. Basecoat Paint - Two coats of a 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 solids 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 manufacture.		
B	Each batch of basecoat color shall be checked for a proper match before painting of the cab and the body. After the cab and body are painted, the color shall verified again 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.		
C	All removable items such as brackets, compartment doors, door hinges, and trim shall be removed and separately if required, to ensure paint behind all mounted items. Body assemblies that cannot be finish painted after assembly shall be finish painted before assembly.		

D	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 manufacture's written paint standards shall be available upon request.		
E	The cab shall be two-tone, with the upper section painted #10 white along with a shield design on the cab face and lower section of the cab and body painted #90 red.		
485.	**PAINT - ENVIRONMENTAL IMPACT**		
A	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. Frame rails		
	• Metal treatment chemicals shall be chrome free. The wastewater generated in the metal treatment process shall be treated on-site to remove any other heavy metals.		
	• Particulate emission collection from sanding operations shall have a 99.99% efficiency factor.		
	• Particulate emissions from painting operations shall be collected by a dry filter or water wash process. If the dry filter is used, it shall have an efficiency rating of 98.00%. Water wash systems shall be 99.97% efficient		
	• Water from water wash booths shall be reused. Solids shall be removed on a continual basis to keep the water clean.		
	• Paint wastes are disposed of in an environmentally safe manner.		
	• Empty metal paint containers shall be 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.		
B	Additionally, the finished apparatus shall not be manufactured with or contain products that have ozone depleting substances. 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.		
486.	**GALVANIZED CHASSIS FRAME ASSEMBLY**		
A	The chassis frame assembly shall be hot dip galvanized before the installation of the cab and body, and before installation of the engine and transmission assembly, air brake lines, electrical wire harnesses, etc.		
B	Components that are included with the chassis frame assembly that shall be hot dip galvanized are:		
	• Frame rails		
	• Frame liners		
	• Cross members		
	• Front frame extension		
	• All galvanized components are inspected for compliance with ASTM specifications.		
C	Battery boxes shall be stainless steel.		
D	All components that are not galvanized shall be painted primer and gloss paint to match the lower job color.		
487.	**PAINT GRILLE MESH** The mesh on the front grille shall be painted Black.		
488.	**COMPARTMENT INTERIOR PAINT** The interior of compartmentation shall be painted with a gray spatter-type paint.		

489.	**AERIAL DEVICE PAINT COLOR**		
A	The aerial device paint procedure shall consist of a six (6) 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. Primer/Surfacer Coats - A two (2) component urethane primer/surfacer shall be hand applied to the chemically treated metal surfaces to provide a strong corrosion protective base coat and to smooth out the surface. All seams shall be caulked before painting.		
	3. Hand Sanding - The primer/surfacer coat shall be lightly sanded to an ultra-smooth finish.		
	4. Sealer Primer Coat - A two (2) component sealer primer coat shall be applied over the sanded primer.		
	5. Topcoat Paint - Urethane base coat shall be applied to opacity for correct color matching.		
	6. Clear coat - Two (2) coats of an automotive grade two (2) component urethane shall be applied.		
B	Surfaces that shall not be painted include all chrome plated, polished stainless steel, anodized aluminum and bright aluminum tread plate.		
C	All buy out components, such as monitor, nozzle, gauges, etc. shall be supplied as received from the vendor.		
D	Removable items such as brackets shall be removed and painted separately to ensure paint coverage behind all mounted items.		
E	The stabilizer beams, pedestal and torque box (including water tank cradle) shall be treated with epoxy E-coat prior to painting to help provide resistance to corrosion and chemicals. The stabilizers and torque box shall be painted black.		
F	The aerial device components shall be painted as follows using the aforementioned six (6) step finishing process:		
	• Aerial device ladder sections and extension cylinders: bright silver metallic 224		
	• Aerial device ladder sections and extension cylinders: bright silver metallic 224		
	• Aerial control console: bright silver metallic 224		
	• Aerial lift cylinders: bright silver metallic 224		
	• Aerial egress: #50 red (shall be a contrasting color to the aerial device)		
	• Aerial boom support: gloss black primer		
490.	**REFLECTIVE STRIPES** Three (3) reflective stripes shall be provided across the front of the vehicle and along the sides of the body. The reflective band shall consist of a 1.00" white stripe at the top with a 1.00" gap then a 6.00" white stripe with a 1.00" gap and a 1.00" white stripe on the bottom.		
491.	**CHEVRON STRIPING ON THE FRONT BUMPER**		
A	There shall be alternating chevron striping located on the front bumper.		
B	The colors shall be red and fluorescent yellow green diamond grade.		
C	The size of the striping shall be 6.00".		
492.	**REAR CHEVRON STRIPING**		
A	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. Roll up doors and stainless steel access doors shall not be covered in chevron.		
B	The colors shall be red and fluorescent yellow green diamond grade.		
C	Each stripe shall be 6.00" in width.		

