

DULUTH FIRE DEPARTMENT

FIRE LADDER TRUCK QUINT APPARATUS

APRIL 2, 2012

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DULUTH, MINNESOTA

The following Contracted Specifications is for the piece of apparatus as follows:

Fire Ladder Truck, Quint Apparatus, 2000 gallon per minute Waterous mid-ship mounted fire pump, stainless steel compartmented hosebody, fiberglass booster tank, and all other appurtenances in accordance with the following:

ATTENTION: There will be a pre-bid meeting scheduled prior to the bid closing date. This meeting will be held at a location to be detailed by the City of Duluth. The date, time, and location of this meeting will be provided in the bid documents. All bidders are urged to attend.

1.0 LETTER OF EXCEPTIONS

Any proposals being submitted without "Full Compliance" with these advertised specifications shall so state on the bid proposal page, followed by a detailed "Letter of Exceptions" listing the areas of noncompliance and equipment or designs being substituted. In addition, the specific reasons for the requested exception(s) shall be described. Materials that are commercially available to all manufacturers may not substituted.

2.0 GENERAL REQUIREMENTS

It is the intent of these specifications to cover the furnishing and delivering to the City of Duluth, a complete apparatus equipped as specified. Minor details of construction and materials where not otherwise specified are left to the discretion of Contractor who shall be solely responsible for the design and construction of all features. Such details and other construction not specifically covered herein or not at variance with these specifications should conform with the intent of the specifications as outlined in Booklet No. 1901 dated 2009. Any test equipment required or expense incurred for the Certification Tests shall be borne by Contractor supplying this equipment.

The following additional design criteria shall be applicable to this specification as appropriate:

- a. American Society for Testing and Materials (ASTM) A-36 specification for structural steel
- b. Society of Automotive Engineers , Inc. (SAE) Handbook
- c. American Society of Non-Destructive Testing (ASNT)
- d. ASNT Guidelines; Procedure SNT-TC_IA
- e. American Welding Society (AWS) AWS014.4-77 Classification and Application of Welded Joints for Machinery and Equipment

3.0 APPARATUS NON-EMERGENCY LIGHTING:

All specified 12-volt to be in accordance with D.O.T. regulations.

Apparatus to have sufficient lights to properly illuminate the crew compartment(s), the pump operator's panel(s), each enclosed tool and equipment compartment, work areas, steps and walkways. Lights shall be located to minimize accidental breakage.

All specified light fixtures to be located/fitted prior to and re-installed after finish painting. Where fixture wiring passes through metal body panel, the pass-thru hole to be equipped with a rubber grommet. All specified light fixtures shall be installed, using stainless steel screws with non-metallic "replaceable" threaded inserts (nuts), to allow removal of light fixture, from exterior of body. Where light fixtures are to be installed on a painted panel, all light fixture mounting holes, grommet holes, and fastener holes shall be machined/cut-out prior to prime and finish painting, so that all metal surfaces receive the same protective coating.

4.0 RELIABILITY OF CONTRACTOR:

Contractor shall furnish satisfactory evidence of the ability to design, engineer, and construct the apparatus specified and shall state the location of the factory where the apparatus is to be manufactured and tested. The apparatus design shall be an "original" generated by Bidder and not reproductions of fire/rescue apparatus designs previously engineered by other Contractors/Manufacturers.

Bidder shall provide purchaser with contact information for at least 10 similar units that have been built, sold, and delivered of the type described herein.

5.0 DESIGN:

The design of the equipment shall be in accordance with the best engineering practices. The equipment design and accessory installation shall permit accessibility for use, maintenance, and service. All components and assemblies shall be free of hazardous protrusions, sharp edges, cracks or other elements which might cause injury to personnel or equipment. NOTE: Where "nibbled" or non-continuous cutting methods are used to machine the body material, all edges shall be reworked/machine smoothed for injury prevention and appearance reasons.

All oil, hydraulic, and air tubing lines and electrical wiring shall be located in protective positions, properly attached to the frame or body structure and shall have protective loom and grommets at each point where they pass through structural members. All air lines and electrical wiring shall remain above the chassis frame rails as much as possible to protect them from damage.

Parts and components shall be located or positioned for rapid and simple inspection and recognition of excessive wear or potential failure. Whenever functional layout of operating components determines that physical or visual interference between items cannot be avoided, the item predicted to require the most maintenance shall be located for the best accessibility.

Cover plates which must be removed for component adjustment or part removal will be equipped with disconnect fastenings or hinged panels.

Drains, filler plugs, grease fittings, hydraulic lines, bleeders and check points for all components will located so that they are readily accessible and do not require special tools

for proper servicing. Design practices shall minimize the number of tools required for maintenance.

All components shall be designed and protected so that heavy rain or other adverse weather conditions will not interfere with normal servicing or operation.

All specified stainless steel shall be type 304, 2-B on exterior painted panels and #4-brushed where specified for pump panel overlays and unpainted compartment panels. All specified .125" or heavier smooth painted or swirl finish aluminum shall be 5052-H32 alloy. All specified 4-way aluminum treadplate shall be "polished" treadbrite or equal type 3003 of specified thickness. All specified bolted fasteners shall be coated stainless steel "low profile" button socket head cap screws. All nut fasteners to be Ny-Lok or approved equal, designed to prevent loosening.

Aluminum can not be substituted for any specified stainless fabrications.

NOTE: Lighter gauges of specified materials will not be substituted, stainless steel body fabrications shall be minimum 12-gauge nominal thickness - all basic requirements must be complied with.

Each bidder shall be prepared, if so requested by purchaser, to present evidence of our design experience/capabilities and manufacturing ability to carry out the terms of the contract.

NOTE: Designs that incorporate single source construction may receive priority consideration

6.0 CONSTRUCTION METHODS AND DISASSEMBLY CRITERION

Apparatus body components that are highly susceptible to operational damage shall be easily removed for repair.

NOTE: Apparatus body components that are highly susceptible to operational damage, that will be easily removable, include, but shall not be limited to: Front Body Corners, Outboard Wheel Well Panels, Rear Body Corners, Body Rub Rails, and Compartment Door Jambs. Disassembly of previous stated components shall be accomplished with simple hand tools unlike welded or bonded body proposals which require the use of heat (torches and heat guns), reciprocating saw blades (cutting tools), or material removal tools (drills).

7.0 SERVICEABILITY:

To insure the Purchaser a source of service and parts over a 20 year anticipated life of the apparatus, the bidder shall provide factory service, fabrication/manufacturing, and testing facilities within a 200 mile radius of the Duluth Fire Department Fleet Maintenance facility. This same facility must stock a complete line of all fire fighting equipment and parts for this apparatus.

The bidder must also be equipped to offer prompt service on the product at the purchaser's facility if required.

Records as to the purchase source for all auxiliary components of the specified apparatus shall be available to Purchaser upon request. This purchase information shall include manufacturer name, model number, authorized distributor, current part number, and special installation instructions.

8.0 GENERAL WARRANTY

The new fire apparatus manufactured per these specifications shall be warranted for a period of **ONE (1) YEAR, BEGINNING ON THE FIRST DAY AFTER THE "IN-SERVICE TRAINING"**, including the chassis and other components noted herein.

Under this warranty, Bidder agrees to furnish any parts to replace those that have failed due to defective material or workmanship where there is no indication of abuse, neglect, unusual or other than normal service providing that such parts are, at the option of Bidder, made available for inspection upon request, returned to the Bidders factory or other location designated by Bidder with transportation prepaid within 30 days after the date of failure or within ONE (1) year beginning on the first day after the "in-service training" for the original purchaser, whichever occurs first, and inspection indicates the failure was attributed to defective material or workmanship. Accessories/components warranted by their original manufacturer may be subject to reinstallation charges under the terms of their respective warranties, especially if such warranties exceed the above 1-year warranty terms.

The warranty on the chassis and chassis supplied components, storage batteries, generators, electrical lamps and other devices subject to deterioration is limited to the warranty of the manufacturer thereof and adjustments for the same are to be made directly with the chassis manufacturer by the Purchaser.

This warranty will not apply to any fire apparatus which has been repaired or altered outside the Manufacturer factory or designated (approved) facility in any way, which, in manufacturer's opinion might affect its stability or reliability. Each warranty claim needing repair or service at the designated facility must receive preauthorization by Manufacturer prior to performance of any work.

This warranty will not apply to those items which are usually considered to be normal maintenance and upkeep services: including, but not limited to, normal lubrication or proper adjustment or minor auxiliary pumps or reels.

Refer to the "BOOSTER TANK" section 6.0 for specific warranties on the provided Booster Tank.

This warranty is in lieu of all other warranties, expressed or implied, all other representations to the original purchaser, and all other obligations or liabilities, including liabilities for incidental or consequential damage on Bidder's part. Without limiting the foregoing, any express or implied warranties of merchantability or fitness for a particular purpose or warranties arising by Customer usage or by operation of law with regard to any products delivered pursuant hereto are expressly disclaimed. Bidder neither assumes nor authorizes any person to assume for Bidder, any liability in connection with the sales of Bidder's apparatus unless made in writing by Bidder.

8.1 CORROSION WARRANTY

Bidder shall detail frame, torque box, and all substructure corrosion protection and accompanying warranty.

8.2 20-YEAR WARRANTY ON STAINLESS STEEL BODY FABRICATIONS

The fire apparatus manufacturer (body builder) shall warrant to the original purchaser only, that the stainless steel body components as fabricated by the body builder, under normal use and with reasonable maintenance, be structurally sound and shall remain free from corrosion perforation for a period of at least TWENTY(20) years.

This warranty does not apply to the following items which are covered by a separate warranty: paint finish, hardware, moldings, and other accessories attached to this body.

FIRE APPARATUS MANUFACTURER MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO THE STAINLESS STEEL BODY AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED.

The body builder shall replace, without charge, repair at the factory, or make a fair allowance for any defect in material or workmanship demonstrated to the satisfaction to have existed at the time of delivery or not due to misuse, negligence, or accident. If the body builder elects to repair the body, the extent of such repair shall be determined solely by the body builder, and shall be performed solely at the body builder's factory, or at an approved facility. The expense of any transportation to or from such repair facility shall be borne by the purchaser and is not an item covered under this warranty.

The fire apparatus manufacturer (body builder) shall not be liable for consequential damages and under no circumstances shall its liability exceed the price for a defective body. The remedies set forth herein are exclusive and in substitution for all other remedies to which the purchaser would otherwise be entitled.

The fire apparatus manufacturer (body builder) shall be given a reasonable opportunity to investigate all claims. The purchaser must commence any action arising out of, based upon or relating to agreement or the breach thereof, within twelve months from the date the cause of the action occurred.

8.3 10-YEAR APPARATUS PAINT WARRANTY

The TEN (10) year paint performance guarantee will cover the areas of the vehicle as are originally finished by the apparatus body builder with the specified product for a period of TEN (10) years beginning the first day after the in service training.

The areas as outlined on the Guarantee Certificate, will be covered for the following paint failures:

GUARANTEE INCLUSIONS:

FULL APPARATUS BODY:

- * Peeling or delaminating of the topcoat and/or other layers of paint.
- * Cracking or checking
- * Loss of gloss caused by cracking, checking, or hazing.
- * Any paint failure caused by defective finishes which are covered by this guarantee.

All guarantee exclusions, limitations, and methods of claims are covered in the full certificate provided to the original owner.

The warranty on the chassis paint is limited to the warranty of the chassis manufacturer thereof and adjustments for the same are to be made directly with the chassis manufacturer by the Purchaser.

9.0 PRINTED PROPOSALS/BIDS

All proposals/documents are submitted in typed format. The only handwriting on the proposal forms will be on the signature lines. Each bid proposal must disclose the legal business address of the bidding Partnership/Corporate Entity, and the address of the factory where the proposed apparatus body is to be manufactured, assembled, and tested/certified.

10.0 PROPOSAL SIGNATURES REQUIRED

All pertinent bid documents **MUST BE** signed by the President/Chief Executive Officer of the cooperation and/or LLC overseeing the facility which will manufacture the proposed apparatus.

11.0 REQUIRED BID BOND

A Bidder's Bond in the amount of 5% shall be provided with each bid proposal.

12.0 CHASSIS PREPAYMENT DISCOUNT

The bid shall list any discount that will be provided for prepayment of the chassis upon delivery to the Bidder's factory location.

13.0 DETAILED PROPOSAL SPECIFICATIONS

All bidders shall furnish complete "Detailed Proposal Specifications", describing methods and materials of apparatus manufacture. Each and every specification page shall be printed on "Corporate/LLC Letter Head", with same pages numbered in sequence.

Proposal Specifications shall be in the "**same sequence**" (category and individual feature) as these attached Advertised Specifications, for ease of comparison and evaluation, by the Truck Committee/Purchaser.

14.0 PROPOSAL PRINT/DRAWING

A complete detailed print of the apparatus as is specified shall be provided. The print shall be to scale, 1" = 15", of the exact apparatus being proposed, and not a stock print of a similar unit. All dimensions are subject to a +/- 1/4 inch tolerance. The print shall have complete views of the driver side with chassis cab, passenger side with chassis cab, rear of the body, top view, and front view. The print shall include all of the following depicted items:

14.1 CHASSIS

Exact replication of model of chassis cab, mounted air horns, chassis cab step housings, cab roof "eye brow" light fixture(s), 120-volt shore power receptacle, air system keep-fill receptacle, emergency lighting fixtures, hand rails, siren and/or speakers, and horizontal exhaust system outlet.

14.2 APPARATUS BODY

The apparatus body subframe, underbody tow eyes, water tank profile with baffles and suction sump, all exterior 4-way treadplate pattern areas, body access steps, hand rails, interior compartment shelving, emergency and non-emergency lighting fixtures, ladders and pike poles and storage area, side and rear compartmentation showing dimensions with roll-up type door slats/bundles/bar type handle/latches, and hosebed arrangement with dividers, grating material, and 4-way aluminum hinged hosebed covers.

14.3 PUMP ENCLOSURE & PUMP SYSTEM:

Mid-ship modular pump enclosure/compartment, fire pump and pump transmission profile, tank-to-pump piping, preconnect hosebeds with hose guides, pump control and instrument panel layout with: gauges, instruments, pump controls, discharge outlets with closures, suction inlets with closures, and deluge discharge riser with monitor/device.

14.4 ADDITIONAL OPTIONAL FEATURES:

Other optional features, if specified, shall also be included on the proposal drawing, this includes; interior compartment roll-out trays, slide-in ladder storage, rewind cord reel, SCBA bottle storage compartments/racks, generator installation, permanent quartz lighting, hand operated 120-Volt floodlighting, and other detailed accessories and features so as to provide a "picture" of the proposed apparatus.

14.5 COMPLIANCE:

The drawing as described is part of the Bid Proposal.

15.0 AWARD OF CONTRACT

The contract will be awarded, as soon as possible to the most "responsible bidder", provided their bid is reasonable and it is in the best interest of the City of Duluth. The purchaser reserves the right to waive any formality in bids received once such waiver is in the interest of the purchaser. The purchaser also reserves the right to accept any item in the bid found to be of superior quality or otherwise preferred by the purchaser.

Bidders experience with specified construction methods, and previous use of stainless steel as a construction material will be considered in making the award.

The competency and responsibility of bidders along with the content of bid specification and accuracy /quality of bid drawing(s) will be considered in making the award. The Purchaser reserves the right to reject any and all bids when such rejection is in the interest of the purchaser and to reject of a bidder who, in the judgment of the purchaser, is not in a position to perform the contract.

The Purchaser does not, in any way, obligate itself to accept the lowest or any bid.

The City of Duluth reserves the right to reject any and all bids and purchase the equipment best suited and most acceptable with the City of Duluth required usage.

Bidders who take "Total Exception" to these advertised specifications are hereby advised that such statement will result in immediate REJECTION of their bid.

Prior to award, the bidder representative will meet with purchasing officials (at Purchaser's location) to personally discuss all facets of these specifications to insure a complete and satisfactory understanding of the City of Duluth specifications and the bid

16.0 INSPECTION TRIPS

The City of Duluth Truck Committee members will be advised as to the date of the following phases of construction: Pre-Construction (prior to bending of metal), Pre-Paint (final design/equipment layout), and Pre-Delivery. Truck Committee members reserve the right to travel to the factory during these or any other stages of construction.

Bidder shall arrange for the above specified "Pre-Construction Conference", to be held at the manufacturer's factory, at which time all final designs and equipment mounting locations will be approved. Any changes to original proposal specifications, as approved at the Pre-Construction Conference, will be noted on a "revised specification", and distributed to Truck Committee members within five working days after Pre-Construction Conference.

17.0 DIGITAL PHOTOS PROVIDED TO CUSTOMER

The manufacturer will provide, on a weekly or as requested basis, from the time the chassis arrives/begins and construction of the body compartments begins, "digital" color photos of each phase of construction. The digital photos shall be e-mailed or otherwise provided to the City of Duluth Fire Department.

The above specified digital photos shall include, but not be limited to: bare chassis (as it arrives from chassis factory), modifications to the chassis, installation of the fire pump and its related valves and piping (prior to being enclosed inside the fire pump cavity), water tank and foam tank (prior to their installation inside the apparatus body), fabricated apparatus body components (prior to their being assembled), assembly of the pump compartment fabrications, assembly of the compartmented body fabrications, installation of the water and foam tanks, interior compartment shelving arrangement, hose bed arrangement, and assembly of the fire pump control panel. In addition to the specified

photo shots, the purchaser shall have the right to request certain views of other features and accessories, during their manufacture and installation.

18.0 PERIODIC TELEPHONE CONFERENCES, FROM THE PROJECT MANAGER

The manufacturer will provide, on a weekly basis, from the time the chassis arrives and/or construction of the apparatus body begins, "Monday Morning" telephone conferences, to the person designated by the purchaser, to receive such calls.

The telephone conference updates shall include, but not be limited to: bare chassis arrival date and chassis condition report, arrival and outfitting of the fire pump and its related accessories, commencement of body fabrication, installation (onto the chassis) of the fire pump and pump compartment, commencement of body assembly, installation of the water and foam tanks, and the finish painting and lettering of the apparatus.

19.0 ACCEPTANCE TESTS AND REQUIREMENTS

Acceptance tests on behalf of the purchaser shall be prescribed and conducted prior to delivery by the manufacturer's representative in the presence of such person or persons as the purchaser may designate in the requirements for delivery.

20.0 ALTITUDE REQUIREMENTS:

The apparatus shall be designed to meet the specified rating at 2000 feet altitude above sea level.

21.0 ROADABILITY:

PER NFPA 1901.

22.0 ROAD TESTS:

PER NFPA 1901.

The service brakes shall bring the fully laden apparatus to a complete stop from an initial speed of 20 MPH in a distance not exceeding 35 ft., on a substantially hard level surface road free from loose material, oil, or grease.

Manufacturer's pump test and independent third party pump certification tests shall be conducted in accordance with requirements of NFPA #1901. A Certificate of Testing shall be furnished to the Purchaser, both for the Manufacturer's Preliminary Tests and the third party Certification Tests.

Responsibility for the apparatus and equipment shall remain with the contractor until acceptance by the purchaser.

The Manufacturer must supply at the time of delivery, at least **TWO COPIES** of:

1. Engine manufacturer's certified brake horsepower curve showing the maximum no-load governed speed.
2. Manufacturer's record of pumper construction details, per NFPA 1901.
3. Manufacturer's Run-In Certification with preliminary test results.
4. Pump Manufacturer's Certification of Hydrostatic Tests.
5. Pump Manufacturer's Certification of Pump Test Results.
6. The Certification of Inspection/Test of Fire Department Pumper by an Independent Third Party per NFPA 1901 standards.
7. Weight documents from four (4) individual certified scales showing actual loading on the sides of front axle, sides of rear axle(s), and overall (four total) vehicle (with the water tank full but without personnel, equipment, and hose) shall be supplied with the completed vehicle to determine compliance with NFPA section 10-1. Weights shall be for each tire or dual set of tires, so as to verify side-to-side loading, to be in compliance with NFPA section 4.12.2.3.3
8. At least **TWO COPIES** of the complete operation and maintenance manual covering the completed apparatus as delivered including the pump, emergency lighting and siren, generator, or other furnished accessories.
9. Wiring diagrams of 12-volt electrical systems, installed by apparatus body manufacturer (prime contractor). Diagrams must be "vehicle specific", describing all 12-volt electrical functions as furnished on this **and only this** apparatus.
10. A finalized drawing of apparatus as completed.
11. A "Delivery Manual", consisting of a 3-ring notebook type binder with reference tabs for each section, shall be furnished to include the following items: invoice copy(ies), proof of insurance, Manufacturer's Statement of Origin, acceptance forms, certifications, specifications, individual component manufacturer instructions and parts manuals, warranty forms for body, warranty forms for all major components, warranty instructions and format to be used for compliance with warranty obligations, routine service forms/publications, technical publications or training guide for major components, and apparatus body print "as built".
12. Paint numbers of all color coatings.
13. Certifications of water tank capacity.
14. Written load analysis of 12-volt electrical system as installed by body builder.

A test data plate will be provided at the pump operator's position which gives the rated discharges and pressures together with the speed of the engine as is determined by the manufacturer's test for this particular unit. Plate shall also include delivery date, pump serial number(s), original Customer, and the apparatus manufacturer's serial number.

The contractor shall affix a permanent plate in the driver's compartment specifying the quantity and type of fluids used in the vehicle.

All nameplates and instruction plates shall be metal or plastic with the information permanently engraved, stamped, or etched thereon. Metal nameplates to be installed with plated screws. All nameplates are to be mounted in a conspicuous place.

23.0 FAILURE TO MEET TESTS:

In the event that the apparatus fails to meet the test requirements on first trials, a second trial may be made at the option of the Contractor, within thirty days of the date of the first trials. Such trials shall be final and conclusive and failure to comply with these

requirements shall be cause for rejection. Failure to make such changes as the Chief of the Fire Department and/or the purchaser may consider necessary to conform to any clause of the specifications within thirty days after notice is given to make such changes shall also be cause for rejection of the apparatus.

24.0 PRODUCTION DRAWINGS:

Completed delivery manuals (2 Copies) shall also include production drawings of all individual apparatus body fabrication.

25.0 DELIVERY/CONSTRUCTION:

The period for construction of the vehicle shall be clearly stated, in calendar days from the receipt of purchase order, and shall include the time required for delivery of the chassis to the bidder's factory. The Contractor will not be held liable for delay of delivery caused by accidents, strikes, floods, or other events not subject to our control. All other delays shall be subject to a 500 dollars per day penalty.

The completed unit shall be delivered to the purchaser at the Fleet Services Facility, 4825 Mike Colallilo Drive, Duluth, MN 55807 with full instructions provided to Fleet Services on operation, care, and maintenance of apparatus.

26.0 DELIVERY ENGINEER:

Delivery training shall be performed by a factory Delivery Engineer who shall remain with the acceptance committee **for up to three (3) days** for training and making normal adjustments.

Delivery shall be considered to include, but not be limited to: conducting day or evening classes for instruction of Fire Department personnel and Drivers for operation.

The Delivery Engineer shall be factory trained, fully capable of conducting informative classes on the complete operation of the vehicle. This means familiarity with engine, running gear, transmission, driving skill, as well as handling of pump equipment and all controls.

The Delivery Engineer shall set delivery and instruction schedule with the person appointed by Purchaser, recognizing the need for either daytime or evening classes. Advance notice of at least one (1) week will be given, advising the specific day on which the new apparatus will be ready.

27.0 APPARATUS SIZE - CAPACITY – SEATING

Total overall length of apparatus shall not exceed 42 ft., highest point of apparatus shall not exceed 138 inches, total overall width of apparatus shall not exceed 101 inches, chassis wheelbase shall not exceed 240 inches (rear of cab to front axle of approx 67") , and GVWR shall be a minimum of 65,000 lbs.

A total of six (five with SCBA) seating positions to be provided, "Fully Enclosed", with approved seat belts. Two (2) seating positions to be located inside forward chassis cab and 4 (4) inside the rear crew area.

The GAWR, and GCWR or GVWR of the chassis shall be adequate to carry the fully equipped apparatus including full water and other tanks, the specified hose load, unequipped personnel weight (The unequipped personnel weight shall be calculated at 200 lb. per person times the maximum number of persons to ride the apparatus as specified.), ground ladders, and a miscellaneous equipment allowance of 2500 lbs. (2000 lbs. for apparatus with less than 250 cu. ft. of compartment space). It shall be the responsibility of the purchaser to provide the contractor with the weight of equipment to be carried if it is in excess of the allowance of 2500 lb.

28.0 CUSTOM STYLE CHASSIS

The appropriate attached specified heavy duty commercial chassis shall be furnished, by the apparatus body builder, and its price is included in the total Bid Proposal Package.

CHASSIS: NEW; Arrow XT, Spartan Gladiator, Marauder II, Predator, Typhoon or Inferno

28.1 ENGINE

The engine shall be a Maxxforce 13 or approved equal, diesel, dual turbo-charged, electronically controlled, per the following specifications.

- Max. Horsepower 475 HP @ 1700 RPM
- Governed Speed 2100 RPM
- Peak Torque 1700 lb. ft. @ 1000 RPM
- Cylinders Six (6)
- Operating Cycles Four (4)
- Bore & Stroke 4.96 x 6.54 in.
- Displacement 758 cu. in.
- Compression Ratio 17:1
- Drive line Size 1810
- Fan Drive Thermal Clutch.

Engine oil filters shall be engine manufacturers branded or approved equal. Engine oil filters shall be accessible for ease of service and replacement.

The engine shall be equipped with engine mounted oil check and fill with one piece valve cover.