D	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.		
493.	**REFLECTIVE STRIPE ON STABILIZERS** There shall be 6.00" wide alternating red diamond grade and fluorescent yellow green diamond grade reflective chevron stripes provided on the forward and rear facing sides of both aerial stabilizers. The stripes shall be angled at a 45 degree angle.		
494.	**JOG(S) IN REFLECTIVE BAND** The reflective band located on each side of the apparatus body shall contain one (1) jog(s) and shall be angled at approximately a 45 degrees when installed.		
495.	**OUTLINE, REFLECTIVE STRIPE** A Black outline shall be applied on the top and the bottom of the reflective band. There shall be three (3) set of outline stripes required.		
496.	**TOOLBOARD DIAMOND GRADE CHEVRON STRIPING** A series of alternating red diamond grade and fluorescent yellow green diamond grade reflective stripes shall be applied to the one (1) tool board(s) located P2.		
497.	**CHEVRON, INVERTED "V" STRIPING ON CAB DOORS** There shall be alternating chevron striping located on the inside of each cab door.		
A	The striping shall consist of the following colors:		
	• The first color shall be fluorescent yellow green diamond grade		
	• The second color shall be red diamond grade		
B	The size of the striping shall be 2.00".		
498.	**LETTERING** The lettering shall be totally encapsulated between two (2) layers of clear vinyl.		
499.	**LETTERING** Twenty-one (21) to forty (40) genuine gold leaf lettering, 3.00" high, with outline and shade shall be provided.		
500.	**LETTERING** There shall be printed effect gold leaf lettering, 4.00" high, with outline and shade provided. There shall be 20 letters provided.		
501.	**LETTERING**		
	There shall be printed effect gold leaf lettering, 10.00" high, with outline and shade provided. There shall be 18 letters provided.		
502.	**LETTERING**		
	There shall be reflective lettering, 10.00" high, with outline and shade provided. There shall be three (3) letters provided.		
503.	**LETTERING**		
	There shall be printed effect gold leaf lettering, 3.00" high, with outline and shade provided. There shall be 12 letters provided.		
504.	**MALTESE CROSS INSTALLATION** There shall be one (1) pair of maltese crosses, comprised of printed effect gold leaf material, provided and installed Above EMS cabinet door each side.		
505.	**MALTESE CROSS INSTALLATION** There shall be one (1) pair of Maltese crosses, comprised of genuine gold leaf material, provided and installed Front cab doors.		
506.	**LETTERING/NUMERALS ON CAB GRILLE** Two (2) painted letters/numerals with outline, as determined by the fire department, shall be provided on the cab grille.		
507.	**FIRE APPARATUS PARTS CD MANUAL**		
A	There shall be two (2) custom parts manuals for the complete fire apparatus provided in CD format with the completed unit.		
B	The manuals 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		
C	The manuals 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.		
508.	**SERVICE PARTS INTERNET SITE** The service parts information included in these manuals are 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.		
509.	**CHASSIS SERVICE CD MANUALS**		
A	There shall be two (2) CD format chassis service manuals containing parts and service information on major components provided with the completed unit.		
B	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		
C	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.		
510.	**CHASSIS OPERATION CD MANUALS** There shall be two (2) CD format chassis operation manuals provided.		
511.	**ONE (1) YEAR MATERIAL AND WORKMANSHIP**		
A	Each new piece of apparatus shall be provided with a minimum **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.		
B	A copy of the warranty certificate shall be submitted with the bid package (no exception).		
512.	**THREE (3) YEAR MATERIAL AND WORKMANSHIP**		
A	The new chassis shall be provided with a **three (3) year** material and workmanship limited warranty. The warranty shall cover such portions of the chassis 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.		
B	A copy of the warranty certificate shall be submitted with the bid package (no exception).		
513.	**ENGINE WARRANTY** A **five (5) year** limited engine warranty shall be provided. A copy of the warranty certificate shall be submitted with the bid package.		