A mounted Donaldson dry-type single stage air cleaner shall be furnished, with exterior air intake, engine compartment mounted "graduated" air restriction indicator, and remote dash mounted air restriction warning light.

A spark arrestor shall be installed in the chassis air intake system. This arrestor shall be mounted behind the intake grille to filter out airborne embers. The spark arrestor housing must be easily accessible when the cab is tilted

All other accessories required for a complete engine operated emergency vehicle, to be provided.

28.2 ALTERNATOR

The alternator shall be Leece Neville Model 4962PA, 320 amp, serpentine belt driven unit. The installation shall include an integral self-diagnostic regulator and rectifier for compact installation.

The alternator installation shall be designed to provide maximum output at engine idle speed to meet the minimum continuous electrical load of the apparatus as required.

28.3 BATTERY SYSTEM

Six (6) Exide # XHP-31D, maintenance free batteries shall be provided. Each battery shall be rated at 950 CCA and shall have a reserve capacity of 190 minutes.

Wiring for the batteries shall be 4/0 welding type dual path starting cables for SAEJ541.

28.4 BATTERY STORAGE

Batteries shall be securely mounted in fixed 3/16" stainless steel trays located on each side of the chassis frame. Complete access shall be provided when the cab is fully tilted.

Batteries shall be mounted on non-corrosive matting material.

The battery tray shall be able to withstand a longitudinal acceleration of -46.5g at 0.246 seconds in accordance to SAE J211 standards using a channel frequency class 600 filter. Testing shall be performed at and verified by a third party testing and evaluation center.

28.5 BATTERY WARMER

Six (6) blanket style warmers shall be provided. A Phillips & Temro 120 volt AC blanket-style heater warms the battery core to 60° to 70° above ambient temperature for quick starts. Thinsulate™ thermal insulation helps maintain battery temperature in warm or cold weather. Each battery heater shall be 28" long, 5" tall, 1/2" thick, having a wraparound design.

28.6 BATTERY DISCONNECT SWITCH

The chassis batteries shall be wired in parallel to a single 12 volt electrical system, controlled through a heavy duty, rotary type, master disconnect switch. The master disconnect switch shall be located within easy access of the driver upon entering or exiting the cab.

28.7 BATTERY JUMPER STUDS

A set of Cole Hersee battery jumper studs, model #46210-02 (red) and #46210-03 (black) shall be provided to allow the battery system to be jump started or charged from an external source. The studs shall be located on the bottom of the battery box on the driver's side of the chassis. Each stud shall be equipped with both a rubber protector cap and a 2" square non-conductive plate to prevent accidental shorting.

28.8 AIR COMPRESSOR

A BW 15.9 CFM, Model BA-921 engine driven single cylinder air compressor to be furnished with Teflon air discharge lines.

28.9 AUDIBLE/VISUAL ALARMS

Audible and visual alarm or buzzer to be furnished to indicate: low air pressure, low oil pressure, low water level, and high water temperature. GVG Fire and Emergency Service Vehicle Engine Warning System or approved equal to be furnished.

28.10 EXHAUST

A single passenger side mounted horizontal muffler shall be furnished with horizontal under frame exhaust pipe. There shall be heat deflector plates to protect the transmission or other equipment from excessive heat. An insulation "blanket" wrap shall be provided on the exhaust delivery pipe for reduction of heat into the cab. The "blanket" wrap shall extend down the exhaust delivery pipe to the bottom of the frame rail. Where the horizontal exhaust is provided, the last 18.00" of the tail pipe (outlet) shall be without any restriction of hangers or clamps to ensure an easy deployment of an exhaust extraction hose. Exhaust shall exit on passenger side of vehicle 16" ahead of the rear wheel and 4.00" beneath the rub rail, perpendicular with the body. The exhaust pipe outlet shall be square cut at the end and be **Plymovent/Neiderman** compatible.

28.11 ENGINE ACCESSORIES

An engine temperature thermostatically controlled belt driven Horton Drivemaster fan clutch or approved equal and a bladed fan shall be furnished. A cab dashboard mounted "Fan On" switch, with indicator light, shall be furnished to allow for manual engagement of the cooling fan. Full flow engine mounted oil filter to be furnished. The oil pipe shall be conveniently located and large enough to permit easy filling of the oil reservoir when apparatus is at a standstill with the engine running. All oil filters shall be easily accessible to include disposable elements that are readily available at the local supply sources.

28.12 COOLING SYSTEM

The cooling system of the engine shall be pressurized and shall be adequate to maintain a temperature of coolant in the engine not in excess of the engine manufacturer's maximum temperature rating. Coolant shall provide protection to a minimum minus 60 degrees F. Coolant to be Texaco "Extended Life", pre-charged SCA, with filter. Adequate and readily accessible drain cocks shall be installed at the lowest point of the cooling system and at other such points as are necessary to completely drain all water from the entire cooling

system. These drain cocks shall be so designed as to not open accidently due to vibration. Radiator coolant and hot water type heater hoses to be of Gates blue stripe, with constant tension hose clamps.

28.13 BOOSTER COOLANT PUMP

The specified pump compartment heater core shall be piped to the engine coolant system, installation to include: 12-volt in-line Groco "free-flow" centrifugal cast bronze bodied coolant "boost" pump, additional high grade coolant hose with stainless steel screw type hose clamps, and chassis cab dashboard mounted toggle switch control with engraved nameplate to read: "COOLANT PUMP." Installation of coolant pump shall provide increased rate of coolant flow to assure adequate auxiliary pump pressure gauge heater core temperature during extreme winter conditions.

28.14 GATED AUXILIARY HEATER COOLANT LINES

Engine cooling system chassis cab heater return line shall be equipped with 1/2" i.d. bronze NRS screw type gate valves and 5/8" i.d. neoprene rubber heater hoses extending to specified auxiliary heaters. An additional 1/2" bronze NRS gate valve to be provided on auxiliary heater-to-engine return line. Gate valves shall allow shut down of any or all of the remote auxiliary heating systems that are downstream of the chassis cab heater, should a leak develop.

28.15 ENGINE BLOCK HEATER - Wired Separately from shoreline

A Phillips-Temro 1500-watt, 115 volt block heater or approved equal shall be furnished and installed. It shall be wired to the shore power plug-in or other approved method on the drivers side of the apparatus. Final location to be determined at pre-construction.

28.16 STARTER AND FLYWHEEL HOUSING

An aluminum engine flywheel housing shall be furnished. Delco Remy 12-Volt 39MT electrical starter or approved equal, with thermal protection, shall be provided. Engine starter's characteristics shall be such that when operated under maximum load, the current draw does not induce a voltage drop sufficient to inversely affect the function of the electrical system.

28.17 RADIATOR SKID PLATE

The radiator installation shall include a heavy-duty radiator skid plate to protect the radiator from debris or obstructions under the chassis. The skid plate shall be designed so the angle of approach is not affected.

29.0 TRANSMISSION

An Allison World Transmission, Model 4000EVSR, electronically controlled, automatic transmission shall be provided. Transmission specifications shall be as follows:

- Max. Gross Input Power 600 HP
- Max. Gross Input Torque 1850 lb. ft.

- Input Speed (Range) 1700- 2300 RPM
- Direct Gear (Pumping) 4th (Lock-up)

Transmission installation shall be in accordance with the transmission manufacturer's specification. The transmission shall be readily and easily removable for repairs or replacement.

The transmission shall contain a built-in output retarder, controlled by an on/off switch on the dash, and actuated by releasing the accelerator and utilizing the brake pedal.

One (1) PTO opening shall be provided on both the left and right side of the converter housing (positions one (1) o'clock and eight (8) o'clock).

The transmission shall be calibrated for five (5) forward gears and one (1) reverse gear. Each gear shall have the following ratios:

- First 3.51:1
- Second 1.91:1
- Third 1.43:1
- Fourth 1.00:1
- Fifth 0.74:1
- Reverse-4.80:1

The transmission, upon start-up, will automatically select a four (4) speed operation. The fifth speed overdrive shall be available with the activation of the mode button on the shifting pad.

An illuminated, touch-pad type shift control shall be mounted in the cab, convenient to the driver. Shift control shall be approved by the transmission manufacturer.

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

If Chassis is equipped with ABS, the ABS system shall automatically disengage the auxiliary braking device when required.

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

Successful bidder will meet with Duluth Fire Department and Duluth Fleet Services to discuss gear ratios for optimum hill performance.

An external transmission oil cooler shall be provided in addition to the bottom tank cooler in the radiator.

29.1 TRANSMISSION OIL LEVEL SENSOR

The transmission shall be equipped with the oil level sensor (OLS); this sensor shall allow the operator to obtain an indication of the fluid level from the shift selector. The sensor display shall provide the following checks, correct fluid level, low fluid level and high fluid level.

29.2 PARK TO NEUTRAL

The transmission, upon application of the parking brake, shall automatically shift into neutral.

29.3 RETARDER CONTROL OPTION - 1/2 THROTTLE REL. 1/2 BRAKE PEDAL

The transmission shall have the 1600 ft. lb. torque (medium) spring setting for retardation force unless otherwise decided at pre bid meeting.

The retarder control shall be activated 1/2 upon accelerator release, with the remaining 1/2 retarder activation in conjunction with the brake treadle.

The retarder shall be wired in such a manner so as to illuminate the chassis brake lights when the retarder is engaged and operating.

A temperature gauge and indicator light shall be provided for retarder monitoring.

29.4 SYNTHETIC TRANSMISSION FLUID

Castrol "TRANSYND" or an equivalent synthetic TES 295 transmission fluid shall be utilized to fill the 4000 EVS transmission.

29.5 DRIVE LINES

Drive lines shall be Dana (Spicer) 1810 heavy duty series or equal, with "glide coat" splines on all slip shafts. The chassis manufacturer shall utilize an electronic type balancing machine to statically and dynamically balance all drive shafts. The manufacturer shall provide proof of compliance with all drive shaft manufacturer's standards and specifications

29.6 ARCTIC FLUID PACKAGE

Due to the apparatus operating in extreme cold conditions, the following lubricants shall be upgraded to synthetic:

Engine Oil
Engine Coolant
Transmission
Pump Transmission (If Equipped)
Rear Axle
A/C Refrigerant
A/C Lubricant
Cab Tilt

Hydraulic generator (If Equipped)
Chassis Grease.

30.0 FRONT SUSPENSION AND EQUIPMENT

Front suspension shall be progressive rate front leaf springs. The spring shall be permanently pinned at the front and have a shackle double pinned mounting at the rear.

The front leaf springs shall have a minimum of 10 leaves, a minimum length of 51", and a minimum width of 3-1/2". The capacity at ground shall be 23,000 lbs. All springs shall be of center bolt design. All spring pins shall be positively restrained from rotating in brackets and shackles.

The front suspension system shall be equipped with Monroe, model "Magnum - 70", double acting hydraulic shock absorbers. Shock absorbers to have a minimum bore of 1.38" and an outside diameter of approximately 3-1/4".

The front axle will be a Meritor MFS-20-133 A-N, including low friction "Easy Steer" bushing technology for maximum steering ease and longer life. The front axle shall be rated at 23,000 LBS. Front axle shall have brakes that activate with the parking brake of the vehicle. This parking brake system shall be in addition to the main parking brakes on the rear axle due to the excessive hills in the city.

Heavy duty Meritor EX-225 H, 17" disc brakes shall be provided for the front axle. The front brakes will be full air actuated with automatic slack adjustment. Front brakes will also lock when the parking brake is supplied for added braking on steep grades.

Front axle shall also have a power steering system for ease of steering control and at least a 2 quart see-through power steering reservoir. Front axle shall have a third party certified turning angle of at least 45 degrees. A front discharge or aluminum wheels shall not infringe on this cramp angle.

31.0 REAR AXLE, SUSPENSION AND EQUIPMENT

Rear axle assembly shall be a tandem, Meritor RT-58-185 single reduction with a capacity of 58,000 lbs. Axles shall have a gear reduction as required. Rear axles shall be equipped with a minimum of 17" disc brakes or approved equal. Both sets of axles shall lock when the parking brake is engaged. It shall be a single speed. The gear ratio of the rear axle combined with the 5th or 6th gear of the transmission shall produce a speed at full load governed engine RPM of up to 60 miles per hour.

Driver controlled traction differential, with differential lock control valve, will be furnished. Control will be a locking rocker switch on the dash and in easy reach of the driver. A dashboard mounted large red indicator light shall be furnished to indicate "Rear Axle Differential Lock Engaged".

Also the tandem axle chassis shall include an inter-axle differential lock, which shall allow both axles to be engaged as drive axles. The inter-axle differential lock shall be controlled by a locking rocker switch on the dash within easy reach of the driver. A dashboard

mounted large red indicator light shall be furnished to indicate "Inter-Axle Differential Lock Engaged"

The successful bidder shall review the ratio selection with representatives of the City of Duluth Fleet Services and Fire Department to assure the best selection for the best performance in the City of Duluth.

Mobil synthetic 75W-90W oil to be provided in rear axle

A Hendrickson "FIREMAAX" model #FMX-622 air ride suspension shall be provided for the tandem rear axle. The suspension shall have a weight rating equal to the rear axle weight rating up to 62,000 pounds. The suspension shall have the following features:

- Heavy duty shock absorbers to protect air springs from overextension
- Heavy duty torque rods and bushings
- Premium, heavy duty rubber bushings require no lubrication
- Integrated stabilizer design results for greater stability
- Low spring rate air springs for excellent ride quality
- Dual height control valves to maintain level vehicle from side to side

NOTE: Bidder will provide a rear wheel automatic chain system to be furnished and installed, controlled by a protected (covered) switch on the dash convenient to the driver and indicating light labeled "Automatic Chain".

In addition a set of 4 tire chains, one for each of the outside rear duals, built specifically for the size tires of this apparatus shall be supplied.

32.0 FRONT AND REAR TIRES AND WHEELS

The front tires shall be Michelin 425/65R22.5 "20 Ply" tubeless radial XZY3 wide base mixed tread. The tires shall be fire service rated up to 24,400 lbs and shall have a top speed of 65 mph when inflated to 120 psi.

The rear tires shall be Michelin 315/80R22.5 "20 Ply" tubeless radial XDY-3 traction tread. The tires shall be fire service rated up to 67,000lbs and shall have a top speed of 60 mph when inflated to 130 psi.

Front wheels to be correctly sized Alcoa (preferred) or Accuride, 10-stud-hole aluminum disc with outsides polished, tubeless type, hub piloted.

Rear wheels to be correctly sized Alcoa (preferred) or Accuride, 10-stud-hole aluminum disc, tubeless type, hub piloted with outsides of outer rear wheels polished.

Four (4) each "rigid" metal valve core threaded extensions shall be provided, installed on the inside dual rear tires of the vehicles rear axles. Inside dual wheels shall be positioned so that the valve core extensions protrude through the outside dual wheels, located directly across from the outside dual wheel's valve core.

Stainless Steel front and rear wheel hubs to be furnished with oil viewing window on front.

Front tires to be single (two each). Rear tires shall be dual (four each).

BODYBUILDERS: Each load bearing tire shall not carry weight in excess of the recommended load for intermittent operation for truck tires of the size used, as published by the Tire and Rim Association, Inc., Akron, Ohio or the tire manufacturer's published rating

32.1 TIRE PRESSURE MONITORING DEVICES

Each tire shall be equipped with an air pressure indicator cap on the valve stem. Each cap shall have a visual LED indicator to show if the tire is correctly inflated.

32.2 LUG NUT AND CENTER HUB COVERS, FOR CHASSIS' ALUMINUM WHEELS

The specified front and rear driver's and passenger's side aluminum wheels shall be equipped with chrome plated plastic or polished stainless steel (non-corrosive) friction fit lug nut covers and center hub cap covers. Covers to be installed after proper torque of wheel lug nuts has been reached. Six (6) spare lug nut covers will also be provided.

32.3 AUTOMATIC TRACTION CONTROL (ATC)

To further improve vehicle drive characteristics, the unit shall be fitted with automatic traction control (ATC). This system shall control drive wheel slip during acceleration from a resting point. An extra solenoid valve shall be added to the ABS system. The system shall control the engine and brakes to ensure efficient acceleration. The system shall be equipped with a dash-mounted light indicating the ATC is controlling drive wheel slip. The system shall also include an "off road traction" dash mounted switch that will allow the operator to momentarily allow for more wheel slip when the unit is in deep mud or snow.

This system shall have a three (3) year or 300,000 mile parts and labor warranty as provided by Meritor Wabco Vehicle Control Systems.

NOTE: Bidder to provide an option and price for deletion of this function if possible.

32.4 WHEELWELL MUD FLAPS, FRONT AND REAR

Driver's side and passenger's side front fender and rear body wheel well extension mud flaps shall be furnished, made of fabric reinforced neoprene rubber, bolted to the front fender liner and rear wheel well bulkheads using stainless steel strap brackets and bolts. Mud flaps shall extend approximately 10" below rub rail level.

32.5 WHEEL CHOCKS

Four (4) Ziamatic NFPA compliant cast aluminum "single piece" wheel chocks shall be furnished. Possible storage box location to be determined at pre construction.

33.0 AIR BRAKING SYSTEM

Brake systems shall comply with current regulations and NFPA 1901. All brakes shall be readily assessable for service and replacement. Service brakes shall be of the full air

actuated heavy duty type, and shall include a dashboard mounted dual needle air pressure gauge and low pressure warning buzzer.

All brake rotors, drums, shoes, or pads shall be the largest possible on the chosen axle for maximum braking without driving or handling deficiencies. Color-coded nylon brake lines shall be provided. The lines shall be wrapped in a heat protective loom where necessary in the chassis.

Parking brake shall be of the spring-actuated type, mounted on the rear axle brake chambers. The parking brake control shall be mounted on the cab center instrument panel. A red indicator light shall be provided in the driver dash panel that shall illuminate when the parking brake is applied.

The parking brake shall be plumbed to provide all wheel lock-up when applied.

FMVSS-121 compliant brakes must be furnished, Wabco 4S/4M ABS or approved equal. The Wabco ABS system shall come with a **three (3) year or 300,000 mile parts and labor** warranty provided by Meritor Wabco Vehicle Control Systems.

33.1 HEATED AIR DRYER

A Bendix model AD-IS, or approved equal remote mounted heated air dryer shall be furnished, with heater.

33.2 AIR RESERVOIRS

There shall be a minimum of five (5) air reservoirs and be installed in conformance with best automotive practices.

Reservoir capacity total shall be at least minimum of 7100 cu. in.

The air reservoirs shall be color coded to match the air lines for easy identification, ease of maintenance and troubleshooting. The reservoirs shall be painted the following colors:

Wet Tank	Black
Primary Tank	Green
Secondary Tank	Blue
Auxiliary Tank(s)	Yellow.

For ease of daily maintenance, each air system reservoir shall be equipped with pull cable type drains, which shall be extended to the edge of the body or running board.

Steel air reservoirs shall be furnished that are sized to handle the braking system. One (1) additional air tank with approximately 2000 cubic inch displacement shall be provided for aiding in the use of powering air tools.

The entire chassis air system shall be plumbed utilizing reinforced, Synflex air lines. All of the airlines shall be color coded to correspond with an air system schematic and shall be adequately protected from heat and chafing.

33.3 BRAKING PERFORMANCE AND PARKING BRAKE

The apparatus parking brakes shall operate the **FRONT** and **BOTH SETS OF REAR** wheels. Park-Release brake control to be furnished should control both front and rear with one (1) knob. Placement of control should be easily accessible to a seated driver.

Neither a lock-up device, nor a “Park” position on an automatic transmission can be used to substitute for a separate parking brake system. Brake performance shall comply with all applicable regulations; IE: NFPA, MNDOT, ETC

NOTE: NFPA requires at a minimum: “the service and parking brake system operating independently shall be capable of positively holding the fully loaded vehicle on all City of Duluth streets, or a maximum grade specified (Approx. 30 degree street) when the vehicle is performing any of its designed stationary functions.

34.0 FRAME AND WHEELBASE

Chassis outboard frame rails, left and right sides, shall be clear of protrusions, from back of cab to rear suspension. Frame mounted chassis accessories must be located inside the frame rails, and removable.

BODYBUILDERS: No holes shall be drilled in the frame flanges for securing muffler, wiring, etc. Drill in the web only. No welding is allowed to the frame web or flanges. The total weight of the vehicle shall be distributed as evenly as possible to achieve the best performance possible.

The chassis wheelbase shall be approximately **240”**, with a minimum aft dimension rear of cab-to-front axle distance of approximately **65”**. Rear of axle frame rails shall be “square-end”, extending behind centerline of rear axle.

35.0 BUMPER/TOW HOOKS

Front bumper extension shall extend approx 16” from the front of the chassis to encompass the air horns, sirens, warning lights, and tray for 150’ of 1 ¾” rubber jacket hose, couplings, and nozzle. Bumper extension shall be heavy duty built to resist sagging and fatigue. The ends of the bumper shall be supported by horizontal channels, which shall extend from the frame rails to the sides of the bumper. The front face of the bumper shall be constructed for severe service of at least 3/8” structural steel channel. It shall be one-piece construction. It shall be approximately 12” high, with 2” flanges on top and bottom, and 45 degree angled corners. Ends of bumper shall extend rearward toward cab to provided added protection.

A gravel pan, constructed of a minimum of .188” bright aluminum treadplate, shall be furnished between the bumper and cab face. The gravel pan shall be properly supported from the underside to prevent flexing and vibration of the aluminum treadplate. Also, an aluminum treadplate cover with latch and D-ring handle, and stainless piano hinge shall be made for the hose tray with a slot cut in the edge for the hose to go through. Cover shall seal hose tray as much as possible and have a pneumatic hold open cylinder to keep cover in open position.

Two (2) front chrome plated steel, tow eyes shall be fastened directly to the frame web, extending above the bumper through the aluminum tread plate gravel shield. The tow eyes shall be fastened with grade 8 bolts and nuts.

Tow eyes shall easily assessable for use as anchors for rope rescue scenarios. Exact location to be shown on bid drawing. Tow eyes shall have rounded edges and be free from burrs.

A receiver hitch shall be mounted below the front bumper and rated for at least 12,000 lbs. Power options to this location shall be discussed with Duluth Fleet Services and Duluth Fire Department. Power connector to be Anderson Power Products SBX 175 2-pole connector with auxiliary contacts.

Bumper shall be painted red to match chassis color.

36.0 FUEL TANK

One (1) minimum 65 gallon capacity stainless steel fuel tank or approved equal shall be provided and mounted to fill on the drivers side of the vehicle at the rear of the chassis. It shall be equipped with swash partitions and a vent. Fuel suction and return lines to be furnished as recommended by the engine manufacturer. A .75" drain plug shall be provided in the low point of the tank for drainage. The tank fill opening shall be not less than 2 1/2" in diameter.

The fuel tank shall be installed behind the rear wheels between the frame rails.

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

The fuel tank shall be able to withstand a longitudinal acceleration of -23.0g at 0.166 seconds in accordance to SAE J211 standards using a channel frequency class 600 filter. Testing shall be performed at and verified by a third party testing and evaluation center.

The fuel lines shall be textile reinforced synthetic rubber or plastic hose that is approved for use with diesel fuel and has a minimum max temperature rating of 250° F. The lines shall be sized to meet engine manufacture's requirements, and shall be carefully routed and secured along the inside of the frame rails.

An Alliance Fuel/Water Separator or approved equal shall be furnished, with heated bowl.

36.1 SECONDARY ELECTRIC FUEL PUMP

In addition to the primary fuel pump, a secondary electric fuel pump for re-priming shall be furnished in the main fuel line. A labeled control switch shall be provided on the main dash panel.

36.2 FUEL POCKET

A fuel fill shall be provided in the left side rear wheel well area. A Cast Products heavy duty cast aluminum spring loaded hinged fill door shall be provided.

A label indicating "Ultra Low Sulfur Diesel Fuel Only" shall be provided adjacent to the fuel fill.

37.0 CHASSIS AND CAB EQUIPMENT

- A custom cab design with four doors and retractable safety glass windows shall be provided.
- The cab shall be specifically built for the fire service and have rubber or air suspension mounts.
- Chassis shall be equipped, if available, with a 10" raised cab for the rear section of the cab.
- The cab shall be full tilt style. The engine shall be easily accessible and capable of being removed with the cab tilted. The cab shall be capable of tilting 45 degrees. **Cab tilt shall have manual back-up for raising and lowering the cab.**
- All cab and crew entry doors shall have **electric windows** controlled at the window and at the drivers side instrument panel. .
- All cab glass shall be tinted
- A glove box with a drop-down door shall be installed in the front dash panel in the front of the officer's position
- Four (4) cup holders to be provided and installed. Two (2) in front and two (2) in rear
- Electric windshield wipers, Arctic Type, shall be furnished with delay and power integral blade windshield washers.
- The washer reservoir shall be able to be filled without raising the cab.
- The engine cover (dog house) shall be insulated for protection from heat and sound. The noise insulation shall keep the DBA level within the limits stated in the current NFPA series 1900. There shall be access that allows all engine fluids to be easily checked. The engine cover shall be as built to allow the most usable space possible in the cab area. The engine tunnel shall be modified on the passenger side to fit the turbo and related components.
- There shall be double automotive type rubber seals around the perimeter of the door framing and the door edges to ensure a weather tight fit. Two (2) window defrost fans, Red Dot Model #RD-5-4547, 6.00" shall be provided. Fans shall be mounted to the ceiling of the cab centered above the front dash area.
- A single electric horn to be furnished, steering wheel button controlled.
- Adjustable "tilt" and "telescope" steering wheel column, is to be furnished with steering wheel.
- Four (4) Chevron reflective signs shall be installed on the lowest portion of the inner door panels, one (1) on each door. These chevrons shall cover at least 96 in².