514.	**STEERING GEAR WARRANTY** A **three (3) year** limited steering gear warranty shall be provided. A copy of the warranty certificate shall be submitted with the bid package.		
515.	**FIFTY (50) YEAR STRUCTURAL INTEGRITY**		
A	The chassis frame and cross members shall be provided with a **fifty (50) year** material and workmanship limited warranty. The warranty shall cover the chassis frame and cross members as being free from defects in material and workmanship that would arise under normal use and service.		
B	A copy of the warranty certificate shall be submitted with the bid package (no exception).		
516.	**FRONT AXLE THREE (3) YEAR MATERIAL AND WORKMANSHIP WARRANTY** Independent front suspension shall be provided with a **three (3) year** material and workmanship limited warranty. The manufacturer's warranty shall provide that the independent front suspension and steering gears be free from any defect related to material and workmanship on the portion of the apparatus built by the manufacturer that would arise under normal use and service. A copy of the warranty certificate shall be submitted with the bid package (no exception).		
517.	**REAR AXLE TWO (2) YEAR MATERIAL AND WORKMANSHIP WARRANTY** A **two (2) year** axle limited warranty shall be provided.		
518.	**BRAKE SYSTEM THREE (3) YEAR MATERIAL AND WORKMANSHIP WARRANTY** A **three (3) year** brake system limited warranty shall be provided.		
519.	**TEN (10) YEAR STRUCTURAL INTEGRITY**		
A	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.		
B	A copy of the warranty certificate shall be submitted with the bid package (no exception).		
520.	**TEN (10) YEAR PRO-RATED PAINT AND CORROSION**		
A	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.		
B	A copy of the warranty certificate shall be submitted with the bid package (no exception).		
521.	**FIVE (5) YEAR MATERIAL AND WORKMANSHIP**		
A	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.		
B	A copy of the warranty certificate shall be submitted with the bid package (no exception).		
522.	**CAMERA SYSTEM WARRANTY** A fifty-four (54) month warranty shall be provided for the camera system**.**		
523.	**COMPARTMENT LIGHT WARRANTY**		
A	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.		
B	A copy of the warranty certificate shall be submitted with the bid package (no exception).		
524.	**TRANSMISSION WARRANTY** The transmission shall have a **five (5) year/unlimited mileage** warranty covering 100% parts and labor. The warranty is to be provided by transmission supplier and not the apparatus builder.		

525.	**TRANSMISSION COOLER WARRANTY** The transmission cooler shall carry a **five (5) year** parts and labor warranty (exclusive to the transmission cooler). In addition, a collateral damage warranty shall also be in effect for the first three (3) years of the warranty coverage and shall not exceed $10,000 per occurrence. A copy of the warranty certificate shall be submitted with the bid package.		
526.	**WATER TANK WARRANTY**		
A	The poly water tank shall be provided with a lifetime material and workmanship limited warranty.		
B	A copy of the warranty certificate shall be submitted with the bid package (no exception).		
527.	**TEN (10) YEAR STRUCTURAL INTEGRITY**		
A	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.		
B	A copy of the warranty certificate shall be submitted with the bid package (no exception).		
528.	**ROLL UP DOOR MATERIAL AND WORKMANSHIP WARRANTY**		
A	A roll-up door limited warranty shall be provided. The roll-up door shall be warranted against manufacturing defects for a period of **ten (10) years**. A **five (5) year** limited warranty shall be provided on painted roll up doors.		
B	A copy of the warranty certificate shall be submitted with the bid package.		
529.	**PUMP WARRANTY**		
A	The pump shall be provided with a **five (5) year** material and workmanship limited warranty.		
B	A copy of the warranty certificate shall be submitted with the bid package.		
530.	**TEN (10) YEAR PUMP PLUMBING WARRANTY**		
A	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.		
B	A copy of the warranty certificate shall be submitted with the bid package.		
531.	**TWENTY (20) YEAR AERIAL DEVICE STRUCTURAL INTEGRITY WARRANTY**		
A	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.		
B	A copy of the warranty certificate shall be submitted with the bid package.		
532.	**AERIAL SWIVEL WARRANTY** A **five (5) year** limited swivel warranty shall be provided. A copy of the warranty certificate shall be submitted with the bid package (no exception).		
533.	**HYDRAULIC SYSTEM COMPONENTS WARRANTY** Aerial hydraulic system components shall be provided with a **five (5) year** material and workmanship limited warranty.		
534.	**HYDRAULIC SEAL WARRANTY**		
A	Aerial hydraulic seals shall be provided with a **three (3) year** material and workmanship limited warranty.		
B	A copy of the warranty certificate shall be submitted with the bid package.		
535.	**AERIAL WATERWAY WARRANTY** A **ten (10) year** limited waterway warranty shall be provided. A copy of the warranty certificate shall be submitted with the bid package (no exception).		

536.	**FOUR (4) YEAR PRO-RATED PAINT AND CORROSION**		
A	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..		
B	A copy of the warranty certificate shall be submitted with the bid package.		
537.	**FIVE (5) YEAR GENERATOR WARRANTY** There shall be a 5 year limited warranty provided for hydraulic generators.		
538.	**TEN (10) YEAR PRO-RATED PAINT AND CORROSION**		
A	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.		
B	A copy of the warranty certificate shall be submitted with the bid package (no exception).		
539.	**THREE (3) YEAR MATERIAL AND WORKMANSHIP**		
A	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.		
B	A copy of the warranty certificate shall be submitted with the bid package (no exception).		
540.	**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 proposal.		
541.	**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 proposal.		
542.	**POWER STEERING CERTIFICATION** The fire apparatus manufacturer shall provide a certification stating the power steering system as installed meets the requirements of the component supplier. The certification shall be provided at the time of bid.		
543.	**CAB INTEGRITY CERTIFICATION**		
A	The fire apparatus manufacturer shall provide, at the time of bid, a cab integrity certification. Testing shall meet or exceed the requirements below:		
	• European Occupant Protection Standard ECE Regulation No.29.		
	• SAE J2422 Cab Roof Strength Evaluation - Quasi-Static Loading Heavy Trucks.		
	• SAE J2420 COE Frontal Strength Evaluation - Dynamic Loading Heavy Trucks.		
B	There shall be no exception to any portion of the cab integrity certification. Nonconformance shall lead to immediate rejection of bid.		
544.	**CAB DOOR DURABILITY CERTIFICATION** Robust cab doors help protect occupants. Cab doors shall survive a 200,000 cycle door slam test where the slamming force exceeds 20 G's of deceleration. The bidder shall certify that the sample doors similar to those provided on the apparatus have been tested and have met these criteria without structural damage, latch malfunction, or significant component wear.		
545.	**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.		

546.	**ELECTRIC WINDOW DURABILITY CERTIFICATION** Cab window roll-up systems can cause maintenance problems if not designed for long service life. The window regulator design shall complete 30,000 complete up-down cycles and still function normally when finished. The bidder shall certify that sample doors and windows similar to those provided on the apparatus have been tested and have met these criteria without malfunction or significant component wear.		
547.	**SEATBELT 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.		
548.	**SEAT MOUNTING STRENGTH** Seat attachment strength is regulated by Federal Motor Vehicle Safety Standards and should be validated through testing. Each seat mounting design shall be tested to withstand 20 G's of force in accordance with FMVSS 571.207 Seating Systems. The bidder shall certify that each seat mount and cab structure design was pull tested to the required force and met the appropriate criteria.		
549.	**CAB DEFROSTER CERTIFICATION** Visibility during inclement weather is essential to safe apparatus performance. The defroster system shall clear the required windshield zones in accordance with SAE J381 Windshield Defrosting Systems Test Procedure And Performance Requirements - Trucks, Buses, and Multipurpose Vehicles. The bidder shall certify that the defrost system design has been tested in a cold chamber and passes the SAE J381 criteria.		
550.	**CAB HEATER CERTIFICATION** Good cab heat performance and regulation provides a more effective working environment for personnel, whether in-transit, or at a scene. The cab heaters shall warm the cab 75 F from a cold-soak, within 30 minutes when tested using the coolant supply methods found in SAE J381. The bidder shall certify that a substantially similar cab has been tested and has met these criteria.		
551.	**CAB AIR CONDITIONING PERFORMANCE CERTIFICATION** 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 67 degrees Fahrenheit in 30 minutes. The bidder shall certify that a substantially similar air conditioning system has been tested and has met these criteria. The certification shall be available at the time of delivery.		
552.	**AMP DRAW REPORT**		
A	The bidder shall provide, at the time of bid and delivery, an itemized print out of the expected amp draw of the entire vehicle's electrical system.		
B	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.		