38.0 CAB EXTERIOR

Four (4), exterior NFPA compliant three piece tubular hand-grab rails shall be furnished and installed. They shall be etched, without rubber inserts, and have a drain hole on the bottom. They shall be located on the left and right sides to the rear of the doors. Grab handles shall include one (1) 28.00 inch mounted behind each of the front cab entry doors and one (1) 36.00 inch mounted behind each of the rear cab entry doors.

Handrail brackets shall have 3" standoff to allow for fire gloves. A stainless steel scratch guard shall be provided behind the handrail.

A chromed front grille shall be provided. A custom red vinyl cold weather front shall be provided. The vinyl cover shall cover only the front cab grill and shall be held in place by

twist to lock fasteners. An 11" X 11" flap that can be unzipped or unsnapped shall be provided

All four (4) chassis cab door locks to be keyed the same as ignition switch. Two (2) extra keys are to be provided.

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

38.1 CAB PAINT

Cab exterior to be painted Red in DuPont or approved equal, to match PPG FBCH 35377 (formerly PPG High Solids Basecoat/Clearcoat Code DUH575377 Red).

Chassis, including: frame rails, cross members, axles, suspensions, torque box and any other pertinent location to be painted black and **coated with corrosion resistant material**.

Bidder to detail corrosion process, material used, and locations with Fire Department and Fleet Services.

38.2 MANUFACTURING LABELS

A permanent plate shall be mounted in the driver's compartment specifying the quantity and type of the following fluids that may be used in the apparatus for normal maintenance. Where a fluid is not applicable to the unit, the plate shall be marked N/A to inform the service technician who may not be familiar with the apparatus.

- Engine oil
- Engine coolant
- Transmission fluid
- Pump transmission fluid
- Pump primer fluid
- Drive axle fluid
- Air conditioning refrigerant
- Power steering fluid
- Cab tilt mechanism fluid
- Transfer case fluid
- Equipment rack fluid
- Air compressor system lubricant
- Generator system lubricant
- Front tires air pressure
- Rear tires air pressure

A permanent plate shall be affixed in the driver's area that states the maximum number of personnel allowed to ride on the apparatus at any time.

A sign shall be affixed in the chassis cab, in plain sight of the driver that states the overall travel height, overall length, and gross GVWR of the apparatus.

On any gated inlet on the apparatus, a permanent label shall be provided that states:

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

All other appropriate labels to ensure safe operation of the apparatus shall be permanently affixed in conspicuous locations.

38.3 DOT CAB MARKER LIGHTS AND REFLECTORS

Five (5) DOT approved Weldon (or equal) model # 9186-1500-20 Light Emitting Diode (LED) cab marker lamps shall be mounted on the front upper edge of the cab, above the windshield.

Amber LED marker lights with integral reflectors shall be provided on the side of the cab adjacent to the driver's door, one (1) each side.

Truck-Lite Model # 18 red LED marker lights with integral reflectors shall be provided at the lower side rear, one (1) each side.

Truck-Lite # 60115Y yellow LED side marker and turn lights shall be provided on the apparatus lower side, forward of rear axle, one (1) each side.

Truck-Lite Model #19 red LED clearance lights shall be provided on the apparatus rear upper, one (1) each side at the outermost practical location.

Truck-Lite Model # 33740R LED 3-lamp identification bar will be provided on the apparatus rear center. The lights shall be red in color.

Truck-Lite # 98034Y yellow reflectors shall be provided on the apparatus body lower side, as far forward and low as practical, one (1) each side if the apparatus is 30' long or longer.

Truck-Lite # 98034R red reflectors shall be provided on the apparatus rear, one (1) each side at the outermost practical location.

38.4 MIRRORS

One (1) Velvac Deluxe, model 2025, low mount chrome mirror shall be mounted with a polished die-cast aluminum arm on the driver side cab door. One (1) Velvac V-Max, model 2030, low mount chrome mirror shall be mounted with a 17" die cast aluminum polished arm on the officer side front cab corner. Both mirrors shall include a replaceable flat glass and a 30 sq. inch convex glass. Mirror head shall have a highly polished chrome finish.

Both flat mirror heads shall be adjustable by an electric remote control switch inside the cab within easy reach of the driver.

Convex mirrors on lower portion shall be adjustable by an electric remote control switch inside the cab within easy reach of the driver.

The mirror heads shall also be heated with the control within easy reach of the driver.

The mirrors shall be corrosion free under all weather conditions.

Each mirror will be provided with "Signal Mirror" glass (LED directional in the glass)

The Velvac **two (2) year** warranty on material and workmanship and **two (2) year** warranty on chrome finish shall be provided.

One (1), Retrac rectangular convex passenger side down-view mirror shall be furnished above officer's door.

The cab exterior shall include two (2) Retrac rectangular convex look out mirrors. Each mirror shall measure 5.50 inches X 7.50 inches and shall be located ahead of the rear crew doors, one (1) each side providing crew members better visibility to the rear of the vehicle prior to exiting.

39.0 CAB INTERIOR / CLIMATE CONTROL/ SEATING

The cab and dash fascia shall be a flat faced design to provide for ease of maintenance. The cab engine tunnel shall be covered with a multi-layer mat consisting of closed cell foam, PVC, acoustical barrier and no-slip pebble grain. The engine tunnel mat shall be trimmed with aluminum nosing trim for and aesthetically pleasing appearance. The headliner shall be installed in both forward and rear cab sections. Headliner material shall be of an approved material. A sound barrier shall be part of its composition. Material shall be securely fastened to the interior cab ceiling. Forward portion of the cab headliner shall provide easy access for servicing electrical wiring or for other maintenance needs without removing entire unit. Gray interior or approved color shall be furnished.

A climate-control system shall be provided for total cab environmental comfort. This system shall provide heat, cooling and defrost capabilities to various areas in the cab. The system shall consist of a single evaporator unit, mounted in the center overhead of the cab.

The ceiling mounted evaporator/heater unit shall include the following:

- Heavy-duty, high output blower.
- High efficiency coil that includes "rifled" tubing and oversized header tubes for maximum refrigerant distribution.
- Four (4) 3" diameter, adjustable louvers; two (2) each side of the cab overhead, facing the driver and officer seat positions.
- A large center mounted multi-vent defroster louver positioned above the windshield to provide adequate airflow for windshield defrost.
- Four (4) integral 3" diameter louvers, one (1) below the driver and officer seat positions and one (1) under each outboard rear facing crew seat.
- Damper controls shall be pneumatically operated to provide air discharge to the windshield, front overhead air discharge louvers or the seat riser/floor outlets as required.
- An adjustable electric water valve to control the amount of heat.
- Housing shall be fully insulated and enclosed.

- BTU: 53,500 A/C
- BTU: 69,300 Heat
- CFM: 590 Heat
- CFM: 590 A/C.

The ceiling mounted evaporator unit shall be designed to include a deep well condensate collection pan, which shall include an automatic air vacuum pump to ensure proper drainage.

The ceiling mounted evaporator unit shall be enclosed with an ergonomically designed, custom panel to provide maximum headroom and a pleasing appearance.

A serviceable foam intake filter shall be installed on the rear of the evaporator.

The controls panel shall actuate the air-distribution system with air cylinders, which are to be separated from the brake system by an 85-90 psi pressure protection valve.

All defrost/heating systems will be plumbed with one (1) seasonal shut-off valve mounted near the engine.

Two (2) 12-volt, roof top, single condensers shall be mounted on the cab roof so as not to interfere with the aerial device or any emergency lighting systems. The condensers shall be designed with high performance, long life fan assemblies. The fan motors are to be equipped with sealed housings and shaft.

The condensers and coil design shall include rifled tubing for maximum efficiency. Each coil shall be painted black. The condenser unit will include a receiver drier with a high and low pressure switch. The wire harness shall include necessary wiring for the clutch circuit as well as a separate power relay circuit.

Mounting design shall enable easy servicing of all components and unit replacement if necessary.

Separate heater and A/C blower controls for the front and rear of cab if possible.

One (1) 53,500 BTU auxiliary heater shall be provided and installed in the rear section of the crew cab under the center rear facing seat riser. The fan controls shall be located on the heater unit. The auxiliary heater system hoses shall be silicone with stainless steel constant torque clamps approved for use with silicone hose. All defrost/heating systems shall be plumbed with one (1) seasonal shut-off valve at the front corner on the right side of the cab. The cab must be tilted to access the shut-off valve.

Two (2) 13,500 BTU heaters shall be provided and installed in the face of the seat riser storage area for the left and right front seats, one (1) each side. The heater fan controls shall be individual switches located in easy reach of the person in a seated position. The auxiliary heater system hoses shall be silicone with stainless steel constant torque clamps approved for use with silicone hose. All defrost/heating systems shall be plumbed with one

(1) seasonal shut-off valve at the front corner on the right side of the cab. The cab must be tilted to access the shut-off valve.

Drivers seat shall be a H.O Bostrom Sierra Air with 5" travel option, fore and aft adjustment, suspension cover, and Durawear seat covering.

Officers seat shall be a H.O. Bostrom Tanker 450 Air with 5" travel option, fore and aft adjustment suspension cover, cavity cover, and Durawear seat covering. SCBA bracket shall be **Smartdock Gen 2** for Scott 4.5 SCBA.

Rear seats shall be two (2) rear facing H.O. Bostrom Tanker 400 and two (2) forward facing H.O. Bostrom Tanker 400 CT Flip-up. They shall have cavities for Scott 4.5 SCBA, with cavity covers, and suspension covers. The seat covering shall be Durawear. SCBA bracket shall be **Smartdock Gen 2** for Scott 4.5 SCBA.

In order to maximize leg room Officers and drivers seats shall be set back as far as practical and dog house as small as possible.

Five (5), Weldon model # 8080-8000-13 or approved equal 12-volt clear cab dome/red map lights with a switch on each side of the light to allow choice of the clear light, the red light, or both. Two light fixtures will be located in the front of the cab and three lights will be mounted in the rear of the cab. The lights will be activated by the door switch and can be turned on manually with the switches located on the lights.

Seat belts and/or safety straps shall be red and conform to all applicable regulations, all 3-point type.

39.1 CONTROLS, INSTRUMENTS, ELECTRICAL SYSTEMS

- Low air pressure light and buzzer
- Primary and secondary 2" air pressure gauges
- Engine compartment mounted air restriction indicator with graduations and warning light in dash
- Odometer/Trip Odometer/Hour/Diagnostic/Voltage Display
- Diagnostic interface connector located below dash
- Electric 2" fuel gauge
- Engine ECM connector, mounted back of cab: Park Brake and Neutral Interlock
- Electrical engine coolant temperature gauge
- Transmission oil temperature gauge
- Engine and trip hour meters integral within driver display
- Two (2) electric/air dash mounted PTO switches to be provided with indicator lights
- Electric engine oil pressure gauge
- Electronic MPH speedometer with secondary KPH scale
- Electronic tachometer, 3000 RPM
- Digital voltage display
- Marker Light Switch, integral with headlight switch
- One valve Park Brake Control, with Warning Indicator Light
- Self-canceling turn signal switch/dimmer/washer/wiper/hazard lights
- Integral electronic turn signal flasher

39.2 NFPA HELMET HOLDERS

Four (4) NFPA helmet holders shall be provided and installed. Final location to be determined at final inspection.

39.3 RADIO

One AM/FM/CD/WB cab mounted radio to be provided with four (4) radio speakers and an AM/FM antenna mounted on forward driver side roof. Isolated in-line fuse protected wiring shall be provided, extending direct from battery to chassis cab AM/FM/WB Radio so as to support pre set stations and clock, if any.

40.0 NFPA MODIFICATIONS TO CHASSIS:

The following modifications shall be made by the apparatus body builder, to the furnished fire apparatus truck chassis. Each modification shall be described within the Manufacturers proposal specifications so as to prove compliance or non-compliance with the following:

40.1 ELECTRICAL WIRING INSTALLATION STANDARDS - 12 VDC

All electrical circuit wiring installed by the apparatus body builder will be stranded copper alloy conductors of a gauge rated to carry 125% of the maximum current for which the circuit is protected. Wiring will be color coded and/or printed with circuit function description, or number code, over each conductor's entire length.

Original equipment chassis wiring, extending to rear, including: left turn circuit, right turn circuit, brake circuit, and back-up light circuit will be re-routed to the interior chassis cab or power distribution center. New replacement color coded legend imprinted SXL insulated multi-stranded copper chassis wiring will extend from chassis cab to rear body electrical chassis functions. Replacement wiring will be bundled in heat resistant vinyl loom, passing through the apparatus body, to the rear.

Specified rear amber directional lights will not be activated by brake lights.

40.2 ELECTRICAL WIRING INSTALLATION PERFORMANCE - 12 VDC

All wires will be of sufficient size so that voltage drop in any electrical device will not exceed 15%.

40.3 BATTERY CABLE INSTALLATION STANDARDS

Chassis battery cables to be routed from batteries' common positive to engine starter, return from engine starter to battery switch, and from battery switch to power distribution terminal post located in engine compartment. All battery cables will be minimum 2-0 S.F. welding cable, heavily insulated super fine multi-stranded copper enclosed within high temperature vinyl loom and equipped with solid copper soldered terminals/lugs. Edge protector or rubber grommets will be furnished where ever battery cables pass through sheet metal panels.

40.4 AUDIBLE DEVICE INSTALLATION STANDARDS

Where furnished, air horns, electric siren, electronic siren speakers, and other audible emergency equipment will be mounted as low and as far forward on the apparatus as practical. Audible warning equipment will not be mounted on the roof of the chassis cab, or the roof of any crew cab.

40.5 GROUND CLEARANCE STANDARDS

Axle housings will clear the road surface by at least 8" and an angle of departure of at least 8 degrees will be maintained at rear of the vehicle, even when fully loaded.

40.6 NON-REMOVABLE IGNITION DEVICE

The chassis ignition actuation will be by a rotary/toggle keyless switch.

40.7 VISIBLE WARNING DEVICE AND PLACARDS

The specified "Door Ajar" indicator light shall be mounted inside chassis cab so as to be visible to the seated driver.

A permanent sign that states "Occupants Must Be Seated And Belted When Apparatus Is In Motion" shall be provided. The sign shall be visible from each seated position. Additionally, an accident prevention sign shall be located at the rear step area of the vehicle to warn personnel that standing on the step while the vehicle is in motion is prohibited.

40.8 "OPEN DOOR" INDICATOR

A flashing indicator light shall be furnished, installed in the cab, wired to all compartment light automatic door switches so as to indicate "OPEN" apparatus body compartment door. Indicator light to be Red, minimum 2" diameter, visible to driver and officer, identified with permanent engraved nameplate to read; **"DO NOT MOVE APPARATUS WHEN LIGHT IS ON"**.

40.9 OVERALL HEIGHT/WIDTH/LENGTH/WEIGHT DATA PLATE

There shall be a high-visibility placard located in direct view of the seated Driver, which shall indicate, in feet-and-inches; the overall height of the vehicle (to the highest permanent point-except antennas), the overall width (at steps, fenders, and rubrails-not retractable mirrors), and overall length of vehicle (bumper to tailboard). The data plate shall also indicate, in pounds, the vehicle's total "as delivered" weight.

The dimensions and weight shall be "as manufactured", and the customer must revise the data plate, if they so change the height (by permanent loading and accessory equipment/device installations), and the weight by adding loose equipment, products, and supplies.

40.10 FLUID DATA LABEL

A permanent data label shall be affixed in the driver's compartment specifying quantity and type of the following fluids used in the vehicle.

1. Engine Oil
2. Engine Coolant
3. Chassis Transmission Fluid
4. Pump Transmission Lubrication Fluid
5. Pump Primer Fluid
6. Drive Axle Lubrication Fluid
7. Air Conditioning Refrigerant
8. Air Conditioning lubrication oil
9. Power Steering Fluid
10. Cab Tilt Mechanism Fluid
11. Transfer Case Fluid
12. Equipment Rack Fluid
13. Air Compressor System Lubricant
14. Generator System Lubricant
15. Front Tire Cold Pres
16. Rear Tire Cold Pressure

40.11 NO RIDE LABEL

A label shall be located on the vehicle at the rear step area that shall warn personnel that riding on these areas while the vehicle is in motion is prohibited.

40.12 SEATING/OCCUPANCY LABEL

A label shall be installed in the cab to denote the exact number of passengers to be carried in the chassis cab.

42.0 CHASSIS MODIFICATIONS SPECIFIC FOR PUMPING APPLICATION:

42.1 SPEED GOVERNOR TEST

Engine limiting speed governor will be tested, upon arrival to the apparatus body builders factory for compliance with the maximum no-load engine operating speed, as determined on appropriate engine power curve sheet.

42.2 SUSPENSION DEFLECTION TEST

Apparatus body builder will make record of and provide following information to Customer: actual bare chassis 4-point (at wheels) weights, actual bare chassis 4-point (at back of cab and rear axle) top of frame rail heights to ground, and actual suspension deflection amount with the imposed actual weights of 4,000 lbs., 8,000 lbs., and 16,000 lbs. at projected load centerline.

As per NFPA 1901, 4.12.2.3.3, same 4-point weights of fully loaded vehicle will not exceed a difference, side-to- side, of 7-percent.

42.3 PUMP MODE TRANSMISSION LOCK-UP

Vehicle electronic automatic transmission to be "signaled" by shifting of the fire pump into pump gear, so as to activate transmission "Lock-Up" mode (direct drive). A transparent cover plate, to be provided for installation over transmission shift key pad during pumping operations, removable and stored on side of shift console.

42.4 SUSPENSION AND FRAME CORROSION PROTECTION

Rear axle suspension brackets, left and right sides, front and rear, will be caulked with silicone sealant preventing build-up of road salts and moisture that may cause future corrosion of bracket-to-frame-rail attachment points.

42.5 SUSPENSION LUBRICATION ACCESS

Rear suspension grease zerks will be replaced with 90 degree zerks allowing lubrication from beneath the apparatus body.

42.6 FIRE SERVICE FRAME PREPARATION

In order to assure maximum apparatus body compartments along the entire length of the left and right frame rails ahead of and behind the rear axles, all exterior frame mounted accessories will be removed and relocated inside frame rails so as to not interfere with access to the fire pump, piping, tank sump, transmission, and exhaust system. Relocation of air dryer and air tanks will facilitate access for maintenance of these same components.

42.7 FRAME RAIL MOUNTING PROCEDURE

All chassis frame rail mounted brackets, supports, pump flanges, and apparatus body subframe components will be bolted to the frame rail sides. No holes will be drilled in the frame flanges, only the web will be drilled. No welding will be allowed to the chassis frame, web, or flanges, ahead of the rear most suspension brackets.

42.8 CHASSIS CAB STEP RUNNINGBOARDS

The driver, officer and crew cab steps shall be as wide as possible and shall be at least 8.00" of depth.

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

The inside cab steps shall not exceed 18.00" high. The crew cab entrance shall be a one (1) step design to the cab floor for easy access.

The cab shall include one (1) 18" three-piece knurled aluminum grab handle mounted behind each of the front cab entry doors and one (1) 36" three-piece knurled aluminum grab handle mounted behind each of the rear cab entry door. The grab handles shall be fabricated of extruded aluminum with a knurled finish to enable non-slip assistance with a

gloved hand. Each grab handle shall include a stainless steel scuff plate to help protect the cab paint from damage.

A handrail shall also be provided inside each cab door for ease of entry.

All steps, running boards, and the tailboard shall be the appropriate gauge stainless steel and have pattern-cut puncture fabricated non-slip foot grip.

42.9 STAINLESS STEEL UNDER STRUCTURES

Surfaces where the aluminum and stainless materials mate, shall be lined with dielectric barrier tape, prior to assembly.

42.10 MASTER BATTERY CUT-OFF SWITCH

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

A green "battery-on" pilot light shall be furnished, mounted on electrical console or cab dashboard, visible to driver.

A low voltage indicator light and alarm shall activate when the system voltage drops below 11.8 volts.

43.0 CHASSIS MODIFICATIONS

43.1 LIGHT PACKAGE ACTUATION CONTROLS

The entire warning light package shall be actuated with a single master warning switch in the cab switch panel. The wiring for the warning light package will engage all of the lights required for "Clearing Right of Way" mode when the vehicle parking brake is not engaged. An automatic control system will be provided to switch the warning lights to the "Blocking the Right of Way" mode when the vehicle parking brake is engaged.

43.2 SWITCH PANEL WITH POWER CONTROL

This vehicle/apparatus shall be equipped with an 8-Button lighted switch panel with Multiplexed relay control or approved equal multiplex system. The switch panel shall provide a splash proof front. The switches shall provide a large backlit target area and tactile feel for use with gloves. The switch labels shall be sunlight readable with high contrast replaceable text and have color indicators to provide ON/OFF indication of the switch.

The electronic relay control module shall be all solid state and provide central power switching. External wire harness mating via automotive grade connectors. All +12Vdc power outputs shall be over-current and over temperature protected.

Specified emergency lighting fixtures, non-emergency lighting fixtures, and electrical components shall be individually activated following specified illuminated switches. Emergency lighting switches to be illuminated RED, non-emergency switches to be

illuminated GREEN. An illuminated "MASTER EMERGENCY SWITCH", shall be furnished, providing power for individual emergency lighting switches. Back-lit nametags, describing function of each individual switch, to be located centerline of each switch. Switches to be mounted on a removable electrical panel, raised and sloped rearward to prevent windshield glare.

Controls and switches, which are expected to be operated by the driver while the apparatus is in motion, are to be within convenient reach of the driver. The controls to operate the siren to be within convenient reach of both driver and front passenger (officer). **Final layout and location to be approved by fire department at preconstruction.**

43.3 SOLDERED AND HEAT SHRINK PROTECTED EMERGENCY FIXTURE WIRING

The following specified emergency lighting fixtures shall have their wiring leads "soldered" (crimp or disconnect connectors are not acceptable), with all soldered joints covered with heat-shrink vinyl protection material.

43.4 CAB FRONT WARNING LIGHTS

FOUR (4), Whelen model 600 Series, 4" x 6" rectangular LED lighthoods and four(4) chrome plated surrounds to be furnished, surface mounted located independent of each other on the front of the cab. Light lenses to be 6" wide x 4" high, driver's Red, passenger's side Red. Lights to be activated by a separate illuminated rocker switch identified by function. Lights to be completely sealed for weather resistance.

Two (2) Whelen 500 Series TIR 6 rectangular flush mounted emergency LED lights with associated 5E chrome surround flanges to be furnished in grille. Light to be activated by same switch as above warning lights.

Final locations to be determined at pre construction meeting.

43.5 WIG-WAG HEADLIGHTS

The chassis headlights shall alternately flash between high and low beam left and right when emergency lights are activated. There shall be a switch in the master warning light bank to activate this function.

Note: This function must be disabled with application of chassis parking brake per NFPA 1901.

43.6 EMERGENCY LED WARNING LIGHTS

Two (2), Whelen model 600 series, 4" x 6" rectangular LED lighthoods and two (2) chrome plated surrounds to be furnished, surface mounted located driver and passenger front bumper sides. Light lenses to be 6" wide x 4" high, driver's Red, passenger's side Red. Lights to be activated by a separate illuminated rocker switch, identified by function.

Two (2), Whelen model 600 series, 4" x 6" rectangular LED lighthoods and four (4) chrome plated surrounds to be furnished, surface mounted located driver and passenger side above

front wheel. Lights to be activated by a same illuminated rocker switch as above lights. Lights to be completely sealed for weather resistance.

43.7 LIGHTBAR

Four (4) Whelen Edge Ultra Freedom front facing Super LED 28" Mini Lightbars with permanent mounting brackets installed on the forward portion and above rear doors of the cab roof complete with back-lit rocker style switch at the 12V emergency light console. The lightbar shall be equipped with forward facing and side facing lights only due to the raised roof. The lightbar shall be equipped with red lenses. Final approval of lightbar shall be made at preconstruction.

If any clear sections in the lightbar, the same shall be deactivated in the Blocking Right of Way mode.

43.8 OPTICOM EMITTER

One (1) Opticom Emitter shall be provided and installed for intersection traffic light control. Emitter shall be controlled by an illuminated switch on the cab dash in conjunction with the other emergency lights. The emitter shall be wired to shut off when the vehicle parking brake is set.

43.9 ELECTRONIC SIREN

One (1), Code 3 model 3692, electronic siren amplifier to be furnished, surface mounted to the specified electrical console. A built-in microphone to be furnished with coil cord and mounting clip. Siren amplifier to be wired to the specified electronic siren speaker(s).

43.10 DUAL SPEAKERS

Two (2), Whelen model SA314P, 100-watt rectangular concealed speakers to be furnished, one (1) each located recessed behind driver side and passenger front bumper facing straight forward. Back side of speakers to have boxed aluminum protective enclosure. Vertical surface of front bumper to be "cut-out" to fit speaker.

43.11 MECHANICAL SIREN

One (1), Federal model Q2B chrome plated mechanical siren to be furnished, mounted on top of front bumper horizontal surface, driver side. Mechanical siren to be properly wired with loom protected insulated heavy multi-stranded copper cable for minimum voltage drop. Siren brake to be furnished, activated by separate momentary push-button switch, identified as: "**SIREN BRAKE**". Power to siren shall be available only when Master Emergency switch is turned on.

Above specified Federal Q2B siren to be operated by driver's side floor mounted foot switch as well as the following specified console switch.

43.12 SIREN ACTIVATION

Above specified Federal Q2B mechanical siren to be activated by electrical console passenger side mounted momentary push-button switch with nametag to read: "**SIREN**".