C	All of the above listed items shall be provided by the bidder per the applicable NFPA 1901 or 1906 (Current Edition).		
553.	**ADDITIONAL REQUIRED LOOSE EQUIPMENT: BID AS OPTION 1**		
A	**HOSE:**		
	• 1500' (15, 100' Sections) of 5 inch All American HFX50X100Y50S HFX, yellow in color, with 5" Storz type locking sexless couplings.		
	• 1500' (30, 50' Sections) of 3 inch All American NP30X50Y25N N DURA, yellow in color, with 2.5 inch lightweight aluminum NST couplings.		
	• 1500' (30, 50' Sections) of 2.5 inch North American DB-800 hose, orange in color with 2.5 inch lightweight aluminum NST couplings.		
	• 1000' (20, 50' Sections) of 1.75 inch North American D-BAK hose, Yellow in color, with 1.5 inch lightweight aluminum NST couplings.		
	• 1000' (20, 50' Sections) of 1.75 inch North American D-BAK hose, Red in color, with 1.5 inch lightweight aluminum NST couplings.		
	• 1 12 foot Kochek 2P601 6 inch PVC suction hose with 5 inch Storz x 6 inch Male NST.		
	• 1 Kochek LL602 6NH Big Water Low Level Strainer with 8 inch tubing and external screen (LL602) with jet siphon.		
B	**NOZZLES:**		
	• 10 Akron 2127 1.5 inch X 1.5 inch Shutoff without Pistol Grip.		
	• 10 Akron 1499 15/16 inch Plain tip.		
	• 10 Akron 4866 Akron Fixed Orifice Assault Fog Tip – 185@50psi.		
	• 4 Akron 2126 2.5 inch X 2.5 inch Shutoff with and without Pistol Grip.		
C	**FORCIBLE ENTRY TOOLS**		
	• 4 Fire Hooks Unlimited DYN-DUO-REX combination tools.		
	• 4 Fire Hooks Unlimited PART RH 6 foot (NY) Roof Hooks.		
	• 4 Fire Hooks Unlimited PART RH 10 foot (NY) Roof Hooks.		
	• 4 Stanley Fat Max 60 inch Fiberglass Round Point shovels.		
	• 4 Tekton 3416 - 30 inch Bolt Cutters.		
	• 4 Flame Fighter SH10 10 pound Sledge Hammer with Fiberglass Handle.		
D	**FLASHLIGHTS**		
	• 4 Streamlight Vulcan 180 Vehicle Mount Systems Part # 44315.		
	• 4 Streamlight Survivor 12V DC Fast Charge – Orange Part # 90509.		
E	**ADAPTERS**		
	• 4 Kochek Style 35R2525 2.5 inch X 2.5 inch Double Swivel Female.		
	• 4 Kochek Style 36R2525 2.5 inch X 2.5 inch Double Male		
	• 2 Red Head Style 148-3 Triple Holder Set w/Style 105 hydrant wrench.		
	• 6 Red Head Style 101 Universal Spanners.		
	• 2 Harrington HSSW-401 Storz Spanner sets.		
	• 1 Bullard QXT Thermal imaging camera with truck mount charging system.		
	• 2 Kochek SKE54R 4 inch FNST rocker lug x 5 inch Storz 30 degree elbow.		
	• 2 Kochek CC507 5 inch blind cap with cable.		
F	**LADDERS**		
	• 2 Duo Safety 585-A 10 foot folding attic ladder.		
	• 1 Duo Safety 875-DR 16 foot roof ladder.		
	• 1 Duo Safety 875-DR 18 foot roof ladder.		
	• 1 Duo Safety 1200-A 28 foot 2 section extension ladder.		
	• 1 Duo Safety 1200-A 35 foot 2 section extension ladder.		

G	**EXTINGUISHER**		
	• 1 15# CO2 fire extinguisher.		
	• 1 Ansul AA20 20# ABC fire extinguisher.		
	• 2 Amerex B240 2.5 gallon water extinguisher.		
	• 10 Kochek MM1501 1.5 NH mounting plates.		
H	**MOUNTING PLATES**		
	• 10 Kochek MM2501 2.5 NH Mounting plates.		
	• 10 Kochek Mf507 4 inch or 5 inch Storz mounting plates.		
I	**EQUIPMENT MOUNTS**		
	• 4 Ironslok HD – K5003 - HD		
J	**MISCELLANEOUS**		
	• Akron 3444-CONFIG 500GPM Mercury Quick Attack LE with Mercury nozzle 4446 and stacked tips 2420		
	• 1 Super Vac V20-GX 20 inch Gas PPV Fan		
	• 4 Akron Scenestar ELSS-XLAC		
	• 1 Rotary Saw Stihl TS 700 14 inch with 4 Desert Diamond Fire Rescue Safety Blades 10314A08LN-14		
	• 1 Stihl 462 Rescue package		
554.	**THIS VEHICLE MUST BE DELIVERED BEFORE 12-31-2021**		

VI. Sedgwick County's Responsibilities

- Provide information, as legally allowed, in possession of the county, which relates to the county's requirements or which is relevant to this project.
- Designate a person to act as the County Contract Manager with respect to the work to be performed under this contract.
- County reserves the right to make inspections at various points of the project. Contractor agrees to openly participate in said inspections and provide information to the county on the progress, expected completion date and any unforeseen or unexpected complications in the project.

VII. Proposal Terms

A. Questions and Contact Information

Any questions regarding this document must be submitted in writing to Britt Rosencutter at britt.rosencutter@sedgwick.gov by 5:00 pm CDT, Thursday, July 16, 2020. Any questions of a substantive nature will be answered in written form as an addendum and posted on the purchasing website at https://www.sedgwickcounty.org/finance/purchasing/requests-for-bid-and-proposal/ under the Documents column associated with this RFP number by 5:00 pm CDT, Wednesday, July 22, 2020. Firms are responsible for checking the website and acknowledging any addenda on their proposal response form.

B. Minimum Firm Qualifications

This section lists the criteria to be considered in evaluating the ability of firms interested in providing the service(s) and/or product(s) specified in this Request for Proposal. Firms must meet or exceed theses qualifications to be considered for award. Any exceptions to the requirements listed should be clearly detailed in proposer's response. Proposers shall:

1. Have a minimum of 20 years' experience in providing services similar to those specified in this RFP.
2. Have an understanding of industry standards and best practices.
3. Have experience in managing projects of comparable size and complexity to that being proposed.
4. Have knowledge of and comply with all currently applicable, and as they become enacted during the contract term, federal, state and local laws, statutes, ordinances, rules and regulations. All laws of the State of Kansas, whether substantive or procedural, shall apply to the contract, and all statutory, charter, and ordinance provisions that are applicable to public contracts in the county shall be followed with respect to the contract.
5. Municipal and county government experience is desired, however, the county will make the final determination based on responses received and the evaluation process.
6. Have the capacity to acquire all bonds, escrows or insurances as outlined in the terms of this RFP.
7. Provide project supervision (as required) and quality control procedures.
8. Have appropriate material, equipment and labor to perform specified services.
9. Park only in designated areas and display parking permit (if provided).
10. Wear company uniform or ID badge for identification purposes.

C. Evaluation Criteria

The selection process will be based on the responses to this RFP. County staff will judge each response as determined by the scoring criteria below. Purchasing staff are not a part of the evaluation committee.

Component	Points
A. Responsiveness to specification	40
B. Cost	5
C. Service and Technical Support	20
D. Replacement Parts Availability	20
E. Delivery Timeframe	15
Total Possible Points	100

Assume the following cost proposals **(examples only)**

A. $50,000.00
B. $38,000.00
C. $49,000.00

Company B with a total price of $38,000.00 is the low offer. Take the low offer and divide each of the other offers into the low offer to calculate a percentage. This percentage is then multiplied by the number of points available for the cost. In this case, 10 points are allocated to cost.

A. $38,000.00 divided by $50,000.00 =.76	.76*10	7.6 points
B. $38,000.00 divided by $38,000.00 =1.00	1.00*10	10 points
C. $38,000.00 divided by $49,000.00= .77	.77*10	7.7 points

Any final negotiations for services, terms and conditions will be based, in part, on the firm's method of providing the service and the fee schedule achieved through discussions and agreement with the county's review committee. The county is under no obligation to accept the lowest priced proposal and reserves the right to further negotiate services and costs that are proposed. The county also reserves the sole right to recommend for award the proposal and plan that it deems to be in its best interest.

The county reserves the right to reject all proposals. All proposals, including supporting documentation shall become the property of Sedgwick County. All costs incurred in the preparation of this proposal shall be the responsibility of the firm making the proposals. Sedgwick County reserves the right to select, and subsequently recommend for award, the proposed service which best meets its required needs, quality levels and budget constraints.

D. Request for Proposal Timeline

The following dates are provided for information purposes and are subject to change without notice. Contact the Purchasing Department at (316) 660-7255 to confirm any and all dates**.**

Distribution of Request for Proposal to interested parties	**Tuesday, June 30, 2020**
Pre-Proposal conference call (not mandatory) 2:00 p.m.	**Friday, July 10, 2020**
Questions and clarifications submitted in writing by 5:00 pm CDT	**Thursday, July 16, 2020**
Addendum Issued by 5:00 pm CDT	**Wednesday, July 22, 2020**
Sealed Proposal due before 1:45 pm CDT	**Tuesday, August 4, 2020**
Evaluation Period	**August 5 through August 14**
Board of Bids and Contracts Recommendation	**Thursday, August 20, 2020**
Board of County Commission Award	**Wednesday, September 2, 2020**

E. Contract Period and Payment Terms

A contractual period will begin following Board of County Commissioners (BoCC) approval of the successful firm and continue through the duration of the assembly of the apparatus.