43.13 UNDER CAB LIGHTING

Six (6), Whelen Model 20C0CDCD LED 2G Series NFPA Compliant LED, 4" round under chassis cab 12-volt ground lights to be furnished, located two (2) driver's side and two (2) passenger's side, beneath cab doors, and two (2) toward the front of the bumper. Lenses to be 4" diameter, Clear. Lights to be completely sealed for weather resistance. Lights to be activated by setting of the parking brake. Also can be activated by a switch mounted in cab.

43.14 ENGINE COMPARTMENT LIGHTING

Two (2), Truck-Lite model 80350, 6" round chrome plated surface mount 12-volt engine compartment interior lights to be furnished, located driver's side and passenger's side overhead the engine. Lens to be 5" diameter, Clear. Lights to be activated by individual light lens mounted switch.

43.15 CORNERING LIGHTS

Two Whelen Model 600 "constant on" cornering lamps with clear lenses shall be provided and mounted ahead of the intersection warning lights on the front bumper at a 15 degree forward facing angle. The lights shall turn on with activation of the turn signal switch.

43.16 CAB SIDE SCENE LIGHTS

The side of the cab shall include two (2) Whelen Model 810 scene lights, one (1) each side which shall be surface mounted. Scene light location shall be located between the front and rear crew doors. The lights shall be activated by either a rocker switch, one (1) for each light, on the cab dash or when the vehicle parking brake is engaged.

43.17 CAB ROOF BROW LIGHTS - 120V

Two (2), Fire Research Optimum Series Model OPA530-S75, 750W/120V Countour Mount Brow Light shall be furnished, designed for mounting on radius surface. Lights to be mounted: one (1) on drivers side and one (1) on passengers side facing forward, above windshield, with remote illuminated 12-volt rocker switch located on chassis console. Lights shall be mounted as to not block the chassis lightbar.

43.18 CAB ROOF SIDE SCENE LIGHTS-120V

Two (2), Fire Research Optimum Series Model OPA530-S75, 750W/120V scene lights shall furnished and be mounted on the sides of the cab one (1) above the drivers and one (1) above the passengers door facing to the respective sides of the apparatus. The lights shall be mounted to the cab roof and not with a Contour Mount.

43.19 HAND HELD SPOTLIGHT

One (1) Havis Model CD-PULS500 handheld spotlight with mounting bracket shall be furnished. Duluth Fire Department shall choose mounting location after pre-construction conference.

43.20 VHF RADIO, ANTENNA & CABLE

Bidder shall provide and install Motorola radio and accessories listed below. Antenna to be roof mounted (exact location to be determined at Pre-Build), with cable ran to the prescribed radio location. Exact location of radio location to be decided at pre-construction meeting.

Model #	Description
• M21URM9PW1AN	XTL 2500 "MantaRey" Main Model
• G442	ADD: XTL 2500 Control Head <ul style="list-style-type: none">○ (4-line, 16-character alphanumeric display)
• G444	ADD: XTL 2500 Control Head Software
• G806	Astro Digital CAI Operation Software
• G51	Smartzone/Singlezone System Software
• G361	Astro 25 Software
• G67	ADD: REMOTE MOUNT
• W22	Standard Palm Microphone
• B18	Auxiliary 5 Watt Speaker
• G335	Antenna 1/4 Wave (764-870MHZ)
• G114	Enhanced Digital ID Display
• G24	2 year E.S.P (3-year total warranty)

43.21 HEADSET SYSTEM

A Firecom cordless headset system for four (4) seating positions shall be furnished and installed. Equipment to include a 3010 R Intercom, MR Cable, two (2) UHW-51 combo packs including a wireless headset, charger, and base station for the Officer and Driver. Officer and Driver headsets shall be capable of talking through the radio to dispatch. Also, one (1) multichannel base station and two (2) UHW-54 headsets with chargers for the firefighter positions. The firefighter positions do not need to talk to dispatch. Final mounting and locations shall be decided at preconstruction. Headsets shall be the UHW (Under the Helmet) model. Headsets shall have ability to be interfaced with above 800MHZ Motorola mobile radio.

43.22 MOBILE DATA COMPUTER MOUNT

MDC Mount:

- Gamber Johnson Docking Station, Internal Power Supply (Dual RF) 7160-0318-06
- Placer Gold APU including power cable 62850-00
- Antenna Bundle for APU/DRU (inc. p/n 70288-70-TMS &62474)
- Associated mounting hardware to mount as specified.

Bidders to determine mount location during pre-construction
Bidders may provide information regarding alternative factory mounting configurations

43.23 MOBILE RADIO CHARGER

One (1) four place radio battery charger for Motorola Model XTS 1500 portable radios will be supplied and installed. Charger shall be wired to shore power circuit to charge batteries when vehicle is in the station.

43.24 HAND LANTERNS - WITH CHARGERS

Two (2), Streamlight model 45301 LiteBox rechargeable hand lanterns to be furnished, complete with 12/120 volt "clip-in" charge rack. Two (2) Streamlight H.I.D LiteBox model 45601 rechargeable hand lanterns to be furnished complete with 12/120 volt "clip-in" charge rack.

Lanterns/chargers to be mounted interior of the chassis cab and wired, location to be determined, by customer.

43.25 INTERIOR COMPARTMENTS

Two (2) interior compartments shall be furnished and installed. The approximate size and shape shall be determined at the pre bid meeting. Compartments shall be located one (1) behind/between rear facing seats facing rearward, and one (1) between rear seats facing forward. They shall have mesh fronts with non-snapping fasteners. One (1) shelf shall be provided for each compartment.

43.26 ON-BOARD BATTERY CHARGER - 40 AMP

One (1), Kussmaul model 091-89-12-Remote, AutoCharge-4000, or required size by manufacturer, fully automatic battery charger shall be furnished, designed for a single battery system. Battery charger to provide 40 amps for a single 12-volt battery system, with input of 120-volts. Battery charger shall be located inside forward chassis cab, with Remote Bar Graph Display visible from ground level.

The above battery charger shall be powered by the following specified 120-volt "shore power receptacle".

43.27 120 VOLT SHORE PLUG – MANUAL

A manual recessed shoreplug with gray weatherproof spring loaded cover shall be furnished and installed so as to be conveniently accessible from ground level. Back side of shoreplug shall be equipped with protective cover, wiring to be enclosed inside coated fabric loom extending into chassis cab interior to power the specified 110-volt powered accessories (including the engine block heater). Shore power receptacle to be convenient for removal by Driver upon entering cab, adjacent to air coupler.

43.28 CHASSIS CAB 120-VOLT SHOREPOWER

Two (2), chassis cab interior (on or near electrical console) mounted 120-volt plug-in receptacles shall be furnished with: surface mounted cast aluminum receptacle box, duplex 120-volt 3-wire household plug-in receptacle, metal duplex cover plate, protected wiring to the specified shoreplug, and engraved nameplate to read: "120-VOLT SHORE POWER." Customer will determine location, upon installation of the electrical console.

43.29 REAR INTERIOR 120-VOLT DUPLEX SHOREPOWER RECEPTACLES

Two (2), 120-volt duplex plug-in receptacle boxes shall be furnished, inside the chassis cab, on the rear interior wall, between forward facing seats, and in the rear cab compartment with: surface mounted cast aluminum receptacle box, duplex 120-volt 3-wire household plug-in receptacle, metal duplex cover plate, protected wiring to the specified shore plug, and engraved nameplate to read: "120-VOLT SHOREPOWER."

43.30 DUAL AIR HORNS

Two (2), Grover model 1512 stuttertone single base chrome plated air horns shall be furnished. Air horns shall be mounted one (1) driver's side and one (1) passenger's side of chassis front bumper, recessed.

Air horns shall be plumbed with minimum 1/4" high pressure nylon tubing, both tubes the same length, to provide "loud" and "balanced" tones.

43.31 ACTIVATION OF AIR HORNS

Air horns shall be activated by the steering wheel horn button. An electrical switch console mounted two-position horn selector rocker switch shall be furnished top position of rocker switch shall select chassis electric horn, and bottom position shall select air horns. Switch shall activate a high capacity 12-volt solenoid operated air valve located on an air distribution block, piped to air horns using "same-length" 1/4" i.d. nylon tubing with brass fittings.

NOTE: Air lines must both be same length and same size to assure loud and balanced horn tones.

43.32 OFFICER'S AIR HORN SWITCH

An additional "Air Horn Only" momentary push-button switch shall be furnished, accessible to Officer, properly identified. Control shall activate the same above specified high capacity 12-volt air solenoid.

43.33 AIR COUPLER/SHORELINE

An air coupler "shoreline" shall be furnished, consisting of: an Aeroquip FD-45 exterior male coupler with built-in check valve, appropriate high pressure vinyl air line tubing with brass fittings, panel mounted NRS brass screw gate valve with exterior control knob, and matching female coupler with built-in check valve (for use with Customer's station air line). Air shoreline shall be piped to chassis primary air system reservoir, so as to allow "keep-

full" of the chassis air system when connected to Fire Station air supply. Air coupler to be convenient for removal by driver upon entering cab, adjacent to shore power receptacle.

43.34 AIR SYSTEM PRESSURE PROTECTION VALVE

The chassis air system shall be furnished with a Pressure Protection Valve/Device, located at point of air supply to auxiliary accessories. The Pressure Protection Valve shall prevent the passage of air pressure, to apparatus builders installed accessories, such as: Air Horns, PTO or Pump Shift, Air Actuators, and other air operated accessories, whenever system air pressure is below 80 psi.

44.0 FIRE PUMP SYSTEM:

44.1 PUMP MOUNTING

The following midship pump system is independently mounted on a "pump house" subframe which itself is bolted to and easily removable from the chassis frame rails. The pump mounting brackets are: solid mounted one side, casting opposite side, (as recommended by Waterous), so as to prevent torque/twisting loads on pump castings. Pump house design provides a rigid module, separate of body and chassis cab, its side runningboards always remaining in alignment with apparatus body rubrails.

44.2 PLUMBING

The fire pump shall be configured with cast iron discharge manifolds, suction intake adapters, and suction inlet fittings as provided by Waterous.

Flexible discharge lines shall be reinforced high pressure hose assemblies with stainless steel or brass end fittings.

Any welded discharge manifolds, 3" or smaller, to be stainless steel, pressure tested after installation. Heavy wall threaded stainless steel pipe and fittings are preferred and shall be used wherever possible.

Tubing lines shall be polypropylene with brass fittings.

44.3 PUMP FITTINGS & "ROUND TUBULAR" HIGH-FLOW DISCHARGE MANIFOLD

The below specified fire pump shall be provided with high-tensile closed grain cast iron "bolt-on" left and/or right side discharge fittings (upstream of discharge valves only) and cast iron "bolt-on" left side, right side, and/or rear large diameter suction intake adapters, as provided and flow/pressure tested by the fire pump manufacturer.

A stainless steel "round tubular" discharge manifold or approved equal shall be furnished, bolted to and easily removable from, the fire pump's dual (two each) 8-bolt large flow capacity discharge outlet taps.

NOTE: Due to the likelihood of high pressure deformation, manifolds fabricated of square or rectangular tubes are not acceptable.

Heavy wall threaded stainless steel pipe and pipe fittings shall be used, wherever possible, downstream of the discharge valves, and upstream of 2-1/2" suction valves.

All flexible discharge lines and bleeder lines, downstream of respective valves, shall be reinforced high pressure hose assemblies with stainless steel or brass end fittings.

Pressure gauge tubing lines shall be clear polypropylene with brass fittings, manifold drain lines (that are not high pressure hose assemblies) shall be copper tubing or approved equal.

All discharge manifolds and fittings, suction manifolds and fittings, discharge and suction valves, tubings, and hoseline assemblies shall be pressure tested after installation.

45.0 WATEROUS TWO-STAGE 2000 GPM CMU MODEL PUMP

A 2000 gallon per minute, Waterous 2-stage Model **CMU-C20-2000**, Class A, two-stage centrifugal iron body - rear drive fire truck pump shall be furnished, mounted "mid-ship" of the vehicle immediately ahead of the compartments and water tank. Pump transmission to be "chain-drive" style to provide smooth quiet transmission of power. The pump transmission gear ratio shall allow the pump to deliver the percentage of rated capacity at discharge pressures indicated below, while the drive engine is running in it's peak performance range/RPM:

- 100 percent of rated capacity at 150 pounds net pressure
- 100 percent of rated capacity at 165 pounds net pressure
- 70 percent of rated capacity at 200 pounds net pressure
- 50 percent of rated capacity at 250 pounds net pressure

45.1 MANUFACTURER HYDRO TEST

The pump shall be tested by Waterous, hydrodynamically at above pressure and capacities, and for 10 minutes hydrostatically at a pressure of 600 psig. Certification by Waterous shall be provided in delivery manual.

Apparatus Manufacturer's pump performance test to be performed after construction. Factory certification to be provided in delivery manual.

45.2 PUMP INSTRUCTION MANUALS/CD/PAPER

Two (2), Waterous instruction manuals, in CD and paper format, to be provided upon delivery of the apparatus. Manuals to be pump model and serial number specific, to include but not be limited to operation instructions, maintenance (lubrication), and illustrated parts break-down.

45.3 PUMP TEST DATA PLATE

The pump shall be provided with a metal plate giving the rated flow at "capacity" and "pressure" test pressures, together with the RPM of the engine at those pressures and deliveries, and mounted in clear view of the pump operator's panel. Test plate shall also

indicate pump serial number, engine governed speed, and pump mode of operation for all four individual pump rating tests.

45.4 ADDITIONAL FEATURES

Additional pump features shall include: bronze replaceable impellers and impeller seal rings, stainless steel impeller shaft grease lubricated front and oil lubricated rear bearings, horizontally split main pump body, and all moving parts which come into contact with water to be bronze or stainless steel.

45.5 TANK-TO-PUMP VALVE

Bronze tank-to-pump suction check valve to be furnished. A 3-1/2" full-flow Waterous tank-to-pump 1/4-turn valve to be furnished with chrome plated bronze ball, spring loaded seal assembly, and 4" inlet hose connection. The gated suction line from specified tank sump to the tank-to-pump valve shall be furnished with a double T-bolt banded flexible "hump hose" connection and minimum 3-1/2" i.d. piping within the fire pump compartment.

45.6 TANK-TO-PUMP OPERATION

Specified tank-to-pump suction valve to be operated, using a manual push-pull control. The control rod shall be installed so that the "IN" position is "OPEN".

45.7 PUMP DRIVELINE

Extra heavy duty 2.35" x 46 involute spline pump driveline to be furnished for high torque engine applications. Spicer 1710 driveline end yokes furnished, input and output.

Spicer 1710 series driveline components to be furnished to facilitate pump installation, components shall include: slip stub shafts, slip yokes, and cross & bearings to be compatible with pump end yokes and chassis driveline. Modified drivelines shall be high speed balanced.

45.8 PUMP CONTROL LINKAGES

All pump control linkage rods to be heavily cadmium plated, equipped with threaded adjustable clevis joints or swivel ball joints one end and chrome plated or black phenolic control handles outboard end.

45.9 PUMP FLUID CAPACITY PLATE

A permanently mounted metal plate shall be furnished, located inside driver's compartment, specifying the quantity and type of the pump system lubrication fluids (where applicable) as used in this apparatus.

Additional information to be provided for pump accessory equipment fluids not listed, and so designated by Customer.

45.10 INDEPENDENT PUMP CERTIFICATION

The above specified pump test/certification to be performed by apparatus manufacturer and "witnessed" and certified by an independent third party as per NFPA 1901 pumping standards, with proper "serialized" certification documents provided upon apparatus delivery.

A metal fire pump test data plate shall be provided, permanently stamped, with the rated flow and test pressures, together with the RPM of the engine at those pressures and deliveries. Test data plate shall indicate: 100% capacity @ 165 and 150 PSI, 2/3-capacity @ 200 PSI, 1/2-capacity @ 250 PSI, the pump serial number, the engine's governed speed, and pump mode of operation for the four (4) individual pump rating tests. The test data plate shall be mounted in clear view of the standing pump operator.

45.11 FLAME PLATED IMPELLER HUBS

Flame plated impeller hubs shall be furnished along with labyrinth style seal rings.

45.12 PUMP SEALS

"Mechanical" pump seal assemblies to be furnished, for specified two-stage pump, self-adjusting type, maintenance free.

45.13 WATEROUS 5-YEAR PUMP PARTS

The specified Waterous fire pump and Waterous fire pump (only) accessories shall carry a Waterous five (5) year warranty covering defective parts only (not labor). NOTE: This warranty's terms and conditions shall be handled directly between the Customer and the Waterous Company.

45.14 SUCTION PIPING ANODE

A replaceable threaded anode plug shall be installed in the suction piping of the fire pump to help protect the pump and piping from electrolysis.

45.15 DISCHARGE PIPING ANODE

A replaceable threaded anode plug shall be installed in the discharge piping of the fire pump to help protect the pump and piping from electrolysis.

45.16 STAINLESS STEEL SCHEDULE-40 HEAVY DUTY THREADED PIPING

All of the following specified suction and discharge lines of 2", 2-1/2", 3", or 3-1/2" size, which are not cast iron or cast bronze, shall have heavy duty STAINLESS STEEL thread pipe and fittings. Where vibration or chassis flexing may damage or loosen piping, the pipe shall be equipped with Victaulic fittings. The entire discharge and intake piping system, valves, drain cocks, and lines, intake and outlet closures, excluding the tank fill and tank-to-pump lines on the tank side of the valves shall be designed for 500 PSI.

45.17 PNEUMATIC PUMP SHIFT

The pump shift shall be pneumatically operated and incorporate a Waterous built cylinder with double action piston to shift from road to pump and back, designed so that the pump shift remains in its latest position in the event of loss of air pressure. Shift engagement shall be provided by free-sliding collar with internal locking mechanism. The pumpshift engagement control will be located to be easily accessible to driver. Engagement control will include: air control lever with spring loaded locking collar to prevent it from accidentally being moved from the "ROAD" or "PUMP" position, "PUMP ENGAGED" light indicating mechanical shifting of the pump into the "ROAD" position has been accomplished, "O.K. TO PUMP" light to indicated chassis transmission is in the correct pumping gear, and a control plate describing operation of the pneumatic power shift assembly.

45.18 PUMP SHIFT MANUAL OVERRIDE

The above pneumatic pump shift assembly shall be provided with a mechanical pump shift override with single override control located in the lower right hand corner of the driver's side exterior pump panel. Pump pneumatic shift override control shall allow for manual shifting of the air cylinder, allowing the pump to be shifted manually.

45.19 O.K. TO PUMP "THROTTLE READY" INDICATOR

An additional indicator light to be furnished on pump control panel, adjacent to engine throttle controller, to indicate that the vehicle transmission is in the proper gear and driveline is rotating: Light to be labeled "O.K. TO PUMP".

45.20 PUMP PANEL LIGHT WIRING

The driver side pump panel lights shall be wired to the pump shift to provide pump panel illumination when the pump is placed into gear.

45.21 DEACTIVATE WITH PUMP SHIFT

Specified transmission retarder shall be automatically deactivated with the shifting of the pump transmission into "Pump Gear".

45.22 PRIMER PERFORMANCE REQUIREMENTS

The pump shall be capable of taking suction and discharging water with a lift of 10 ft. in not more than 45 seconds with the pump dry, through 20 ft. of suction hose of appropriate size. It shall be capable of developing a vacuum of 22" at an altitude of up to 1000 ft.

45.23 WATEROUS VPES LUBRICATED PUMP PRIMER

A high capacity positive displacement priming system shall be furnished, consisting of: a Waterous VPES rotary vane priming pump with 12-volt electric motor drive, 4-quart oil reservoir for automatic internal lubrication of the priming pump, and a manual/electric priming valve assembly with remote pump operator's panel mounted pull/spring-return control. Priming pump shall be mounted beneath fire pump, with bottom lubricant discharge directed to ground. Primer oil reservoir mounting location on officers side of

pump house shall allow for easy access to check level and refill. Priming valve assembly to be located on top of pump, designed to allow self draining.

45.24 PUMP OVERHEAT PROTECTION

One (1), Waterous Overheat Protection Manager (OPM) model #82516-1A, thermal relief style valve to be furnished, installed on the two 1/2" tapped holes located near the center discharge area of the pump. The OPM consists of a valve that automatically opens when the water in the pump reaches 140 degrees and a warning light located on the pump operator's panel that is triggered by a thermal switch when the water in the pump reaches 180 degrees. The warning light acts as an additional protection device if the temperature inside the pump keeps rising although the valve is open. The OPM valve and switch are both mounted on the two (2) 1/2" tapped holes located near the center discharge area of the pump. Discharge shall be "to ground" or back to the water tank.

46.0 PUMP PLUMBING

46.1 SUCTION VALVE STANDARDS

Following specified 3" or larger gated intakes (except the tank-to-pump intake) shall include a valve mechanism that shall not permit changing the position of the flow regulating element of the valve from full close to full open, or vice versa, in less than 3 seconds. These same air type actuators shall include dual (2-each) adjustable needle valve restrictors, bench set/tested, so as to facilitate the slow movement.

46.2 SUCTION INTAKE BLEEDER VALVES

Each side gated intake shall be equipped with a bleeder valve located inside mid-ship pump compartment, piped to "upstream" suction gate valve, with remote bleeder control in close proximity to the intake. The specified gated suction bleeders shall consist of: 3/4" cast bronze quarter-turn drain/bleeder valves, panel mounted with exterior chrome plated control handle and recessed 1" x 3" i.d. label.

Intake bleeder valve controls to be positioned in a single row immediately above running board riser, driver and/or passenger side (above tailboard, with bleeder valve inboard rear body panel, when at rear of body), identified with inlet color matching permanently engraved identification label.

46.3 INTAKE CAPS

All intakes shall be provided with suitable closures capable of withstanding 500 psi.

46.4 INTAKE STRAINERS

Removable Zinc strainers as provided by Waterous with each gated intake.

46.5 SELF BLEEDING SUCTION CAPS

The suction caps shall be the type which incorporates a thread and vented lug design to automatically relief stored pressure in the line during un-capping.

46.6 PUMP INTAKE RELIEF VALVE

A Waterous Pilot Valve Controlled intake relief valve system shall be furnished, installed inside pump compartment, bolted to suction cavity of the specified fire pump. Valve to be of the pre-set adjustable bypass design, to dump, below the vehicle, excessive inlet water pressure. Relief valve to have a hand adjustment knob on drivers side pump panel for adjustment of bypass pressure.

47.0 PUMP INTAKES

47.1 PASSENGER SIDE 6" MANUAL GATED SUCTION, 6" NST x 4" ELBOW STORZ

The fire pump shall be provided with a flange style suction arm fitting so the butterfly valve may be located IN THE PUMP COMPARTMENT keeping the valve and end fittings within running board width. A passenger's side electric gated 6" pump suction intake to be provided with: 4" storz cap with chain, 6" NST long handled swivel female x 30 degree elbow 4" storz adapter, 6" removable zinc strainer, 6" NST male threaded flanged extension nipple (extending through pump panel), bronze air bleeder valve located inboard pump panel with remote control handle, 6" Monarch butterfly style manual gate valve with crank actuator located behind pump panel, and appropriate interior pump compartment 6" flanged pump intake fitting. Inlet shall have minimum extension outboard the pump panel to allow for preconnected inlet adapter. Manual crank shall be easily accessed by a firefighter standing on the ground at the passenger side pump panel.

A valve control console with spring loaded open/close toggle switch with OPEN/MULTIPLE-TRANSITION/CLOSE" indicator lights for gate valve shall be located on drivers side pump panel.

47.2 PASSENGER SIDE 2-1/2" GATED AUXILIARY SUCTION

An Waterous passenger's side gated 2-1/2" pump suction intake to be provided with: 2-1/2" NST male chrome plated rocker lug plug type cap with chain, 2-1/2" NST chrome plated rocker lug swivel female with internal strainer, bronze bleeder valve with outboard control knob, 2-1/2" full flow Waterous 1/4-turn ball style bronze suction valve with 2-1/2" **FULL FLOW** Waterous 1/4-turn ball style bronze suction valve with chrome plated ball and spring loaded self-adjusting seal assembly (located inside pump compartment), push-pull chrome T-handled "twist-to-lock" intake control handle with recessed color coded nameplate located on driver's side operator's panel and appropriate cast iron pump intake fitting. A minimum 2-1/2" i.d. stainless steel pipe and elbows between valve and pump intake fitting,

47.3 DRIVER SIDE 6" MANUAL GATED SUCTION, 6" NST x 4" ELBOW STORZ

The fire pump shall be provided with a flange style suction arm fitting so the butterfly valve may be located IN THE PUMP COMPARTMENT keeping the valve and end fittings within running board width A driver's side gated 6" pump suction intake to be provided with: 4" storz cap with chain, 6" NST long handled swivel female x 30 degree elbow 4" storz adapter, 6" removable zinc strainer, 6" NST male threaded flanged extension nipple

(extending through pump panel), bronze air bleeder valve located inboard pump panel with remote control handle, 6" Monarch butterfly style gate valve with crank actuator located inboard pump panel, spoke type hand wheel valve control with revolving handle located adjacent to inlet, and appropriate interior pump compartment 6" flanged pump intake fitting. Inlet shall have minimum extension outboard the pump panel to allow for preconnected inlet adapter.

48.0 PUMP DISCHARGES:

48.1 DISCHARGE INSTALLATION STANDARDS

The specified Waterous pump discharge fittings, located interior pump compartment, will be "angle compensated" if required to facilitate mid-ship pump-to-engine/transmission sloped mounting.

48.2 DISCHARGE VALVE STANDARDS

Each of the following specified 3" or larger discharge valves will have an operating mechanism which will not permit changing the position of the flow regulating element of the valve from full close to full open, or vice versa, in less than 3 seconds. Note: Please refer to each of the described discharges as to how "slow-operation" of large diameter discharge valves is achieved.