Either party may cancel its obligations herein upon thirty-day (30) prior written notice to the other party. It is understood that funding may cease or be reduced at any time, and in the event that adequate funds are not available to meet the obligations hereunder, either party reserves the right to terminate this agreement upon thirty (30) days prior written notice to the other. Payment will be remitted following receipt of monthly detailed invoice.

Payment and Invoice Provisions
https://www.sedgwickcounty.org/media/39239/payment_and_invoice_provisions.pdf

F. Insurance Requirements

Liability insurance coverage indicated below must be considered as primary and not as excess insurance. If required, contractor's professional liability/errors and omissions insurance shall (i) have a policy retroactive date prior to the date any professional services are provided for this project, and (ii) be maintained for a minimum of 3 years past completion of the project. Contractor shall furnish a certificate evidencing such coverage, with county listed as an additional insured including both ongoing and completed operations, except for professional liability, workers' compensation and employer's liability. **Certificate shall be provided prior to award of contract.** Certificate shall remain in force during the duration of the project/services and will not be canceled, reduced, modified, limited, or restricted until thirty (30) days after county receives written notice of such change. All insurance must be with an insurance company with a minimum BEST rating of A-VIII and licensed to do business in the State of Kansas **(must be acknowledged on the bid/proposal response form).**

NOTE: If any insurance is subject to a deductible or self-insured retention, written disclosure must be included in your proposal response and also be noted on the certificate of insurance.

It is the responsibility of contractor to require that any and all approved subcontractors meet the minimum insurance requirements.

Workers' Compensation:	
Applicable coverage per State Statutes	
Employer's Liability Insurance:	$500,000.00
Commercial General Liability Insurance (on form CG 00 01 04 13 or its equivalent):	
Each Occurrence	$1,000,000.00
General Aggregate, per project	$2,000,000.00
Personal Injury	$1,000,000.00
Products and Completed Operations Aggregate	$2,000,000.00
Automobile Liability:	
Combined single limit	$1,000,000.00
Umbrella Liability: Following form for both the general liability and automobile **__X__ Required / ____ Not Required** Each Claim Aggregate	 $25,000,000.00 $25,000,000.00
Professional Liability/ Errors & Omissions Insurance: **____ Required / __X__ Not Required** Each Claim Aggregate	 $1,000,000.00 $1,000,000.00
Pollution Liability Insurance: **____ Required / __X__ Not Required** Each Claim Aggregate	 $1,000,000.00 $1,000,000.00

Special Risks or Circumstances:

Entity reserves the right to modify, by written contract, these requirements, including limits, based on the nature of the risk, prior experience, insurer, coverage, or other special circumstances.

G. Indemnification

To the fullest extent of the law, the provider, its subcontractor, agents, servants, officers or employees shall indemnify and hold harmless Sedgwick County, including, but not limited to, its elected and appointed officials, officers, employees and agents, from any and all claims brought by any person or entity whatsoever, arising from any act, error, or omission of the provider during the provider's performance of the agreement or any other agreements of the provider entered into by reason thereof. The provider shall indemnify and defend Sedgwick County, including, but not limited to, its elected and appointed officials, officers, employees and agents, with respect to any claim arising, or alleged to have arisen from negligence, and/or willful, wanton or reckless acts or omissions of the provider, its subcontractor, agents, servants, officers, or employees and any and all losses or liabilities resulting from any such claims, including, but not limited to, damage awards, costs and reasonable attorney's fees. This indemnification shall not be affected by any other portions of the agreement relating to insurance requirements. The provider agrees that it will procure and keep in force at all times at its own expense insurance in accordance with these specifications.

H. Confidential Matters and Data Ownership

The successful proposer agrees all data, records and information, which the proposer, its agents and employees, which is the subject of this proposal, obtain access, remains at all times exclusively the property of Sedgwick County. The successful proposer agrees all such data, records, plans and information constitutes at all times proprietary information of Sedgwick County. The successful proposer agrees that it will not disclose, provide, or make available any of such proprietary information in any form to any person or entity. In addition, the successful proposer agrees it will not use any names or addresses contained in such data, records, plans and information for the purpose of selling or offering for sale any property or service to any person or entity who resides at any address in such data. In addition, the successful proposer agrees it will not sell, give or otherwise make available to any person or entity any names or addresses contained in or derived from such data, records and information for the purpose of allowing such person to sell or offer for sale any property or service to any person or entity named in such data. Successful proposer agrees it will take all reasonable steps and the same protective precautions to protect Sedgwick County's proprietary information from disclosure to third parties as with successful proposer's own proprietary and confidential information. Proposer agrees that all data, regardless of form that is generated as a result of this Request for Proposal is the property of Sedgwick County.