48.3 DISCHARGE OUTLET BLEEDER VALVES

The specified discharge outlet bleeders will consist of: 3/4" high pressure flexible hose assemblies extending between discharge valve and bleeder valve, 3/4" cast bronze 1/4-turn drain/bleeder valve mounted interior pump compartment, exterior pump panel chrome plated bleeder valve control handle, and recessed 1" x 3" color coded (to match corresponding discharge outlet) permanently engraved identification label.

Discharge outlet bleeder valve controls, for side discharges or hosebody pre-connect discharges, to be located in a single row immediately above left or right side pump panel runningboard riser. Rear body discharge outlets, where specified, will have bleeder valves inboard rear body panel, and control exterior above tailboard. Class 1 Model 34AD automatic drains shall be installed on all crosslay, ladder waterway and discharge plumbing that flows in a low routed area that are located below the 1/4 turn manual drain. The drains shall be located in areas where there is a possibility of back flow and will open whenever pressure in the line drops below 6 PSI.

48.4 PRESSURE GAUGE DISCHARGE CONTROL ALIGNMENT

The following specified exterior side pump panel mounted discharge controls shall be located adjacent to or immediately below and inline with corresponding individual discharge pressure gauge.

48.5 SELF-BLEEDING DISCHARGE CAPS

The rocker lug discharge caps shall of the type which incorporates a thread and vented lug design to automatically relief stored pressure in the line during uncapping.

48.6 PASSENGER SIDE 2-1/2" DISCHARGE - 2-1/2" NST OUTLET

Two (2), passenger's side 2-1/2" gated discharge to be provided with: 2-1/2" NST chrome plated brass rocker lug cap with chain, 2-1/2" NST male x 2-1/2" NST rocker lug swivel female 45 degree chrome plated brass extension elbow, 2-1/2" NST male x 2-1/2" iron pipe female chrome plated brass outlet adapter, 2-1/2" threaded pipe extension nipple (extending through pump panel), 3/4" bronze bleeder valve located inboard pump panel with remote control knob adjacent to discharge outlet, 2-1/2" Waterous **FULL FLOW** 1/4-turn discharge valve with chrome plated ball and spring loaded self-adjusting seal assembly (located inside pump compartment), push-pull chrome T-handled "twist-to-lock" discharge control handle with recessed color coded nameplate located on driver's side operator's panel and appropriate cast iron pump discharge fitting.

48.7 PASSENGER SIDE LDH DISCHARGE, 2-1/2" NST X 4" STORZ OUTLET

One (1), passenger's side 3-1/2" gated discharge to be provided with: 2-1/2" NST chrome plated brass rocker lug cap with chain, 2-1/2" NST male x 4" storz lightweight adapter, 4" storz x 4" SIPT swivel female 30 degree smooth sweep elbow lightweight outlet adapter, 4" i.d. outlet extension nipple (extending through pump panel), 3/4" bronze bleeder valve located inboard pump panel with remote control knob adjacent to discharge outlet, 3-1/2" Waterous "ELECTRIC ACTUATOR OPERATED" 1/4-turn discharge valve with chrome plated ball and spring loaded self-adjusting seal assembly (located inside pump compartment), operator's panel mounted valve control console with spring loaded open/close rocker switch and OPEN/MULTIPLE- TRANSITION/CLOSED indicator lights, and appropriate cast iron pump discharge fitting.

48.8 AERIAL WATERWAY DISCHARGE

The aerial waterway discharge shall be gated at the pump by a full flow ball valve. The piping shall be schedule 10 stainless steel and will be 4" minimum. This pipe will connect to the ladder waterway swivel and extend through the rear of the body on the right side and terminate in NST thread. This extension shall serve as the rear waterway inlet and shall have a 4" Storz lightweight connection, a cap and chain. . A minimum of two (2) grooved pipe clamps shall be incorporated into the system for easy removal. A Waterous full flow 3 1/2" quarter turn discharge valve with chrome plated ball and spring loaded self-adjusting seal shall be provided for the waterway discharge. A Waterous electronic valve control shall be provided with controls at the pump operators panel with function plate. The control shall be equipped with ten (10) LED lights that show the range of open/close position of the valve. The controller shall have a switch to operate the Preset feature as well as a Class 1 Flowminder digital Pressure and Flow Meter Gauge. Also a 1-1/2" relief valve preset at 200 PSI shall be located beneath the turntable to protect the waterway system from excessive pressures.

48.9 HORIZONTAL CROSSLAYS PRECONNECTS OR SPEEDLAYS (PREFERRED)

A horizontal crosslay hosebed will be provided and plumbed above the pump in a traverse design for three (3) crosslays. It shall be easily assessable for rapid deployment and have stainless steel rollers at each end. Vertical rollers shall be installed on each side of the hose bed opening, and a horizontal roller shall be installed under the opening. Hose bed flooring shall be perforated for drainage and easily removed for pump access. Crosslay discharges shall be plumbed with 2-1/2" stainless steel piping to below floor level and terminate with a 2-1/2" swivel reduced down to 1-1/2". The swivel shall extend above the floor and the floor slotted so as to allow for deployment of the attack line to either side without kinking the hose at the coupling connection. Valve shall be a 2-1/2" **FULL FLOW** Waterous 1/4-turn discharge valve with chrome plated ball and spring loaded self-adjusting seal assembly (located inside pump compartment), push-pull chrome T-handled "twist-to-lock" discharge control handle with recessed color coded nameplate located on driver's side operator's panel and appropriate cast iron pump discharge fitting.

One (1) 2-1/2" crosslay capable of holding at least 250' of 2-1/2" hose with couplings and nozzle in a single stack configuration.

Two (2) 1-3/4" crosslay capable of holding at least 250' of 1-3/4" hose with couplings and nozzle in single stack configuration.

48.10 SPEEDLAYS (PREFERRED)

48.10.1 HORIZONTAL SPEEDLAY #1

Speedlay #1 shall be a transverse hose bed, which shall be designed as an integral part of the pump module design, located forward of the pump just above the frame rails.

Hose deployment shall be accomplished from either side of the apparatus. The speedlay hose bed flooring shall be designed to be removable, constructed from brushed finish, perforated aluminum material.

48.10.2 SPEEDLAY #1 SLIDE-OUT TRAY

A 3/16" aluminum, three (3) sided, "J" shaped slide out tray shall be provided for speedlay #1 to allow easy loading of the hose off the vehicle. The tray shall be designed to slide out from either side of the vehicle. The sides and floor of the opening shall be lined with Nylatron to assist in the loading of the tray.

The tray shall have a cut out on each side of the tray so it may be used as a handle to remove the tray. The handle area shall extend passed the side panel on each end of the tray to allow removal of the tray without getting fingers caught in the latch tray mechanism.

A cadmium plated thumb type latches shall be provided for the tray to secure the tray in the speedlay opening.

The outer edge of the speedlay #1 hosebed shall be trimmed with two (2) vertical and (1) horizontal (bottom) stainless steel rollers, on each side of the vehicle to assist in hose removal.

The speedlay #1 discharge shall terminate through the rear wall of the hosebed with a 1 1/2" NSTM chicksan swivel adapter. The hosebed rear wall shall be slotted to allow the swivel to through the wall, allowing the pre-connected hose to be pulled off either side of the apparatus without kinking the hose at the coupling connection.

Speedlay #1 shall be designed to have a minimum total capacity of 3.5 cubic feet as required by NFPA -1901 to accommodate a minimum of 200 feet of 1-3/4" fire hose. The hose shall be loaded in a double stack configuration.

The speedlay #1 discharge shall be plumbed utilizing 2 1/2 " schedule 10 stainless steel piping and/or flexible hose, 45 degree threaded elbows and a limited number of 90 degree sweep elbows in an assembly from the pump to speedlay hosebed. A 2 1/2" to 1 3/4" reducer shall be supplied.

A minimum of one (1) grooved pipe coupling shall be furnished in this assembly to allow for flex and serviceability.

A 2-1/2" Waterous **FULL FLOW** 1/4-turn discharge valve with chrome plated ball and spring loaded self-adjusting seal assembly (located inside pump compartment), push-pull chrome T-handled "twist-to-lock" discharge control handle with recessed color coded nameplate located on driver's side operator's panel and appropriate cast iron pump discharge fitting shall be used.

Product must carry a 10 year manufacturer's warranty.

The speedlay #1 discharge valve shall be controlled by a push/pull handle located on the operator's panel.

The speedlay #1 discharge shall be equipped with a 2 1/2" diameter Noshok pressure gauge. The gauge shall have a rugged corrosion free stainless steel case and clear scratch resistant molded crystals with captive O-ring seals to ensure distortion free viewing and seal the gauge. The gauge shall be filled with a synthetic mixture to dampen shock and vibration, lubricate the internal mechanisms, prevent lens condensation and ensure proper operation from -40°F to +160°F.

The gauge shall exceed ANSI B40.1 Grade A requirements with an accuracy of +/- 1.5% full scale and include a size appropriate phosphorous bronze bourdon tube with a reinforced lap joint and large tube base to increase the tube life and gauge accuracy.

A polished chrome-plated stainless steel bezel shall be provided to prevent corrosion and protect the lens and gauge case. The gauge shall have black graphics on a white background.

48.10.3 HORIZONTAL SPEEDLAY #2

Speedlay #2 shall be a transverse hose bed, which shall be designed as an integral part of the pump module design, located forward of the pump just above the lower speedlay. Hose deployment shall be accomplished from either side of the apparatus. The speedlay hose bed flooring shall be designed to be removable, constructed from brushed finish, perforated aluminum material.

48.10.4 SPEEDLAY #2 SLIDE-OUT TRAY

A 3/16" aluminum, three (3) sided, "J" shaped slide out tray shall be provided for speedlay #2 to allow easy loading of the hose off the vehicle. The tray shall be designed to slide out from either side of the vehicle. The sides and floor of the opening shall be lined with Nylatron to assist in the loading of the tray.

The tray shall have a cut out on each side of the tray so it may be used as a handle to remove the tray. The handle area shall extend passed the side panel on each end of the tray to allow removal of the tray without getting fingers caught in the latch tray mechanism.

A cadmium plated thumb type latches shall be provided for the tray to secure the tray in the speedlay opening.

The outer edge of the speedlay #2 hosebed shall be trimmed with two (2) vertical and (1) horizontal (bottom) stainless steel rollers, on each side of the vehicle to assist in hose removal.

The speedlay #2 discharge shall terminate through the rear wall of the hosebed with a 1 1/2" NSTM chicksan swivel adapter. The hosebed rear wall shall be slotted to allow the swivel to through the wall, allowing the pre-connected hose to be pulled off either side of the apparatus without kinking the hose at the coupling connection.

Speedlay #2 shall be designed to have a minimum total capacity of 3.5 cubic feet as required by NFPA -1901 to accommodate a minimum of 200 feet of 1-3/4" fire hose. The hose shall be loaded in a double stack configuration.

The speedlay #2 discharge shall be plumbed utilizing 2 1/2" schedule 10 stainless steel piping and/or flexible hose, 45 degree threaded elbows and a limited number of 90 degree sweep elbows in an assembly from the pump to speedlay hosebed. A 2 1/2" to 1 3/4" reducer shall be supplied.

A minimum of one (1) grooved pipe coupling shall be furnished in this assembly to allow for flex and serviceability.

A 2-1/2" Waterous **FULL FLOW** 1/4-turn discharge valve with chrome plated ball and spring loaded self-adjusting seal assembly (located inside pump compartment), push-pull chrome T-handled "twist-to-lock" discharge control handle with recessed

color coded nameplate located on driver's side operator's panel and appropriate cast iron pump discharge fitting shall be used.

Product must carry a 10 year manufacturer's warranty.

The speedlay #2 discharge valve shall be controlled by a push/pull handle located on the operator's panel.

The speedlay #2 discharge shall be equipped with a 2 ½" diameter Noshok pressure gauge. The gauge shall have a rugged corrosion free stainless steel case and clear scratch resistant molded crystals with captive O-ring seals to ensure distortion free viewing and seal the gauge. The gauge shall be filled with a synthetic mixture to dampen shock and vibration, lubricate the internal mechanisms, prevent lens condensation and ensure proper operation from -40°F to +160°F.

The gauge shall exceed ANSI B40.1 Grade A requirements with an accuracy of +/- 1.5% full scale and include a size appropriate phosphorous bronze bourdon tube with a reinforced lap joint and large tube base to increase the tube life and gauge accuracy.

A polished chrome-plated stainless steel bezel shall be provided to prevent corrosion and protect the lens and gauge case. The gauge shall have black graphics on a white background.

48.10.5 HORIZONTAL SPEEDLAY #3

Speedlay #3 shall be a transverse hose bed, which shall be designed as an integral part of the pump module design, located forward of the pump just above the lower speedlay. Hose deployment shall be accomplished from either side of the apparatus. The speedlay hose bed flooring shall be designed to be removable, constructed from brushed finish, perforated aluminum material.

48.10.6 SPEEDLAY #3 SLIDE-OUT TRAY

A 3/16" aluminum, three (3) sided, "J" shaped slide out tray shall be provided for speedlay #3 to allow easy loading of the hose off the vehicle. The tray shall be designed to slide out from either side of the vehicle. The sides and floor of the opening shall be lined with Nylatron to assist in the loading of the tray.

The tray shall have a cut out on each side of the tray so it may be used as a handle to remove the tray. The handle area shall extend passed the side panel on each end of the tray to allow removal of the tray without getting fingers caught in the latch tray mechanism.

A cadmium plated thumb type latches shall be provided for the tray to secure the tray in the speedlay opening.

The speedlay #3 discharge shall terminate through the rear wall of the hosebed with a 2 1/2" NSTM chicksan swivel adapter. The hosebed rear wall shall be slotted to allow

the swivel to through the wall, allowing the pre-connected hose to be pulled off either side of the apparatus without kinking the hose at the coupling connection.

Speedlay #3 shall be designed to have a minimum total capacity of 3.5 cubic feet as required by NFPA -1901 to accommodate a minimum of 200 feet of 2 1/2" fire hose. The hose shall be loaded in a triple stack configuration.

The speedlay #3 discharge shall be plumbed utilizing 2 1/2" schedule 10 stainless steel piping and/or flexible hose, 45 degree threaded elbows and a limited number of 90 degree sweep elbows in an assembly from the pump to speedlay hosebed.

A minimum of one (1) grooved pipe coupling shall be furnished in this assembly to allow for flex and serviceability.

A 2-1/2" Waterous **FULL FLOW** 1/4-turn discharge valve with chrome plated ball and spring loaded self-adjusting seal assembly (located inside pump compartment), push-pull chrome T-handled "twist-to-lock" discharge control handle with recessed color coded nameplate located on driver's side operator's panel and appropriate cast iron pump discharge fitting. .

Product must carry a 10 year manufacturer's warranty.

The speedlay #3 discharge valve shall be controlled by a push/pull handle located on the operator's panel.

The speedlay #3 discharge shall be equipped with a 2 1/2" diameter Noshok pressure gauge. The gauge shall have a rugged corrosion free stainless steel case and clear scratch resistant molded crystals with captive O-ring seals to ensure distortion free viewing and seal the gauge. The gauge shall be filled with a synthetic mixture to dampen shock and vibration, lubricate the internal mechanisms, prevent lens condensation and ensure proper operation from -40°F to +160°F.

The gauge shall exceed ANSI B40.1 Grade A requirements with an accuracy of +/- 1.5% full scale and include a size appropriate phosphorous bronze bourdon tube with a reinforced lap joint and large tube base to increase the tube life and gauge accuracy.

A polished chrome-plated stainless steel bezel shall be provided to prevent corrosion and protect the lens and gauge case. The gauge shall have black graphics on a white background.

48.11 DRIVER SIDE DISCHARGE, 2-1/2" VALVE, 2-1/2" NST OUTLET

One (1), driver's side 2-1/2" discharge to be provided with: 2-1/2" NST chrome plated brass rocker lug cap with chain, 2-1/2" NST male x 2-1/2" NST rocker lug swivel female 45 degree chrome plated brass elbow extension, 2-1/2" NST male x 2-1/2" iron pipe female chrome plated brass outlet adapter, 2-1/2" threaded pipe extension nipple (extending through pump panel), 3/4" bronze bleeder valve located inboard pump panel with remote control knob adjacent to discharge outlet, 2-1/2" **FULL FLOW** Waterous 1/4-turn

discharge valve with chrome plated ball and spring loaded self-adjusting seal assembly (located inside pump compartment), push-pull chrome T-handled "twist-to-lock" discharge control handle with recessed color coded nameplate located on driver's side operator's panel and appropriate cast iron pump discharge fitting.

48.12 FRONT BUMPER DISCHARGE

One (1) bumper crosslay discharge with lid located at front bumper, plumbed using 2-1/2" I.D. wire reinforced, high pressure hose coupled with stainless steel fittings, provided with a 2-1/2" NPT X 1 1/2" NST male brass 90 degree chrome swivel. Final design of the front bumper adaptation, hose well, and manual valve location shall be approved by fire department before construction begins.

48.13 1-1/2" GATED TANK FILL/PUMP COOLING LINE

One (1), gated 1-1/2" tank fill discharge line, from pressure side of fire pump to water tank to be provided with: tank fill spud located at top front of water tank, high pressure wire reinforced 1-1/2" hose with reusable threaded end couplings, 1-1/2" NRS bronze screw-type valve and pump operator's panel mounted screw type control knob. Tank fill valve to be of the screw-type so that it can be throttled and used as a bypass or pump cooling line.

48.14 ENGINE COOLER

An auxiliary cooler or heat exchanger shall be installed in the engine compartment between the engine and the chassis radiator. The cooler shall permit the use of water from the pump for cooling system. The cooling shall be done without mixing engine and pump water. Control valve for cooler shall be located on drivers side pump panel.

48.15 GATED PUMP COOLER LINE, 1/4-TURN CONTROL

One (1), gated 3/8" pump recirculating/cooling line, from pressure side of fire pump to water tank top to be provided with: 3/8" female TIPT spud located at top front of water tank, high pressure tubing, and 3/8" bronze body 1/4-turn ball style valve with chrome handle located on operator's control panel. Valve to be identified as pump cooling line.

48.16 MIDSHIP PUMP MASTER MANIFOLD DRAIN

Waterous manifold drain valve, with bronze body and stainless plunger shall be furnished mounted on pump transmission and operated by a push-pull cable with chrome plated T-handle control on operator's panel. Drain valve shall be piped, with copper tubing, to low points of pump suction and discharge cavities to allow simultaneous draining through a single drain valve.

49.0 PUMP CONTROLS/ACCESS/LIGHTS

49.1 CAPTAIN ELECTRONIC PRESSURE GOVERNOR

The apparatus shall be equipped with a Class 1 "Captain" model appropriate for the desired engine/pump governor/throttle system that is connected directly to the Electronic Control Module (ECM) mounted on the specified diesel engine.

The Captain shall operate as a Pressure Sensor Governor (PSG) eliminating any need for a relief valve on the discharge side of the pump.

The unit shall include a special preset function, which allows a predetermined pressure to be set and easily adjustable.

49.2 PUMP CONTROL INSTALLATION STANDARDS

All side mechanical pump control rods, rotating and push-pull, will be heavily cadmium plated solid cold roll steel, equipped with adjustable clevis joints or swivel ball joints and chrome plated brass or black phenolic control handles/knobs. All discharge controls and outlets, suction controls and inlets, drain valve controls, bleeder valve controls, and all other pump related controls shall be properly identified with permanent engraved or cast nameplates describing function and operation of each control. Nameplates for discharge controls, discharge outlets, and respective pressure gauges will be color coded and indicate: numerical sequence, location of outlet, type of discharge, and size of hose to be used.

49.3 PUMP ENCLOSURE – DRIVERS SIDE CONTROLS

The pump compartment/enclosure shall be located "midship" of the vehicle, approximately 1" ahead of and totally separate from specified compartmented apparatus body and water tank. Pump compartment to be fully enclosed, with front panel, back panel, and both side panels fabricated of 12-gauge type 304 stainless steel. Pump compartment length (front-to-rear) to be approximately 54" width "side-to-side" and height (above runningboards) 80". Access to interior pump compartment is provided by specified hinged driver's side gauge panel, removable top cross-lay flooring, removable back/top pump compartment 4-way aluminum cover plate, and passenger's side access door.

The entire driver and passenger side pump controls shall be covered by a full height roll up door enclosure. Door shall be Amdor roll up shutter and shall be painted to match other doors on the apparatus. The roll-up door shall be mounted to stainless steel framework, which shall extend to the edge of the running board step to allow maximum clearance behind the roll-up door.

All pump discharge and suction controls are to be mounted on driver's side pump operator's control panel, so as to permit operation of the pump from one central location style door that matches other doors.

A slide-out platform shall be located below the driver's side running board step. The platform shall be constructed from 2" aluminum tubing with Grip-Strut material inserts the

step shall have a minimum weight rating of 500 pounds. Deployment of this platform shall be connected to the DO NOT MOVE TRUCK warning circuit. The step shall slide on stainless steel pins fitted in a machined frame which shall mount to the pump house frame. Drawer slides are not acceptable.

49.4 PUMP PANEL OVERLAYS - DRIVER SIDE AND PASSENGER SIDE

Driver's and passenger's side pump panels to be overlaid with #4 brushed stainless steel, extending from running board level (beneath riser scuffplate) to immediately below specified driver's side hinged gauge panel and passenger's side hinged pump compartment interior access door. Stainless steel overlays to be installed over painted driver's and passenger's side pump panels, all mounting holes and control holes drilled prior to finish painting and final installation. Vertical sides of brushed stainless steel overlays to be trimmed with polished extruded aluminum moldings, bolted with concealed fasteners and removable. All discharge outlet and suction inlet holes to be concentric/custom-fit around extension fittings, trimmed with extruded rubber channel.

49.5 REMOVABLE OVERLAY INSERTS

The passenger's and driver's side brushed stainless steel pump panel overlays shall be equipped with removable overlay inserts, of maximum size to allow access to interior pump compartment mounted suction and discharge valves and piping. Overlay inserts shall be of the same material as background overlay surface, flush mounted and equipped with a minimum of ten (10) polished stainless steel 1/4-turn slotted screw fasteners each. **Specified suction and discharge fittings and adapters to be threaded to allow disassembly for removal of overlay inserts.**

49.6 PUMP ACCESS DOOR

A vertically hinged passenger's side pump compartment interior access door to be furnished, at least 24" wide x 22" high, "flush" U-formed with: polished stainless steel piano hinged bolted to door and door jamb, large polished stainless steel bent ring D-handle latch, rotary-slam latch hardware, vinyl coated chain door stop, polished aluminum treadplate removable full inner door liner, and polished stainless steel perimeter door jamb with removable hollow core rubber weatherstripping.

49.7 PUMP ENCLOSURE RUNNINGBOARDS

Pump panel running boards to be provided, driver's and passenger's side, fabricated of polished 4-way aluminum treadplate, bolted in position and removable. Running boards to be in line with rear tailboard and body rubrails, at least 10" deep, and include an integral 3" vertical riser scuffplate covering bottom portion of exterior side pump panels.

For the above specified driver's and passenger's side pump panel running boards to be fabricated of 12-gauge puncture-grip brushed stainless steel.

49.8 RECESSED OPEN DUNNAGE AREA

A recessed dunnage (open well) compartment to be furnished, top of pump compartment ahead of hosebody between pump compartment side panels. Dunnage compartment to be of

maximum size, equipped with removable sectional fabricated/reinforced floor sections. Removal of floor sections will allow top access to pump and its piping.

49.9 PUMP COMPARTMENT LIGHT

Two (2), Truck-Lite model 80350, 6" round chrome plated surface mount 12-volt interior pump compartment light to be furnished, mounted ceiling of interior pump compartment. Lens to be 5" diameter, Clear. Light to be activated by light lens mounted push-button switch.

49.10 DRIVER AND PASSENGER SIDE PUMP PANEL OVERHEAD LIGHTS

Three (3) each fully enclosed 12-volt light fixtures shall be furnished, located overhead the driver's side pump gauges and instruments, light fixture to be installed beneath a fabricated stainless steel light shield. The driver side light fixture shall be activated by shifting the pump into gear or pump panel light switch, the specified passenger side pump panel lights shall be activated by a pump panel light switch THREE (3) each fully enclosed 12-volt light fixtures shall be furnished, located in the top center and outboard corners of the passenger's side pump panel overlay. Fixtures to be installed beneath a fabricated stainless steel light shield. Provided lighting will be capable of clearly illuminating all pump panel controls in total darkness.

49.11 PUMP COMPARTMENT GROUND LIGHTING

Two (2) Whelen Model 20C0CDCD LED 4" round under body 12-volt ground lights to be furnished, located: two (2) each driver's side under pump compartment Lights to be completely sealed for weather resistance, lenses 4" diameter. Lights to be wired for activation by setting of the parking brake. Also can be activated by a switch mounted in cab for cab and body ground lights.

49.12 QUICK COUPLE AIR CONNECTION - PUMP PANEL

An air coupler shall be furnished located driver's and passenger's side exterior pump panel, consisting of: exterior brass female coupler, to match Milton #S-790 (shop style), with built-in check valve, appropriate high pressure vinyl air line tubing with brass fittings, pump panel mounted 3/8" 1/4-turn gate valve with exterior control knob, and matching male coupler (for use with Customer's air accessory). Air coupler shall be piped to chassis secondary air reservoir.

50.0 PUMP PANEL GAUGES/LABELING

50.1 PUMP GAUGE PANEL

The specified pump pressure gauges, discharge pressure gauges, and engine monitors/instruments shall be installed on a brushed stainless steel hinged gauge panel, located in top portion of driver's side exterior pump control panel. The gauge panel is to be equipped with a polished stainless steel piano hinge on the bottom and two adjustable-grip chrome plated lift-and-turn latches, located in upper corners. Gauge panel to be of the "tilt-out" style, to allow access to back of gauges and interior fire pump compartment. Top integral light housing to be furnished with full length multiple-bulb enclosed fixture

50.2 PUMP HOUR METER - PUMP PANEL

A Hobbs fire pump hour meter to be furnished, installed on pump operator's gauge panel, grouped with specified engine gauges. Hour meter to be of the electrical type, equipped with appropriate remote oil pressure sender installed on pump transmission. A permanently engraved nameplate shall read: "PUMP HOURS."

50.3 ENGINE INFORMATION/WARNING CENTER

A CLASS 1 ENFO III engine information/warning center shall be furnished for the pump panel. The sending units will be installed in the engine and a wiring harness supplied for the apparatus manufacturer. The ENFO III provides the pump operator with electrical system and engine operating information in a single unit. This unit shall include an audible alarm. The ENFO III shall display the following.

- Engine RPM
- System Voltage display and alarm
- Engine oil pressure display and alarm
- Engine temperature display and alarm (oil or coolant)

50.4 PUMP MASTER GAUGES AND TEST GAUGE PANEL

Master pump intake and pump discharge pressure indicating devices shall be located within 8" of each other, edge to edge, with the intake (suction) pressure indicating device to the left of the pump discharge pressure indicating device.

50.5 MASTER DISCHARGE GAUGE

A 4" diameter NoShok compound style pressure gauge to be furnished, registering -30 x 600 psi, black numerals on white background. Gauge needle shall have a "bright orange" tip for improved visibility. Gauge to be piped to discharge volute of fire pump, equipped with a black permanently engraved identification nameplate installed below the gauge, to read: "DISCHARGE."

50.6 MASTER SUCTION GAUGE

A 4" diameter NoShok compound style pressure gauge to be furnished, registering -30 x 600 psi, black numerals on white background. Gauge needle shall have a "bright orange" tip for improved visibility. Gauge to be piped to suction volute of fire pump, equipped with a black permanently engraved identification nameplate installed below the gauge, to read: "SUCTION."

50.7 TEST GAUGE PANEL

One (1), dual test plug assembly to be furnished, installed on specified gauge panel adjacent to respective pump suction and pump discharge gauge. Test plugs to be piped to pump suction cavity and discharge cavity using high pressure clear nylon tubing with brass fittings.

#3 Passenger Side Yellow with Black Letters	4" Discharge
#4 Ladder Pipe Purple with White Letters	Ladder Waterway
#5 Passenger Side White with Black Letters	2-1/2" Discharge/Foam
#6 Front Preconnect Blue with White Letters	2-1/2" Preconnect/Foam
#7 Middle Preconnect Black with White Letters	1-1/2" Preconnect/Foam
#8 Rear Preconnect Green with White Letters	1-1/2" Preconnect/Foam

All Intakes Burgundy with White Letters:

Passenger Master Intake
 Driver Master Intake
 Passenger 2-1/2" Aux. Intake
 Tank to Pump

All others to be Black with White Letters.

51.0 PUMP HEAT PACKAGE:

Pump compartment shall be constructed and insulated to keep pump from freezing during cold weather operations.

51.1 HEATER CASING, STAINLESS STEEL CONSTRUCTION

A removable swirled stainless steel heater casing, completely enclosing the under side of the pump compartment to be provided. The heat shield shall use hex bolt fasteners to fasten the bottom perimeter of the compartment and be easily removable. A slide-out center bottom panel to be provided, allowing inspection and access of normal maintenance items.

51.2 AUXILIARY COOLANT TYPE PUMP ENCLOSURE & COMPARTMENT HEATERS

Two (2) 30,000 BTU hot water type automotive heaters to be furnished, installed inside pump compartment, plumbed to engine cooling system. Heater installation to include: gated engine coolant feed and return lines, dual 12 volt electric fans, lighted rocker style fan switch located on pump control panel, indicator "ON" light in cab, and one (1) set of flexible air ducts extending from heater core to back side of specified pump pressure

gauges and other pump instruments or controls which are susceptible to freezing. Heater placement shall allow for circular movement of heated air, within the pump module.

Placement of both heaters to be determined at the Pre-Construction Conference.

One (1) 16,000 BTU hot water type automotive heater to be furnished and installed in the bulkhead wall of passenger side forward compartment.

NOTE: Heater installation to include gated engine coolant feed and return lines, 12-volt electric fan, and fan control switched with the pump compartment heater.

52.0 PUMP FOAM SYSTEM:

52.1 FOAM MANIFOLD

A flanged bolt-on or victaulic grooved stainless steel or cast iron pump discharge manifold shall be furnished, for use with the specified Class A direct discharge injection foam system. Discharge manifold shall include a bronze or stainless steel spring loaded swing-check valve, fitting tap for foam injection line, fitting tap for flow sensor, bottom fitting tap with remote manifold drain valve, and multiple taps for use with discharge valves designated as foam lines. Discharge foam manifold shall be of adequate size/capacity to handle flows not exceeding 1000 gallons per minute.

52.2 FOAMPRO 2001 SINGLE AGENT FOAM SYSTEM

The apparatus shall be equipped with a "single agent" FoamPro 2001, electronic, fully automatic, variable speed, direct injection, discharge side foam proportioning system. The system shall be capable of handling Class A foam concentrates. The foam proportioning operation shall be based on direct measurement of water flows, and remain consistent within the specified flows and pressures. The system shall be equipped with a digital electronic control display, suitable for installation on the pump panel. Foam system operations placards to be furnished, as required by NFPA 1901.

Incorporated within the control display shall be a micro-processor that receives the input from the flowmeter, while also monitoring foam concentrate pump output, comparing values to ensure that the operator preset proportional amount of foam concentrate is injected into the discharge side of the fire pump.

A paddle wheel type flowmeter shall be installed in the discharge line to the specified "foam capable" discharges.

The digital computer control display shall enable the pump operator to perform the following control and operation functions for the foam proportioning system:

1. Provide push-button control for foam proportioning rates from 0.1% to 9.9% in 0.1% increments.
2. Show current gallon per minute water flow rate.

3. Show total gallons of water discharged, during and after foam operations are completed.
4. Show total gallons of foam concentrate consumed.
5. Simulate flow rates for manual operation.
6. Perform set-up and diagnostic functions for the computer control microprocessor.
7. Flash a "low concentrate" warning when the foam concentrate tank(s) run low.
8. Flash a "no concentrate" warning and shut the foam concentrate off, preventing damage to the pump, should the foam tank go empty.

A 12-volt electric motor driven positive displacement foam concentrate pump, rated up to 2.5 GPM, with operating pressures up to 250 psi (maximum psi of 400) shall be installed in a suitable location near the apparatus pump hose.

A pump motor electric driver (mounted to the base of the pump) shall receive signals from the computer control display, and power the 1/2 horsepower electric motor directly coupled to the concentrate pump in a variable speed duty cycle to ensure that the correct proportion of concentrate preset by the pump operator is injected into the fire stream.

The FoamPro digital computer control display shall have a factory-set "default" at the following specified ratio/percentage, a value that can be temporarily or permanently changed.

The foam injection system shall be plumbed to the specified onboard Class A foam concentrate tank, using: minimum 3/4" i.d. brass piping, bronze 1/4-turn shutoff valve, bronze wye with removable strainer, and 3/4" i.d. clear vinyl foam liquid hose. NOTE: In order to provide proper foam concentrate flow rates, smaller inside diameter components shall not be used.

52.3 FOAM CELL

One (1), 25-gallon capacity foam cell to be furnished, located "notched-into" the specified non-metallic water tank, totally separate from water cavities and equipped with exterior top fill tower with removable cover and interior screen. The tank shall have a combination vent and manual fill tower marked "Foam Fill." The fill tower shall be constructed of 1/2" PT2E polypropylene and shall be a minimum dimension of 8" x 8" at the outer perimeter. The tower shall have a 1/4" thick removable polypropylene screen and a PT2E polypropylene hinged-type cover with latch. The tower shall be located in a location for filling without raising aerial ladder. Bottom foam liquid drain, means for venting of foam cell, and appropriate foam liquid outlet for use with specified foam system. A "low level" tank sensor switch to be furnished as provided by foam system manufacturer.

52.4 CLASS - A FOAM CAPABLE DISCHARGE OUTLETS

The following discharges to be Class A foam capable are: All three preconnected crosslays/speedlays, one (1) passenger side 2-1/2" discharge and front bumper discharge .

The direct discharge injection system control shall have a factory-set "default" at: .5% (ratio at which system is preset to, with system activation), a ratio that can be temporarily or permanently changed.

53.0 APPARATUS WATER TANK

53.1 WATER TANK

The water tank shall have a capacity of 500 U.S. gallons. Certification of the tank capacity shall be recorded on the manufacturer's record of construction and shall be provided to the purchaser upon delivery of the apparatus.

53.2 UPF POLY TANK CONSTRUCTION

The UPF Poly-Tank ® IIE shall be constructed of 1/2" thick PT2E™ polypropylene sheet stock. This material shall be a non-corrosive stress relieved thermoplastic, black in color, and U.V. stabilized for maximum protection.

53.3 BOOSTER TANK

The booster tank shall be of a specific configuration and shall be so designed to be completely independent of the body and compartments. All joints and seams shall be nitrogen welded and tested for maximum strength and integrity. The top of the booster tank shall be fitted with removable lifting eyes designed with a 3 to 1 safety factor to facilitate easy removal.

53.4 TANK BAFFLES

The transverse swash partitions shall be manufactured of 3/8" PT2E™ polypropylene (natural in color) and extend from approximately 4" off the floor to just under the cover. The longitudinal swash partitions shall be constructed of 3/8" PT2E polypropylene (natural in color) and extend to the floor of the tank through the cover to allow for positive welding and maximum integrity. All partitions shall be equipped with vent and air holes to permit movement of air and water between compartments. The partitions shall be designed to provide maximum water flow. All swash partitions shall interlock with one another and be welded to each other as well as to the walls of the tank.

53.5 TANK SUMP

There shall be one (1) sump in the bottom of the water tank. The sump shall be constructed of 1/2" polypropylene and shall be located in the left front quarter of the tank. On all tanks that require a front suction, a 4" schedule 40 polypropylene pipe shall be installed that will incorporate a dip tube from the front of the tank to the sump location. The sump shall be used as a combination clean-out and drain. All tanks shall have an anti-swirl plate located approximately 2" above the sump to pre-vent air from being entrained in the water while pumping.

53.6 TANK FILL CONNECTION

All tank fill couplings shall be backed with flow deflectors to break up the stream of water entering the tank, and shall be capable of withstanding sustained fill rates of up to 1,000 GPM.

53.7 TANK LID

The tank lid shall be constructed of 1/2" thick PT2E™ polypropylene to incorporate a multi three-piece locking design that allows for individual removal and inspection if necessary. The tank lid shall be recessed 3/8" from the top of the tank and shall be welded to both sides and longitudinal partitions for maximum integrity. Each one of the lids shall have hold downs consisting of 2" polypropylene dowels spaced a maximum of 30" apart. These dowels shall extend through the covers and shall assist in keeping the covers rigid under fast filling conditions. A minimum of two lifting dowels shall be drilled and tapped 1/2" x 13" to accommodate the lifting eyes.

53.8 TANK MOUNTING

The UPF Poly-Tank IIE shall rest on the body cross members in conjunction with such additional cross members, as required by the tank manufacturer.

The tank shall be isolated from the cross members through the use of hard rubber strips with, a minimum Rockwell Hardness of 60 durometer. Additionally, the tank shall be supported around the entire perimeter and captured both front and rear as well as side to side to prevent the tank from shifting during vehicle operation.

Although the tank shall be designed on a free floating suspension principle, it shall be required that the tank have adequate hold down restraints to minimize movement during vehicle operation.

The tank shall be completely removable without disturbing or dismantling the apparatus structure.

53.9 LIFETIME TANK WARRANTY

The tank shall have a lifetime warranty from UPF.

53.10 WATER TANK FILL TOWER

The tank shall have a combination vent and manual fill tower marked "Water Fill." The fill tower shall be constructed of 1/2" PT2E polypropylene and shall be a minimum dimension of 8" x 8" at the outer perimeter. The tower shall be located in the left front corner of the tank or location for filling without raising aerial ladder. The tower shall have a 1/4" thick removable polypropylene screen and a PT2E polypropylene hinged-type cover with latch.

53.11 UPF TANK OVERFLOW

The tank shall be equipped with a minimum of a 4" schedule 40 polypropylene overflow/air vent pipe. The pipe shall be installed in the fill tower and extend through the tank and dump to the rear of the rear axle.

53.12 CRADLE FOR WATER TANK MOUNTING

The tank carrier shall be designed specifically for this apparatus. The carrier structure shall be supported by and welded directly to the top plate of the torque-box.

53.13 TANK DRAIN VALVE

One (1) 1-1/2" tank drain valve(s) shall be provided in the pump compartment.

54.0 APPARATUS BODY SUBFRAME: (STAINLESS STEEL)

An apparatus body forward "yoke" style subframe or approved equal shall be furnished, constructed of welded heavy wall stainless steel tubing. Rubber cushion vibration isolators to be furnished, two (2) per side, so as to allow flexing of chassis frame rails independent of apparatus body yoke subframe. Horizontal members, supporting driver's and passenger's front and forward side compartment floors, shall be 3" x 3" x .125" wall rectangular stainless steel tubing. To allow for maximum depth, recessed compartment sides, vertical subframe members shall be 2" x 3" x .188" wall rectangular stainless steel tubing. Top over-the-frame tank support to be 3" x 1-1/2" stainless steel tubing, lined with 1/2" neoprene rubber.

Bidder shall depict, in the specified proposal drawings, the subframe and water tank sump designs.

All body subframe components shall be attached to the chassis frame with hardened steel bolts, bolt holes machined through subframe and chassis frame side webs. Body subframe supports shall be positioned so as to provide approximately 22" (with truck fully loaded) from ground to top of body rubrails and rear tailboard. All apparatus body side and/or rear compartment floors subframe horizontal supports shall be positioned parallel (level) with top of chassis frame rails. **NOTE: Apparatus body subframes which are fastened to chassis channel frame with U-bolts, sandwich clamps, or other temporary fastening methods are not acceptable.**

The apparatus body subframe materials, and construction methods, shall allow for a "lifetime" warranty, of the entire subframe structure.

55.0 APPARATUS BODY CONSTRUCTION MATERIALS:

55.1 FABRICATIONS

The following apparatus body structural components shall be fabricated of minimum 12-gauge type 304, #4 "brushed" (both sides of sheet metal) stainless steel: passenger's and driver's side front body corners with integral body cross panel, passenger's and driver's side front compartment segments with integral roof/back wall/floor and threshold, passenger's side and driver's side forward wheelwell bulkheads, passenger's side and driver's side wheelwell housings, passenger's side and driver's side lower level wheelwell segments, passenger's side and driver's side over-the-wheel upper level compartment segments with integral roof and back wall, passenger's side and driver's side rear wheelwell bulkheads, passenger's and driver's rear side compartment segments with integral compartment

roof/back wall/floor and threshold, passenger's side and driver's side rear body corners, center rear compartment segment with integral roof/back wall/compartment floor, upper level removable vertical door jambs, and the specified forward transverse and full length side hosebed risers. NOTE: During fabrication and body assembly, all brushed stainless steel exterior body panels must be covered with protective vinyl masking.

The following specified accessory components shall be fabricated of .125" 5052-H32 smooth sheet aluminum: interior compartment adjustable shelf quad-rail brackets, interior compartment vertical front and rear corner bulkheads, and any specified vertically or horizontally hinged exterior compartment door panels.

All specified interior compartment adjustable shelving, trays, and shelving tracks have a machined "swirl" finish.

The following apparatus body components shall be fabricated of 12-gauge type 304, #4 "brushed" stainless steel, with pattern cut/puncture fabricated non-slip foot grip surfaces: both driver side and passenger side pump panel runningboards, and any optionally specified rear body step housings Exterior rear body horizontal header, exterior rear body vertical door jambs, exterior rear body inboard vertical side overlays, and top of pump house.

The specified compartment roof top overlays, and any specified hinged door interior liners shall be fabricated of .100" polished aluminum treadplate.

The following apparatus body components shall be fabricated of minimum 16-gauge "polished" type 304 stainless steel: driver's and passenger's front and rear side rubrails (where specified).

55.2 FASTENERS

All apparatus body screw type fasteners shall be stainless steel "low profile" button socket head cap screws with stainless steel hex "Ny-Lok" threaded nuts designed to prevent loosening. Size of fasteners and spacing shall provide for maximum structural integrity and no leakage in flanged areas between fasteners. Where possible, only button socket head cap screw heads shall be exposed to exterior, with all nuts located interior compartment. Any necessary exterior exposed nut fasteners shall be polished stainless steel or chrome plated "acorn" covering fastener threads. **NOTE: Hex head, truss head, phillips pan head, or other large profile fasteners shall not be used for assembly of fabricated sheet metal components.**

56.0 APPARATUS BODY CONSTRUCTION METHODS:

All individual apparatus body fabricated components shall be: computer designed for repeatable tolerances, precision computer control machined for superior cut edge quality, computer control machine fabricated for individual part accuracy, and assembled in such a way, as to allow for easy disassembly. Each fabricated component shall be structurally reinforced with integral flanges, eliminating the need for add-on structural shapes. Exterior compartment and hosebody fabrications shall be free of all projections which might injure personnel or fire hose. NOTE: Where "nibbled" or other non-continuous non-smooth cutting methods are used to machine the body material, all edges must be reworked/filed for injury prevention and improved appearance.

Where bolted construction methods are employed, flanged mating areas of individual fabricated components shall have CNC machined fastener holes, properly spaced for strength, and located inside specified compartments so that fasteners are not visible from exterior sides of apparatus body. All flanged mated areas, of non-stainless steel fabrications, shall be properly etched, prime painted, rust proofed, and seal caulked, prior to assembly. NO HOLES SHALL BE DRILLED AFTER COATING AND FINAL ASSEMBLY OF INDIVIDUAL COMPONENTS.

Due to the high risk of operational damage, the following body components shall be easily separated and removable for future repairs or modifications: driver's and passenger's side front compartment corners, driver's and passenger's wheelwell liners and outboard wheelwell panels, driver's and passenger's side rear compartment corners, compartment door jambs, the rear compartment/vertical rear face of body, hosebed riser (vertical extension) panels, and runningboard/tailboard areas.

The width (front-to-rear) of driver and passenger side wheelwell housings shall be sufficient to provide clearance ahead of and behind chassis rear spring suspension shackles and spring leafs in their fully deflected position and allow "full depth" (into chassis frame rails) lower level side compartments. Design and installation of the rear wheelwell enclosures shall allow for convenient removal and replacement in the event of damage.

Compartment door jambs shall be easily removable so as to allow future modifications to door opening sizes.

The lower portion of the forward side compartments shall be recessed into body subframe depth, driver's side and passenger's sides. Recessed area shall be full width of compartment cavity at least 36" high, occupying entire underbody area below water tank.

Rear vertical surface to provide mounting area for specified rear lighting and optional body steps. Rear outboard corner shall be full height recessed beveled, designed to provide vertical mounting surface for grab handles with stand-off type brackets. Beveled surface to be 4" wide, recessed at least 2-1/2" from exterior body rubrail.

Driver's side, passenger's side, and rear compartments shall be equipped with "sweep-out" floor, raised at least 1" above compartment bottom door opening. Side compartment floors shall extend out below compartment doors, with 3" flange down and 1" return in, providing rigid mounting surface for specified rubrails.

Passenger's side and driver's side front and rear interior compartment corners to include vertical full height bulkheads (wiring harness covers) rigidly mounted, to provide mounting for specified adjustable shelf tracks, and easily removable.

All compartment door sill edges shall be overlaid with stainless steel to protect the paint.

57.0 APPARATUS BODY AND CONFIGURATION:

A custom engineered and fabricated fire apparatus compartmented body shall be furnished, designed to be located immediately to rear of a midship fire pump compartment, totally separate of pump compartment, supported by and mounted to the specified apparatus body

sub-frame. The design of apparatus body shall provide for maximum compartments ahead of, above, and back of the tandem rear wheelwell housing, driver's side and passenger's side of vehicle. So as to provide maximum depth compartments, the apparatus body overall width shall be 100" (not to exceed 101" at running boards / rub rails).

57.1 PASSENGER'S SIDE COMPARTMENTATION:

At least four (4) passenger's side compartments shall be provided full height ahead of, upper level above, and full height behind tandem rear wheel well housing.

The (P1) passenger's front side compartment segment (ahead of rear wheels) shall be approximately 42" interior width x 70" interior height x 14" upper level interior depth/27" lower level interior depth. Compartment segment to be fully enclosed and weather sealed, equipped with one (1) Amdor roll-up compartment door, size of approximately 38" wide x 66" high.

The (P2) passenger's side over-the-wheels upper level compartment segment shall be approximately 53" interior width x 33" interior height x 14" upper level interior depth /27" lower level interior depth. Compartment to be fully enclosed and weather sealed, equipped with one (1) Amdor roll-up compartment door, size of approximately 49" wide x 29" high.

The (P3) passenger's rear side over-the-wheels upper level compartment segment shall be approximately 90" interior width x 27" interior height x /27" interior depth. Compartment to be fully enclosed and weather sealed, equipped with one (1) Amdor roll-up compartment door, size of approximately 86" wide x 22.5" high.

The (P4) passenger rear side compartment segment (behind rear wheels) shall be approximately 49" interior width x 64" interior height x 27" deep with an approximate door opening of 45" wide x 59" high. Compartment shall be fully enclosed and weather sealed, equipped with one (1) Amdor roll-up compartment door, size of approximately 45" wide x 59" high

57.2 DRIVER'S SIDE COMPARTMENTATION:

At least four (4) driver's side compartments shall be provided full height ahead of, upper level above, and full height behind tandem rear wheelwell housing. All compartments to be "sweep out" design with stainless steel front edge drip cap.

The (D1) driver's front side compartment segment (ahead of rear wheels) shall be approximately 42" interior width x 70" interior height x 14" upper level interior depth/27" lower level interior depth. Compartment segment to be fully enclosed and weather sealed, equipped with one (1) Amdor roll-up compartment door, size of approximately 38" wide x 66" high.

The (D2) driver's side over-the-wheels upper level compartment segment shall be approximately 53" interior width x 33" interior height x 14" upper level interior depth /27" lower level interior depth. Compartment to be fully enclosed and weather sealed, equipped with one (1) Amdor roll-up compartment door, size of approximately 49" wide x 29" high.

The (D3) driver's rear side over-the-wheels upper level compartment segment shall be approximately 90" interior width x 27" interior height x 27" interior depth. Compartment to be fully enclosed and weather sealed, equipped with one (1) Amdor roll-up compartment door, size of approximately 86" wide x 22.5" high.

The (D4) driver's rear side compartment segment (behind rear wheels) shall be approximately 49" interior width x 64" interior height x 27" deep with an approximate door opening of 45" wide x 59" high. Compartment shall be fully enclosed and weather sealed, equipped with one (1) Amdor roll-up compartment door, size of approximately 45" wide x 59" high

58.0 APPARATUS BODY FEATURES:

58.1 SHOREPOWER 120 VOLT RECEPTACLE

One (1) single gang flush mounted 120 volt receptacle powered from the shoreline shall be furnished and installed in the P1 compartment 8" from the floor level. Mounting of this receptacle shall not interfere shelf adjustability.

58.2 BACKBOARD STORAGE

A vertical backboard sleeve shall be installed in the P1 compartment. It shall be installed toward the rear of the vehicle in the compartment and shall be built strong enough to allow for shelving brackets in that compartment to be mounted to it.

58.3 PAC TRAC MOUNTING SYSTEM

Mounting system boards to be put in D2, D3, P2, P3 compartments with final layout at preconstruction meeting. Two sections to be horizontal slide out version with full extension.

Brackets will be furnished for the following equipment:

- 8- P/N 1004 PT 2 flathead and 2 pickhead axes
- P/N K5010 PT sledge
- P/N K5010-12 PT sledge
- Denver Tool
- P/N 1042-2 PT adapters
- P/N 1042-1 PT adapters
- 6- P/N 1004 PT Crow Bars
- Bolt Cutters
- Irons
- 4-P/N K5030 Saws
- Hydraulic Ram
- Hydraulic Cutter
- Hydraulic Spreader

58.4 SPANNER WRENCH SETS

The following wrenches and holders shall be provided and installed.

Four (4) Aluminum Universal spanner wrench's with two (2) dual wrench holders

Two (2) Adjustable Hydrant Wrenches

Four (4) Aluminum Storz spanner wrenches with two (2) dual wrench holders

Wrenches and holder locations to be determined at final inspection.

58.5 TURTLE TILE FLOORS

Turtle Tile brand black sectional vinyl tiles shall be furnished, installed on top surface of all specified interior rear and side compartment floor areas

58.6 COMPARTMENT VERTICAL DIVIDERS

There shall be three (3), six (6) total, infinitely adjustable vertical dividers in the D3 and P3 compartments. They shall be attached at the top and back wall of the compartment. Dividers shall be made of .25" thick 5052 aluminum sheet. Quad-rail vertical track assemblies shall bolt to specified interior compartment bulkheads

58.7 COMPARTMENT SHELVING

Perimeter double broke infinitely adjustable full length compartment shelves shall be furnished, where specified, mounted to and removable from front and rear bulkhead mounted quad-rail vertical track assemblies. Quad-rail vertical track assemblies shall bolt to specified interior compartment bulkheads, track height to provide minimum 42" vertical shelf adjustment (in full height compartment).