I. Proposal Conditions

https://www.sedgwickcounty.org/media/31338/proposal-terms-conditions.pdf

General Contract Provisions

https://www.sedgwickcounty.org/media/31337/general-contractual-provisions.pdf

Mandatory Contract Provisions

https://www.sedgwickcounty.org/media/31336/mandatory-contractual-provisions.pdf

Independent Contractor

https://www.sedgwickcounty.org/media/54780/independent-contractor-addendum.pdf

Sample Contract

https://www.sedgwickcounty.org/media/39236/sample-contract.pdf

VIII. Required Response Content

All proposal submissions shall include the following:

1. Firm profile: the name of the firm, address, telephone number(s), contact person, year the firm was established, and the names of the principals of the firm.
2. The names of the staff members who will be available for work on the contract, including a listing of their work experience.
3. The firm's relevant experience, notably experience working with government agencies.
4. At minimum, three (3) professional references, besides Sedgwick County, with email addresses, telephone numbers, and contact persons where work has been completed within the last three years.
5. A disclosure of any personal or financial interest in any properties in the project area, or any real or potential conflicts of interest with members of the Sedgwick County Board of County Commissioners or county staff.
6. A description of the type of assistance that will be sought from county staff, including assistance required from the county to lessen the costs of this project.
7. Proof of insurance meeting minimum insurance requirements as designated herein.
8. Those responses that do not include all required forms/items may be deemed non-responsive.

IX. Response Form

REQUEST FOR PROPOSAL
#20-0039
2EA. 107' AERIAL TRUCKS

The undersigned, on behalf of the proposer, certifies that: (1) this offer is made without previous understanding, agreement or connection with any person, firm, or corporation submitting a proposal on the same project; (2) is in all respects fair and without collusion or fraud; (3) the person whose signature appears below is legally empowered to bind the firm in whose name the proposer is entered; (4) they have read the complete Request for Proposal and understands all provisions; (5) if accepted by the county, this proposal is guaranteed as written and amended and will be implemented as stated; and (6) mistakes in writing of the submitted proposal will be their responsibility.

NAME _____

DBA/SAME _____

CONTACT_____

ADDRESS_____ **CITY/STATE**_____ **ZIP**_____

PHONE_____ **FAX**_____ **HOURS**_____

STATE OF INCORPORATION or ORGANIZATION _____

WEBSITE ADDRESS_____ **EMAIL**_____

NUMBER OF LOCATIONS_____ **NUMBER OF PERSONS EMPLOYED**_____

TYPE OF ORGANIZATION: Public Corporation _____ Private Corporation_____ Sole Proprietorship _____

Partnership_____ Other (Describe): _____

BUSINESS MODEL: Small Business _____ Manufacturer _____ Distributor _____ Retail _____

Dealer _____ Other (Describe): _____

Not a Minority-Owned Business: _____ **Minority-Owned Business:** _____ **(Specify Below)**

____African American (05) _____ Asian Pacific (10) _____ Subcontinent Asian (15) _____ Hispanic (20)

____Native American (25) _____ Other (30) - Please specify_____

Not a Woman-Owned Business: _____ **Woman-Owned Business:** _____ **(Specify Below)**

_____Not Minority -Woman Owned (50) _____ African American-Woman Owned (55) _____Asian Pacific-Woman Owned (60)

_____ Subcontinent Asian-Woman Owned (65) _____Hispanic Woman Owned (70) _____Native American-Woman Owned (75)

_____Other – Woman Owned (80) – Please specify_____

ARE YOU REGISTERED TO DO BUSINESS IN THE STATE OF KS: _____Yes _____ No

INSURANCE REGISTERED IN THE STATE OF KS WITH MINIMUM BEST RATING OF A-VIII: _____Yes _____No

ACKNOWLEDGE RECEIPT OF ADDENDA: All addendum(s) are posted to our RFQ/RFP web page and it is the vendor's responsibility to check and confirm all addendum(s) related to this document by going to www.sedgwickcounty.org/finance/purchasing.asp .

NO._____, DATED _____; NO._____, DATED_____; NO._____, DATED_____

In submitting a proposal, vendor acknowledges all requirements, terms, conditions, and sections of this document. Proposal submission format should be by order in which sections are listed throughout the document. All minimum and general requirements should be specifically addressed and detailed in proposer's response. **Exceptions to any part of this document should be clearly delineated and detailed**.

Signature_____ Title_____

Print Name_____ Dated _____

X. **Response Form pg. 2**

Qty.	Description	Unit Price	Extended Price
2 ea.	107’ Aerial Trucks complete as requested	$	$
Make/Model:			
Delivery Date:			