Fourteen (14) each, compartment pan style shelves shall be furnished, constructed of .25" thick 5052 aluminum sheet. Shelf perimeter flanges (4 each) shall be broke up 3". Each shelf shall have a load capacity of no less than 200 lbs. and shall be infinitely adjustable.

Each compartment shelf shall have two (2) angular clamp brackets bolted to under side shelf floor, a minimum four (4) aluminum heavy flat bar track clamps with threaded stainless steel carriage bolts and self-locking nuts, easily accessible for shelf height adjustment. Compartment shelves, shelf angular clamp brackets, and Quad-Rail track assemblies shall be unpainted "swirl-finish". Entire front edge of shelves shall have reflective Red and White alternating striping.

Shelf locations to be Three (3) each: D4 (driver back side), P1 (passenger side forward), P4 (passenger side back), and One each: D1 (driver forward side), D2 (driver side upper) P2 (passenger side upper).

58.8 ALUMINUM ROLL-OUT TRAYS-GRANT SLIDES;

Five (5), each fabricated "swirl finish" aluminum roll-out trays shall be furnished, located on the floor and upper of D1, and floor of D4, P1, P4 compartments. Roll-out trays shall include three (3) 35 1/2" wide x 26" front-to-rear x 2-1/2" deep aluminum pan style tray,

and two (2) 33" wide x 26" front-to-rear, two (2) 200 lb. (400 lb. total capacity) Grant cadmium plated, multi-section, roller slide assemblies bolted to tray and angle brackets, spring loaded rear tray mounted latch to hold tray in extended position, spring loaded front tray mounted latch to hold tray in retracted position, and 12-gauge fabricated swirl finish stainless steel sliding track mounting angles with integral latch strikers. Mounting angles shall be bolted to floor or an infinitely adjustable attachment of specified compartment, using self-locking stainless steel fasteners. NOTE: Trays shall provide full extension from the designated compartment

58.9 COMPARTMENT SHELVING TURTLE TILES

Turtle Tile brand black section vinyl tiles shall be furnished, installed on top surface of all interior compartment horizontal shelves. Tiles shall be cut to size and shape of all shelves. Polished stainless steel channel type shelf tile retainers to be provided, full length of each horizontal shelf, bolted to and removable from outboard shelf flange. The specified Turtle Tile black sectional floor tiles shall include leading edge sloped ramps at all compartment door openings.

58.10 FIRE EXTINGUISHER MOUNTING:

Three individual sleeve style brackets shall be provided and mounted in D3 compartment for three (3) fire extinguishers. Fire extinguishers shall be a one (1) 2 ½ gallon water, two (2) 10 Lb ABC. Final design and OK will be decided at pre-construction with pictures of other apparatus shelves provided.

58.11 SCBA BOTTLE RACK

Passenger side upper portion of the P1 compartment shall be compartmented into a minimum of 27" deep x 56" high x 8" wide and equipped with a Polyprene or approved equal rack of individual sleeves to accommodate five (5) Scott 4.5 SCBA cylinders and one (1) Super "D" size O2 cylinder. Rear wall of rack to be enclosed with same Polyprene material as the rack to prevent damage to tank bottoms during loading and under all road conditions. Cylinder rack (sleeves) shall be down sloped at rear to prevent cylinders from sliding outboard.

58.12 COMPARTMENT DOORS AND DOOR ACCESSORIES:

AMDOR™ brand Roll-Up Compartment Door Specification.

Compartment doors shall be equipped with AMDOR™ brand roll-up doors complete with the following features: 1" aluminum double wall slats with continuous ball & socket hinge joint designed to prevent water ingress and weather tight recessed dual durometer seals, double wall reinforced bottom panel with stainless steel lift bar latching system, bottom panel flange with cut-outs for ease of access with gloved hands, reusable slat shoes with positive snap-lock securement, smooth interior door curtain to prevent equipment hang-ups, one-piece aluminum door track / side frame, top gutter with non-marring seal, non-marring recessed side seals with UV stabilizers to prevent warpage, dual leg bottom seal, with all wear component material to be Type 6 Nylon. Door ajar switch system shall be provided by AMDOR™ and shall NOT include magnetic proximity based components. Switch device shall be a military grade contact switch capable of meeting MIL-S-8805 which can only be activated through positive engagement of the lift bar. Door striker will include

support beneath the lift bar to prevent door curtain bounce. Optional wet paint shall be applied by AMDOR™ using a 4 stage Base Clearcoat system applied over an anodized substrate material for corrosion protection. No exceptions or substitutions to this AMDOR™ brand roll-up door specification are acceptable.

The following specified roll-up style compartment door tracks/extrusions to be "flush" with exterior body panels/door jambs. NOTE: Roll-up door tracks which are riveted or welded in position are not acceptable.

The following specified door opening sizes may be reduced by no more than 3" total width (1-1/2" per side) and 4" total height. Decrease in compartment opening sizes is caused by profile of side track extrusions with weatherstripping and bottom door slat which remains in door opening.

Doors and frames as well as space between frames on exterior shall be painted to match cab red color.

58.13 ENCAPSULATED ROLL-UP DOOR PROTECTION

The above specified roll-up door "bundles" will be encapsulated within custom fabricated swirl finish aluminum shrouds, protecting "bundled" door slats from interior compartment damage. Fabricated shrouds to be of minimum size necessary, to accommodate largest diameter door bundle, and will span the full width of compartment. Shrouds will be easily removable, with hex head bolts from within the compartment interior.

NOTE: The above specified door bundle encapsulators are removable, from within the compartment interior, so as to allow for door slat and rewind mechanism maintenance/cleaning, without having to remove exterior treadplate overlapping body panels.

58.14 COMPARTMENT LIGHTS

Lighting for compartments shall be LED Night Stik lighting. It shall be full height and run down the entire inside edge of the compartment door on both sides. Lighting shall be activated by a switch when door is opened. All compartments shall have this lighting.

58.15 BODY EMERGENCY LED WARNING LIGHTS

Six (6), Whelen model 600 series, 4" x 6" rectangular LED lightheads, three (3) each side, and six (6) chrome plated surrounds to be furnished, surface mounted on driver and passenger sides. Lights to be located in front of and between rear tandem wheels and recessed into rear side of "coffin" compartments. Lights to be activated by a illuminated rocker switch. Lights to be completely sealed for weather resistance

Four (4) Whelen 500 Series TIR 6 rectangular flush mounted emergency LED lights, two each side, with associated 5E chrome surround flanges to be furnished and installed at the bottom rear corner of the body and top of body ahead of turntable access ladder of the body Light to be activated by same switch as above warning lights.

Final locations to be determined at pre construction meeting.

58.16 BODY GROUND LIGHTING

Eight (8), Whelen model 20C0CDCD LED, 4" round under body 12-volt ground lights to be furnished, located: two (2) each driver's side under front compartment and behind rear wheels under last compartment, two (2) each passenger's side under front compartment and behind rear wheels under last compartment, two (2) each as described in stabilizer section, and two (2) under turntable access ladder. Lights to be completely sealed for weather resistance, lenses 4" diameter. Lights to be wired for activation by setting of the parking brake. Also can be activated by same switch for cab ground lights mounted in cab.

58.17 REFLECTIVE STRIPING/LETTERING – MATCH EXISTING RIG

At minimum a 4" wide horizontal White ScotchLite reflective stripe with a 1" stripe above and below shall be affixed to the perimeter of the vehicle, placed approximately 3" above runningboard/rubrail level, to conform with NFPA 1901 reflectivity requirement.

Front facing stripe shall be 4" wide with 1" stripe above and below, located below horizontal hood seam below grille. .

The lettering and stripping package to be provided by the Graphix Shoppe or approved facility to match 2010 pumper and per customer approval.

58.18 POLISHED STAINLESS RUBRAILS

Driver's and passenger's forward and rear bottom side compartments shall be furnished with fabricated polished stainless steel rubrails, extending from front compartment corners to rear wheelwell cut-out, and from rear wheelwell cut-out to rear compartment corners. Rubrails shall be "in-line" with pump panel runningboards and rear tailboard corner steps, 3" high, protruding 1/2" from body sides. Rubrails shall be channel shape, extending into compartment interior (below compartment doors), flanged up to facilitate installation of specified removable hollowcore door weatherstripping. Polished stainless steel rubrails shall be bolted in position and easily removable, fasteners concealed below body and inside compartment.

58.19 BODY REAR WHEEL WELL LINERS

Fully removable, bolt-in, stainless steel fender liners shall be provided. The wheel well liners shall extend from the outer wheel well body panel, into the truck frame. Removable vertical splash shields, inward of the wheels, shall be provided to give access to the hydraulic components. The completely washable fender liners shall be designed to protect the front and rear compartments and main body supports from road salts, dirt accumulation and corrosion. Fender liners which are welded in place or are only partially removable or are not in compliance with Federal DOT regulations shall not be considered. There shall be sufficient room in this area for the use of rear tire chains on both axles.

58.20 BODY REAR FENDERETTES

The tandem rear fenders shall be equipped with easily replaceable, polished stainless steel fenderettes. The fenderettes shall be equipped with a rubber gasket molding between the body panel and the fender. Integral welded crown type liners shall not be acceptable.

58.21 BODY REAR WHEEL CORNERING LIGHT

Two (2), one (1) on each side, Whelen perimeter enhancement light Model PELCC in steady white shall be provided and installed between the rear tandem wheels shining toward the ground. Lights shall be activated with the corresponding turn signal and front bumper cornering light and shall be steady on function.

58.22 SWEEP-OUT WHEEL WELL COMPARTMENT

The upper level compartment floors, located above rear wheels, shall be "sweep-out" design, integral with rear wheelwell housing, fabricated of specified smooth sheet material.

58.23 POLISHED DRIP CAP

Compartment roof top liner fabricated "polished treadplate aluminum" drip caps flange shall cover the roll-up door top overhead extruded moulding.

58.24 DOOR JAMBS

Specified upper level vertical side door jambs shall be "flush" with exterior door surface, bolted in position and removable so as to allow for future modifications to door opening size or door type. Width of door jamb shall prevent interference with adjacent doors.

58.25 FRONT COMPARTMENT CORNERS

Front compartment outboard corners and rear compartment outboard corners, driver's and passenger's sides, shall include integral full height vertical door jambs "flush" with exterior door surface.

58.26 COMPARTMENT ROOF HEADERS

Horizontal compartment segment roofs, driver's side and passenger's side, shall include integral full length top door jambs "flush" with exterior door panel.

58.27 TREAD-BRITE COMPARTMENT ROOF TOPS

Driver's and passenger's side compartment roof tops shall be lined/plated with polished 4-way aluminum treadplate, flanged down on front, rear, and full length outboard side to meet extruded aluminum drip molding. Aluminum treadplate liners shall be "single piece" to eliminate mis-matched seams, extending full length and full width of compartment roof top. Treadplate aluminum liners shall be bolted in position, after finish painting of compartment roofs, underside seal coated prior to final installation.

58.28 TREADBRITE "COFFIN" COMPARTMENTS

Two (2) "coffin" style compartments shall be installed on top of the D1 and D2 and the P1 and P2 compartments. Compartments shall be approximately 12" high X 16" wide X 96" long. Compartments shall have a single weatherproof tread-brite lid capable of being walked on. Lid shall have three (3) rubber closures and have pneumatic hold open

cylinders. Lid shall have a full length stainless steel hinge and shall open from the middle of the apparatus to the outside. Compartment shall be illuminated by full length Nite-Stik LED lighting that shall be activated by opening the lid.

58.29 TUBULAR BODY RAILINGS

Apparatus body tubular railings shall be furnished, consisting of: 1-1/4" o.d. etched non-slip tubes, chrome plated double bolt type 3" stand-off end type and center rail brackets, stainless screws to prevent rotation of tubular railings within bracket, and neoprene rubber surface mounting gaskets furnished between rail bracket and painted body surface. Rubber insert railings shall not be accepted.

58.30 RUNNINGBOARDS:

The specified pump panel runningboard shall be in-line with body rubrails.

All aluminum treadplate to be fitted, removed, undercoated with rustproofing material, non-aluminum areas properly lined with 3M dielectric tape, and bolted in position.

Pattern cut/puncture fabricated non-slip foot grip surfaces shall be provided, integral with tailboard material, at appropriate step locations.

Steps, platforms, or secure ladders shall be provided so that firefighters have access to all working and storage areas of the apparatus. The maximum stepping height from ground to first step shall not exceed 24". Additional steps can not be more than 18" apart. All steps, platforms, or ladders shall sustain a minimum static load of 500 lbs. without permanent deformation and shall have skid resistant surfaces. Any step shall have a minimum area of 35 sq. in. Platform shall have a minimum depth of 8". Ladders shall have at least 7" clearance between any rung and the apparatus body.

58.31 SQUARE FRONT COMPARTMENT CORNERS

The passenger's side and driver's side outboard front body corners shall incorporate a full height fabricated, square profile, designed to provide a vertical front mounting surface for bottom push-up or removable tri-pod style telescoping quartz light poles with stand-off type brackets.

58.32 RECESSED/BEVELED REAR COMPARTMENT CORNERS

The driver side and passenger side rear body corners shall incorporate a full height fabricated, "recessed bevel", designed to provide a vertical mounting surface for bottom push-up telescoping quartz light poles with stand-off type brackets. Beveled surface to be 4" wide, recessed inboard the exterior body rubrail.

58.33 ROPE RESCUE ANCHORS/RECEIVER HITCH

Four (4) tow eyes, frame mounted, in "pocket", one(1) each side of front rear tandem tire on the passenger and drivers side shall be included and easily assessable for use as anchors for rope rescue scenarios. Weight ratings, exact location, and mounting options shall be

discussed with Duluth Fleet Services and Duluth Fire Department. Tow eyes shall have rounded edges and be free from burrs.

A receiver hitch shall be mounted below the D1 and P1 and rated for at least 12,000 lbs. Power options to this location shall be discussed with Duluth Fleet Services and Duluth Fire Department. Power connectors to be Anderson Power Products SBX 175 2-pole connectors with auxiliary contacts.

59.0 120V/240V ELECTRICAL SYSTEM AND ACCESSORIES

All specified 120/240 volt alternating current system shall meet the requirements of NFPA 1901, as it relates to vehicle mounted systems, including but not limited to: Materials, Grounding, Overcurrent Protection, Wiring Methods, Wiring identification, Wet Locations, Dry Locations, Receptacle Listings, Electrical System Testing, Placarding, and Operational Testing.

59.1 BODY ELECTRICAL JUNCTION COMPARTMENT

A weather tight electric junction compartment shall be provided in the left side lower front compartment. This compartment shall be recessed through the inside rear wall of the compartment to provide an easily accessible enclosure to house all of the body wiring junction points, terminal strips, solenoids, etc. The design of this compartment shall not decrease the storage capacity area of the compartment in which it is located. A removable panel shall be provided for access to this compartment.

59.2 HYDRAULIC GENERATOR

One (1), Smart Power Systems model HR-15 2600015 hydraulic pump driven generator shall be furnished, rated at 15,000-watt, 120/240-volt single phase, complete with: appropriate chassis transmission mounted "hot-shift" PTO, PTO mounted hydraulic pump, necessary hydraulic high pressure hoses and fittings, and the above specified modular frame hydraulic generator system. The modular generator system shall include the reservoir, hydraulic motor, hydraulic oil filter and cooler and a meter panel as per NFPA standards. Cab mounted switch shall be located within easy reach of the driver and shall have a "Generator On" indicator light.

The system will generate power as standard 120VAC and/or 240VAC, 60 hertz, and handle loads up to 15,000 watts.

59.3 GENERATOR LOCATION

The above specified hydraulic generator shall be located on top of the body under the aerial ladder behind the pump compartment protected from the elements with allowances made for proper venting.

59.4 ELECTRIC CORD REEL/LOCATION

Two (2), push button rewind 240 VAC 4-conductor electric cord reel assembly to be furnished, consisting of: Hannay model ECR1618-17-18 electric 4-conductor cord reel, 200 ft. of 10-4 S. O. insulated multi-stranded copper electric cord, bright orange ball type cord

stop, water-proof conduit and appropriate multi-stranded copper wiring from reel to specified generator circuit breaker panel, 12-volt insulated battery cable from reel rewind to battery disconnect switch, and the specified cord end mounted receptacle box. Cord reel to be equipped with a 4-way polished stainless steel cord roller assembly. Cord reel rewind switch to be located in compartment below the reel within easy reach from ground. Reel to be mounted, one (1) drivers side and one (1) passenger side, above the D3 and P3 compartment module, in a protective treadbrite box that can withstand walking on. Access shall be from a treadbrite weather resistant cover with a full length stainless steel hinge and rubber closure.

59.5 CORD END CONFIGURATION

The following specified cord receptacle box shall be hardwired to the end of the reel cords and non-removable. A mechanical cord clamp shall be provided at receptacle box to prevent detachment of the cord under normal use conditions.

59.6 YELLOW DUPLEX RECEPTACLE BOX

There shall be two (2) Extenda-Lite model EJB-CS yellow vinyl coated back lighted electrical junction box(es), equipped with four (4) non-NEMA # 7310-B 3 wire 20 amp twist lock electrical receptacles, two on each side. Each receptacle shall be equipped with a spring loaded snap cover. A cord reel shall be prewired to the cast aluminum junction box to supply power to the four receptacles. An extension cord shall be connected to the junction box through a heavy duty water resistant strain relief and flexible extender. Each side of the junction box shall be fitted with polypropylene faceplates which are back lighted so that plug orientation to the receptacles is quick and easy to align.

Junction box holder shall be furnished located adjacent to reel roller assembly or as customers designates.

59.7 GENERATOR CIRCUIT BREAKER PANEL

One (1), Square-D 100-amp circuit breaker panel to be furnished, with at least four (4) individual switch type manual-reset circuit breakers, (20-amp for 120-volt receptacle/10-amp for lighting). Panel to be located inside a weatherproof apparatus body compartment passenger side front corner, provided with waterproof non-metallic flexible conduit (extending from generator to circuit breaker panel and circuit panel to electrical accessories), with appropriate size multi-stranded color coded THHN insulated wiring. All circuits shall be identified with permanently engraved nameplates describing controlled function.

59.8 BODY SCENE LIGHTING-120V

Four (4), Fire Research Optimum Series Model OPA530-S75, 750W/120V scene lights shall furnished and be mounted on the sides of the body one (1) above the D1 compartment and one (1) above the P1 compartment toward the front of the apparatus recessed into the side of the "coffin" compartments, and one (1) above the D3 and P3 compartments enclosed in a protective treadbrite box facing to the respective sides of the apparatus. Each set of lights shall be controlled by one (1) switch in the cab labeled Drivers Side Scene and Passengers Side Scene.

60.0 APPARATUS BODY COMPARTMENTATION REAR/HOSEBED AREA:

The specified hosebed area shall be located between upper level body side/compartment back walls.

60.1 MAIN HOSEBED AREA

The apparatus body hosebed area, located between passenger's body side and center of apparatus. Hose bed height shall be between 36" and no more than 60" from the ground. The hosebed will also be designed to allow the hose, without chutes or slideout trays, to be deployed straight out of the rear of the vehicle. Stainless steel rollers shall be located on three (3) sides of the hose bed if required to keep hose from snagging on sides of hose bed. The hosebed will also be designed so that the aerial ladder does not have to be raised to reload hose. Hose bed shall be designed for easy reloading.

NOTE; All hose bed options will be considered. The floor of hosebed shall be no more than 60" from ground level. This dimension is exposed on the provided Proposal Drawing.

All surfaces of the hosebed shall be free from all sharp objects such as bolts, nuts, etc., to avoid damage to fire hose.

Dunnage shall be covered with .125" treadbrite, bolted into position with blind fasteners. Generator well shall remain open to the driver's side dunnage above pump compartment.

Extruded aluminum slatted hosebed gratings shall be furnished, running longitudinal full length of hosebed with underside crosswise reinforcements slats running full width of hosebed area. Longitudinal aluminum hosebed gratings to be spaced at least 1/2" apart for proper hose ventilation. Top longitudinal and bottom crosswise slats shall be assembled with aluminum clamp type tabs and stainless steel threaded fasteners, so as to allow complete disassembly and rearrangement for future hosebed modifications. Longitudinal gratings shall be "cut-out" around specified water tank stack(s).

60.2 HOSEBED CAPACITY

The main hosebed shall be designed to accommodate: 1000 ft. of four (4) inch large diameter hose dead-lay.

NOTE: In addition to the above requirement a location is required for 500' of 2 1/2" hose. Department preference locations to be discussed at pre-bid meeting.

60.3 HOSEBED COVER (If Required)

One (1) full size Vinyl hose bed cover shall be provided and installed if necessary. The cover shall be made from 22 ounce, heavy duty vinyl coated polyester fabric (TXN 226). The cover will be sewn with ultraviolet resistant thread and will have 2" wide nylon webbing sewn around the perimeter to provide additional strength.

The cover will be secured to the front body top flange with Velcro and quarter-turn fasteners.

60.4 SLIDE-IN STORAGE FOR LADDERS AND PIKE POLES

A **completely sealed** storage compartment to be furnished full length of body. Storage compartment shall accommodate: sleeve and tray mountings for specified extension ladder/roof ladder/folding ladder/eight (8) pike poles. The ladder trays shall be bottom lined with nylon, for "free-slide" surface. Compartment to be approximately 42" above ground equipped with horizontally hinged access door with large D-ring stainless steel 1/4-turn slam latch and stainless piano hinge.

Compartment to be illuminated with at least one (1) full door width Nite Stik brand LED lighting. Light to be activated with opening of rear door.

Ladders and pike poles listed below shall be furnished and installed in apparatus:

- One (1) Duo-Safety 35 ft. 1200-A series 2- section ladder
- One (1) Duo-Safety 28 ft. 1200-A series 2-section ladder
- Two (2) Duo-Safety 16 ft. 875-A series Roof ladder
- One (1) Duo-Safety 14 ft. 1000-A series 2 section ladder
- One (1) Duo-Safety 10 ft. 585-A series folding ladder

- Two (2) six (6) foot Ash handle New Yorker style with malleable iron end pike poles
- Two (2) eight (8) foot Ash handle New Yorker style with malleable iron end pike poles
- Two (2) twelve (12) foot Ash handle New Yorker style with malleable iron end pike poles
- One (1) six (6) foot trash hook

60.5 REAR BODY COMPARTMENTATION: (IF POSSIBLE)

One (1) vertically hinged equipment compartment, on the left rear of the body panel measuring approximately 12" wide x 59" high x 22 " deep, with door opening of 10.5" wide x 56" high. Hinge and door shall be fabricated of stainless steel. Door latch shall be D-ring stainless steel ¼ turn slam type latch. Door shall be weather sealed with drip molding above.

Compartment to be illuminated with one (1) full door height Nite Stik brand LED lighting. Light to be activated with opening of rear door.

Exterior rear face of body, including: passenger's side rear door jamb, driver's side rear door jamb, rear top header, and inboard vertical rear corners shall be fabricated of brushed stainless steel.

60.6 REAR BODY GROUND LIGHTING

Two (2) Whelen Model 20C0CDCD LED 4" round under body 12-volt ground lights to be furnished, located: two (2) each driver's side under rear of apparatus. Lights to be completely sealed for weather resistance, lenses 4" diameter. Lights to be wired for activation by setting of the parking brake

60.7 RUBBER MOUNTED FLEXIBLE REAR BODY MARKER LIGHT

Two (2) rubber, angled LED marker lights shall be mounted on the rear most corner of the body, one (1) each side. The lights shall be mounted in a molded flexible rubber shaft that extends away from the body approximately 6". The lights shall be equipped with an amber lens facing forward and a red lens facing to the rear of the vehicle.

The lights shall be wired to the parking light circuit.

60.8 REAR TAIL LIGHTING

Two (2), Whelen model 6OROOXRR, 5 "LED" combination stop/tail lights to be furnished, mounted each side at rear of body. Lighting to exceed the SAE requirements. Lenses to be 4" x 6", Red. Lights to be wired for activation by service brake and headlamp switch.

Two (2), Whelen model 6OA00TAR LED turn signal lights with populated arrow shape and multiple flash patterns to be furnished, mounted one each side at rear of body. Lenses to be 4" x 6" Amber. Lights to be wired for activation by left or right turn signal (not by brake lights).

Two (2), Whelen model 6OJOOOCU, halogen back up lights to be furnished, mounted one each side at rear of body. Lenses to be 4" x 6", Clear. Lights to be wired for activation by reverse gear of truck transmission.

Two (2), Whelen model 600 series warning light, 4" x 6" rectangular LED lightheads mounted located driver and passenger side at the bottom of the lighting bracket.. Lights to be activated by a same illuminated rocker switch in the cab. Lights to be completely sealed for weather resistant. Lights to activated by same switch as below Rear Body Emergency Warning Lights.

Above specified lights to include two (2) Whelen 600 series model CAST4V at driver's side and passenger's side rear body corners. Lights to be in same order as above.

60.9 REAR BODY EMERGENCY WARNING LIGHTS

Two (2), Whelen model 600 Series, 4" x 6" rectangular LED lightheads and two(2) chrome plated surrounds to be furnished, surface mounted located independent of each other on the upper outside rear corners of the body. Light lenses to be 6" wide x 4" high, driver's Red, passenger's side Red. Lights to be activated by a separate illuminated rocker switch identified by function. Lights to be completely sealed for weather resistance.

Two (2) Whelen 500 Series TIR 6 rectangular flush mounted emergency LED lights with associated 5E chrome surround flanges to be furnished and installed on the rear of the body. They shall be located below the roll up door at the outside corners. Light to be activated by same switch as above warning lights.

Final locations to be determined at pre construction meeting.

60.10 REAR BODY TRAFFIC ADVISOR

A Whelen LINZ6 Dominator Plus series, Model # TADP8RB shall be furnished and installed on the rear of the apparatus. It shall have a control unit in the cab in a position that is in easy reach of the driver.

60.11 REAR BODY SCENE LIGHTING-120V

One (1), Fire Research Optimum Series Model OPA530-S75, 750W/120V scene light shall be furnished and be mounted on the rear of the body as high up as practical. Light shall be controlled by one (1) switch in the cab labeled Rear Scene Light.

60.12 REAR BODY SCENE LIGHTING-12V

The rear of the body shall include two (2) Whelen Model 810 scene lights, one (1) each side as high as practical which shall be surface mounted. The lights shall be activated by either a rocker switch, on the cab dash or when the vehicle is placed in reverse.

60.13 REAR OBSERVATION SYSTEM

A rear observation system shall be provided, consisting of a rear apparatus mounted high resolution (270K pixels) completely waterproof camera with adjustable viewing angles, and a color Slimline flat panel display with a 5-1/4" viewing screen mounted on the interior chassis cab driver side visor or approved location.

Camera eye shall be located above rear center compartment.

60.14 REAR TOW EYES/ RECEIVER HITCH

Two (2) tow eyes, rear frame mounted shall be included and easily assessable for use as anchors for rope rescue scenarios. Exact location to be shown on bid drawing. Tow eyes shall have rounded edges and be free from burrs.

A receiver hitch shall be mounted below the rear bumper and rated for at least 12,000 lbs. Power options to this location shall be discussed with Duluth Fleet Services and Duluth Fire Department. Power connectors to be Anderson Power Products SBX 175 2-pole connectors with auxiliary contacts.

60.15 FRAME DRAG BAR

A heavy duty drag bar shall be installed at the rear of the vehicle on the frame or approved location to protect the body behind the rear wheels from damage due to scragging the ground.

60.16 CHEVRON STRIPPING, REAR OF APPARATUS

A minimum of 48 square feet of 4" multiple diagonal reflective stripes shall be provided full width at rear of apparatus body. Stripe shall form "Chevrons", using alternating red #3M680-71-06 and yellow (Sunflower) 3M680-82-06 reflective stripes, only interrupted by the rear apparatus lighting, hand rails, steps, and door hardware. Chevron pattern shall be

applied to flat metal surface prior to installation of the above specified bolt on “removable” accessories.

61.0 AERIAL LADDER 100' FOUR (4) SECTION HEAVY DUTY AERIAL LADDER

61.1 GENERAL INFORMATION

The aerial ladder assembly shall be a four (4) section telescoping ladder constructed per NFPA 1901, pre-piped waterway, turntable, torque box and outriggers.

61.2 INTENT OF AERIAL SPECIFICATIONS

The intent of these specifications is to describe a telescoping elevating ladder. It shall consist of four (4) ladder sections, a turntable, torque box and four outriggers. The height of the unit shall be at least 100' and the horizontal reach shall be at least 94'.

61.3 DESIGN STANDARDS

The design criteria of the unit shall be to create a structure and system that emphasizes safety, product reliability, and ease of operation.

These criteria shall be:

- The hydraulic system shall be designed so that if a failure of any component or assembly within the system occurs, a single point failure of the entire system shall not occur.
- The minimum ultimate design condition at the ladder base shall be 7.3 Million inch pounds.
- All structure load supporting elements of the aerial ladder 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 American National Standards Institute (ANSI) and the current National Fire Protection Association (NFPA) 1901 standard.
- The aerial device shall be capable of sustaining a static load one and one-half times it's rated tip load capacity (live load), in every position in which the aerial device can be placed when the vehicle is on a firm and level surface.
- The aerial device shall be capable of sustaining a static load one and one-third times it's rated tip load capacity (live load) in every position in which the aerial devices can be placed when the vehicle is on a slope of five degrees downward in the direction most likely to cause overturning.
- All material and welds shall have a fatigue life structural safety factor of at least 2:1. This shall be derived from a fracture mechanics analysis for crack initiation and propagation of the material and welds for all operating temperature ranges and shall take into account structure weight, payload, wind load, ice load, nozzle reactions, and dynamics. Since modern engineering technology accepts the fact that a large welded structure whose failure can lead to injury should be analyzed using this procedure, there can be no exceptions.
- All welds in the aerial device shall be designed per the static and fatigue criteria of the American Welding Society No. D1.1-97. All aluminum welds shall be designed per the static and fatigue criteria of the American Welding Society Standard No. D1.2-97.
- The aerial truss must be constructed from high strength 100,000 PSI yield steel.

The aerial shall be capable of operating with a rated tip load of either of two of the following conditions.

- Conditions of high wind up to 50 mph.
- Conditions of icing, up to a coating of .25" over the entire aerial structure.

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

- Strain gauge testing of the complete aerial device.
- Analysis of deflection data taken while the aerial device was under test load.
- Accelerometer test to determine dynamic response during ladder operation.
- Accelerometer test to determine dynamic response during road travel.
- Material fracture mechanics testing.
- Weld fracture mechanics testing.
- Hydraulic component operating and burst strength testing.

61.4 HEIGHT AND REACH

The height of the unit shall be a minimum of 100' as measured by NFPA-1901 requirements, Section 22-2.2, which states, "The rated vertical height of an aerial ladder shall be at least 50 ft and shall be measured in a vertical plane with the ladder at maximum elevation and extension from the outermost rung of the outermost fly section to the ground". The bidder shall state the height of the unit as measured by NFPA-1901 standards.

The horizontal reach of the unit shall be a minimum of 94' as measured by NFPA-1901 requirements, Section 20-2.3, which states, "The rated horizontal reach of an aerial ladder shall be measured in a horizontal plane from the centerline of the turntable rotation to the outermost rung on the outermost fly section with the aerial ladder extended to its maximum horizontal reach" The bidder shall state the height of the unit as measured by NFPA-1901 standards.

61.5 WELDMENT FIXTURES

To ensure exact tolerances between parts and part interchangeability, all weldment's shall be manufactured in fixtures. To further insure weld integrity in all weldment's, the fixtures must be able to rotate to enable the weldment to be welded in the number 1 flat welding position resulting in maximum weld penetration in the welded material.

61.6 MATERIAL STANDARD

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 only for verification and not with the intent of "paper changing" the material classification. The material standard for ALL components of the aerial truss shall be no less than 70,000 PSI steel or high strength aluminum alloy.

61.7 AERIAL ELECTRICAL JUNCTION COMPARTMENT

An electric junction compartment shall be provided on the rear of the aerial body. This compartment shall be recessed through the rear wall of the body to provide an easily accessible enclosure to house all of the aerial device wiring junction points, terminal strips, solenoids, etc. All wiring for the aerial device including outrigger, diverter valve, and swivel circuits shall be enclosed in this compartment. The design of this compartment shall not decrease the storage capacity area of the body in which it is located.

61.8 HYDRAULIC SYSTEM

The hydraulic system shall provide power to the entire aerial device as efficient as possible without the use of a hydraulic cooler. NO EXCEPTION!

A hydraulic system relief valve as well as individual circuit relief valves shall be provided to prevent damage to any function or circuit. The relief valve shall have a stainless steel relief spring to ensure proper function and product reliability.

61.9 HYDRAULIC HOSE, TUBING AND FITTINGS

All hydraulic steel tubing, hydraulic rubber covered wire braided hoses, and hydraulic fittings/adapters shall have a minimum burst pressure rating of four times the operating pressure. Hoses and tubing shall be properly sized to minimize heat build up during extended periods of operation. Hoses and tubing shall be properly sized to minimize flow restrictions.

All hydraulic hose shall have a tube and cover constructed of Nitrile elastomers and shall have a braided/spiral wire reinforcement capable of maintaining a 4:1 safety factor in all areas of the hydraulic system. The hose shall meet the appropriate SAE performance specifications: 100R2 or 100R12.

The manufacturer shall implement the most efficient, leak-free, fluid connector design in the industry.

61.10 LEAK-FREE GUARANTEE

An exclusive three-year leak free guarantee shall warrant the connections to be leak-free for a period of three (3) years.

61.11 HYDRAULIC PUMP

A load sense pressure compensated hydraulic axial piston pump shall be provided which shall be capable of operating under any rated platform load condition and aerial device position at normal engine idle or governor controlled fast idle. The hydraulic pump shall be capable of generating sufficient flows to allow multiple aerial functions without significant loss of speed.

61.12 HYDRAULIC OIL RESERVOIR

A hydraulic oil reservoir of at least 43 gallons shall be provided to supply the needs of the

hydraulic system. A 2" gated suction line shall be provided between the oil reservoir and the hydraulic pump. The tank fill shall be provided with a strainer screen and vent cap. Located near the fill cap shall be a dip-stick for checking fluid levels. Before adding fluid the tank must be cleaned and free from all contaminants.

Suction and return ports must be designed to SAE Straight Thread O-ring Specifications. These ports must incorporate an o-ring seal rather than pipe threads.

61.13 DIVERTER VALVE

There shall be an automatic electric over hydraulic three (3) position diverter valve located at the center rear of the apparatus. This diverter valve shall divert hydraulic fluid to either the aerial ladder controls or the outrigger controls.

To prevent accidental operation of the ladder prior to the outriggers being properly set, the diverter valve shall only allow hydraulic fluid to the outriggers until the outriggers are set properly.

To prevent accidental operation of the outrigger system during the aerial ladder operation the diverter valve shall only allow hydraulic fluid to the ladder controls, when the aerial device is raised from the aerial travel support.

In the event of electrical failure the operator shall be able to manually move the diverter valve to the ladder or outrigger position for continuous uninterrupted operation.

61.14 OUTRIGGER SYSTEM HYDRAULIC CONTROL VALVES

The outrigger cylinder system shall be controlled by a pressure compensated, proportional control valve that is designed for parallel hydraulic circuit operations. The valve must be proportional type to provide the smoothest, precise operation of the outriggers. Devices utilizing on/off type outrigger control valves in lieu of proportional valve shall not be acceptable!

This valve shall be modular in design so that individual sections can be replaced in the field, rather than complete valve assemblies, thus reducing maintenance costs. The valve housings shall be made of high tensile cast iron for durability and the individual spools shall be hard, chrome plated for long life and resistance to corrosion. Each valve shall be equipped with a heavy-duty electric solenoid for electric control of the outrigger from the remote operator's station and mechanical handles of ease in override operations. The mechanical handles shall be equipped with large knobs with integral labels inside each knob indicating the function of the handle.

61.15 LIFT, EXTENSION AND ROTATION HYDRAULIC CONTROL VALVE – ELECTRIC

Three (3) ladder directional controllers shall be mounted on the turntable control console. They shall control extend/retract, rotation, and elevation. These controllers are part of the motion control system allowing safe operation of the ladder from the platform.

The main control valve shall be positioned at the turntable control console for direct manual over ride control of each aerial function.

The controllers shall incorporate ICB; J-1939 can bus signaling, transmitted through two (2) J-1939 communication wires to reduce the chance of electrical failures since fewer wires and terminals shall be utilized. Additionally, voltage sensitivity is eliminated thus providing superior motion control. Joystick controllers that utilize potentiometers or mechanical switches to control motion shall not be acceptable.

Adjustments and troubleshooting shall be accessible from the display at the turntable control station.

61.16 PRESSURE FILTER

The pressure filter shall be made of a micro glass medium, which has the highest capture efficiency, dirt holding capacity and life expectancy over other media such as cellulose and synthetic. The pressure filter shall have a bypass circuit protected by a check valve, which shall be installed around the pressure filter. The pressure line filter shall be required even if a suction line filter is provided in the reservoir due to the suction line filter's inability to trap contaminants entering the system. Pressure filter shall be easily assessable for maintenance.

The pressure filter cartridge shall have a sensor, which shall indicate the condition of the filter and provide a warning text message at a display. The display shall have a light warning if the pressure filter is blocked or in the bypass mode.

The pressure filter shall have an absolute rating of five (5) microns.

61.17 RETURN FILTER

The return filter shall be made of a micro glass medium, which has the highest capture efficiency, dirt holding capacity and life expectancy over other media such as cellulose and synthetic. The return filter shall have a bypass circuit protected by a check valve, which shall be installed around the return filter. The return filter shall have a bypass circuit protected by a check valve, which shall be installed around the return filter. Return filter shall be easily assessable for maintenance.

The return filter cartridge shall have a sensor, which shall indicate the condition of the filter and provide a warning text message at a display. The display shall have a light warning if the return filter is blocked or in the bypass mode.

The return filter shall have an absolute rating of five (5) microns.

61.18 MOTION CONTROL SYSTEM

The ladder, outrigger system and interlock systems shall be controlled with the computer operated and monitored hydraulic motion control system or approved equal. The motion control system shall provide state of the art controls for the ladder, outriggers, auto-level and interlock systems. The motion control system must be an electro-hydraulic management system that monitors operator inputs from the control station(s) and converts this data to a usable electronic signal that controls hydraulic valve functions.

The turntable control station shall be equipped with a Master Display Module (MD III).

The Master Display Module (MD III) shall be a completely weather proof and shock resistant micro processor which includes a 3" x 4.5" LCD screen (referenced above). The MD III shall contain programmed parameters for each aerial device function, which provide for proper machine operation and reduce the possibility of abusive operation. The number of wires required to connect the MD III module and control hardware shall be kept to a minimum through the use of serial CAN-bus data transmission technology. The CAN-bus modules shall be attached to each other using just two communication wires.

Each component of the motion control system shall be proven, off the shelf modules and parts, which are available throughout the world. Proprietary hardware designs shall not be acceptable due to the lack of parts availability and support.

The MD III module shall also be capable of monitoring engine and transmission J1939 parameters and warn the operator if there are any conditions of the motion control system out of the set ranges. The MD III display must have built-in troubleshooting and shall allow troubleshooting and function history monitoring for the entire motion control system. The memory function must allow a service technician to identify if these warnings were ignored or overridden.

The motion control system shall receive rotation information from an absolute encoder located on the rotation swivel. The encoder shall provide absolute position of the turntable at any given position from 0 degrees to 360 degrees of rotation.

An MD III information center shall be provided at each aerial control station. The MD III display shall allow the system to be diagnosed and calibrated without the need for separate controllers or computers.

The turntable MD III display shall indicate the following information from on-demand screen:

Degree of rotation from centerline of vehicle.

Short jack warning.

Cradle alignment message.

The MD III screen(s) will also display warning/message screens to alert the operator to a potentially unsafe condition of the aerial device.

61.19 EMERGENCY HYDRAULIC PUMP SYSTEM

In the event of failure of the main hydraulic pump or vehicle engine, the unit shall be equipped with an emergency hydraulic pump which shall be plumbed into the hydraulic system and be electrically driven from the chassis batteries. The emergency pump system shall be capable of limited functions of the ladder and outriggers to stow the unit. The pump shall be controlled from both the right and left outriggers and turntable control stations with spring loaded momentary contact switches.

The pump shall have a separate hydraulic oil supply line, from the main supply line attached directly to the hydraulic oil reservoir. A shutoff valve for each line shall be

provided and check valves shall be incorporated on the pressure side of both pumps to ensure that one shall continue to operate the ladder in the event the other fails.

The pump shall have high tensile steel shafts and gears with the shafts supported by needle bearings. The cylinder plate and gears shall be ground as a set to ensure exacting tolerances. Clearance shall be maintained by a Mylar shim.

61.20 POWER TAKE OFF (PTO) 12 VOLT SWITCH

The apparatus shall be equipped with a power shift PTO driven by the chassis transmission. An indicator light shall be located in the cab next to the PTO switch to show when the PTO is engaged. The PTO shall only engage with the parking brake applied and the transmission in neutral. If the unit is equipped with a pump, the PTO shall be active if the transmission is in "Drive", only if the fire pump is engaged. The PTO shall be a heavy duty pressure lubricated and cooled unit for extended operations.

A master 12 volt "Ladder Power" switch shall be provided adjacent to the PTO switch for control of all ladder 12 volt power, with the exception of the emergency pump circuits.

61.21 HOUR METER

An aerial hour meter shall be installed in the cab adjacent to the ladder power and PTO control switches. The hour meter shall be wired to the aerial PTO circuit to record hours of operation for the aerial. The hour meter shall aid in scheduling preventative maintenance as outlined in the operator's manual.

61.22 ENGINE FAST IDLE ACTUATOR

The fast idle actuator shall be used to raise the engine RPM to a preset level for proper aerial operation. The fast idle switches shall be located at the main outrigger control station and the aerial control station/s. A cab mounted switch shall also be provided

For the safety of personnel and equipment, the fast idle system shall not activate unless the transmission is in neutral. No exceptions shall be acceptable to this system.

61.23 TORQUE BOX

The torque box shall be constructed to withstand loads per the manufacturers' specifications.

61.24 STABILIZERS

Four (4) hydraulic stabilizers shall be supplied. Two (2) in front of the rear tandems and two (2) behind the rear tandems. The stabilizers shall be connected to the hazard light circuit to warn the driver if they are not stowed when the parking brake is released.

61.25 JACK FOOT PADS

A permanently attached self-centering steel foot pad, approximately 1/2" x 13.5" x 15.5" (209 sq. in.) shall be provided on each vertical jack beam. Each foot pad shall swivel longitudinal and require no adjustment during stabilizer set-up. The stabilizer pad shall be

attached without the use of a bearing type swivel due to maintenance required on this design.

Four (4) auxiliary stabilizer pads shall be provided for additional load distribution, measuring 1/2" x 24" x 24" (576 sq. in.). Each auxiliary pad shall be fabricated of 6061-T6 high strength aluminum alloy or approved equal material and have an offset handle for easy use.

The auxiliary pad shall be secured in mounts located below the body compartments or other approved location.

61.26 AUXILARY JACK PADS

Four (4) auxiliary outrigger pads shall be provided for additional load distribution, measuring 1/2" x 24" x 24" (576 sq. in.). Each auxiliary pad shall be fabricated of 6061-T6 high strength aluminum alloy and have an offset handle for easy use.

The aluminum outrigger pads shall have a serrated type aluminum mesh welded to the bottom to assist in keeping ground pads from sliding on ice or snow packed ground.

The aluminum auxiliary pads shall be shipped loose.

61.27 STABILIZERS/LADDER INTERLOCK SYSTEM

An interlock system shall be provided between the outriggers and ladder that prevents the operation of the ladder until the operator places all jacks in the load supporting configuration. Each stabilizer shall be equipped with a pressure sensitive switch that closes only when the jack is firmly in contact with the ground. Until all jack switches close, electrical power shall not be transmitted to the turntable, hence preventing ladder operation. A key controlled override switch shall be provided at the central outrigger control station for emergency override of the interlock system. A green indicator light shall be provided on the stabilizer control panel to indicate the position of the foot pad. Illumination of the indicator light indicates firm ground contact.

61.28 STABILIZER DEPLOYMENT WARNING ALARM

An outrigger deployment warning device shall be provided to warn personnel in the vicinity of the apparatus that the outriggers are in motion. Whenever an stabilizer control is utilized, the device shall produce a pulsing tone, separate and distinctive from that of other audible warning systems provided on the apparatus. When the stabilizer control is released to its neutral position, the signal shall cease.

61.29 STABILIZER LIGHTING

Each outrigger shall be equipped with the following light package:

Two (2) Whelen Model 5GR00FRR LED red flashing lights shall be mounted below each stabilizer beam, facing front and rear. These warning lights shall be activated by the aerial master switch.

One (1) Whelen Model 600 series LED red strobe light installed on each stabilizer cover panel. These lights shall be activated by a switch in the cab in conjunction with the emergency warning master.

One (1) Whelen Model 20C0CDCD LED 4" round under body 12-volt ground lights to be furnished, located under the body, to illuminate each outrigger foot pad area.

The foot pad illumination lights shall be energized by the ladder power circuit.

61.30 STABILIZER WARNING LIGHTS

The stabilizer warning lights are included in the warning light package previously mentioned.

61.31 STABILIZER SCOTCHLITE - CHEVRON

Red/White "Diamond Grade" ScotchLite material in a Chevron pattern shall be furnished on both sides of the horizontal and vertical beams of any stabilizers.

61.32 STABILIZER CONTROLS

A portable "tethered" electronic stabilizer control station or fixed stabilizer control stations shall be provided on the rear of the apparatus. The hand held stabilizer control box shall be weatherproof and oil resistant. The control box shall have an extension cable and shall allow the stabilizers to be controlled from as far away as 15 feet from the vehicle to allow for clear vision of stabilizer movement. Two fixed control stations option shall be located on the left and right sides at the rear of the apparatus. Body designs that block the view of the stabilizers from the control station shall not be acceptable.

Out and down stabilizer control functions for each stabilizer shall be operated independently, so that vehicle may be set up in restricted areas or on uneven terrain. The diverter valve override control shall be mounted at the center rear hydraulic area behind the hinged outrigger control panel along with the override key and EPU actuator switch. An electrically actuated diverter valve shall be provided in conjunction with the stabilizer controls as a safety device. The diverter valve shall allow the hydraulic fluid to flow either to the stabilizer circuit or the turntable and ladder circuit, but not both simultaneously.

A hinged panel shall be provided at the rear center of the body. The rear panel shall be equipped with a stainless steel hinge, which shall allow the operator to access the diverter valve manual override control, outrigger manual override controls, the electrical system back-up switch, override key switch and EPU controls and hydraulic filter indicator lights.

The portable outrigger control box shall incorporate the following:

- Two (2) or Four (4) stabilizer fully extended indicator lights
- Four (4) stabilizer set indicator lights
- Four (4) stabilizer control toggle switches
- One (1) Fast idle control
- One (1) Ladder Operation indicator light
- One (1) Override indicator light

Fixed stations shall have controls for the corresponding side and a centrally located fast idle control, ladder operation light, and override indicator light

61.33 STABILIZER LEVEL

One (1) bubble type side to side leveling device shall be provided at the rear of the apparatus to assist in the aerial device setup. This device shall be mounted in the center of the rear body panel and shall be at eye level to the operator. The leveling device shall be color coded indicating the following conditions:

- Green Safe operating zone.
- Yellow Caution operating zone.

Since use of this leveling device is of a critical nature, it shall have a serialized number from it's manufacturer to indicate documented quality control.

61.34 TURNTABLE/TURNTABLE DECK

The turntable shall be a fabricated steel weldment designed for the rotation and elevation of the ladder sections. It shall consist of the following:

- A machined steel bearing plate and matching top plate that shall be machined to insure proper fit to the rotation bearing. Manufacturers that do not mill both bearing surfaces shall not be considered. NO EXCEPTION!
- A solid steel turntable deck will be covered with a secure, heavy-duty, fiberglass pultrusion that incorporates an aggressive, non-slip coating. The cover will have a minimum of a 2" photo luminescent coating around the perimeter of the cover. The covers will provide an aggressive, non-slip coating and assist in providing a light source for the turntable during low light conditions. The photo luminescent coating will remain visible for up to 20 hours after exposure to light.

An aluminum tread plate access step shall be mounted near the heel of the ladder to provide easy access to the ladder from the turntable deck.

Turntable safety handrails mounted at the rear and sides of the turntable. The handrails shall be 1.25" diameter polished finish grade 304 stainless steel tubing with an extruded finned rubber grip covering and the joining fittings shall be polished chrome plated tees and ell. All rails shall be a minimum of 42" high.

The turntable deck will be a free from obstructions as possible, due to the importance of this area when the vehicle is in a rescue mode. The turntable deck will allow easy access to the turntable even when the ladder is being operated over the rear of the vehicle.

Turntables with the drive motor or breathing air bottles mounted in any walking areas (front or rear) of the turntable will not be acceptable.

61.35 TURNTABLE ACCESS LADDER FRAMEWORK

The turntable access ladder shall be fabricated from grip-strut material, which shall be reinforced by a structural frame bolted to the rear of the body. There shall be two (2) access ladders provided on the driver's and passenger's side, at the rear of the apparatus.

61.36 TURNTABLE ACCESS DROP DOWN STEP

A pull out, drop down access ladder shall be provided on the left rear of the body and the right rear of the body to access the turntable. The ladders shall be constructed from aluminum structures and cast aluminum open grate steps.

A safety pin shall be provided to secure the step in the stowed position. The drop down steps shall be incorporated in the "DO NOT MOVE TRUCK" warning circuit.

61.37 FULL WIDTH HEEL PIN

The turntable and ladder shall be designed with a full width heel pin or approved equal at the turntable/ladder pivot point. The pin shall be solid steel extending the full width of the turntable vertical supports. The heel pin shall be a minimum of 3" in diameter and is to be equipped with large pin journals in the ladder and turntable supports, which will reduce wear and distribute loads.

61.38 TURNTABLE SAFETY CHAINS

Each turntable handrail opening shall be equipped with safety chains at the rear of the turntable.

61.39 HYDRAULIC, ELECTRIC AND WATER SWIVEL

Hydraulic power to the turntable hydraulic circuits shall be provided through a three (3) port, high pressure, hydraulic swivel that permits 360 degrees of continuous turntable rotation.

Electrical power to the turntable electric circuits shall be provided by a collector ring assembly. The collector rings shall be used for electrical ground, ladder control functions, and a 120 volt A.C. system during 360 degrees of continuous turntable rotation. The collector ring assembly shall have a minimum of **28** circuits.

Water shall be transferred to the aerial waterway by means of a four (4) inch water swivel enabling 360 degree continuous rotation of the turntable.

61.40 ENCODER

The swivel shall be designed with an integral absolute encoder to provide a continuous output indicating the position of the turntable at any given time. The encoder shall be designed to indicate position of the turntable even if power interruption occurs. The number of degrees of rotation shall be shown in a digital readout on the display.

61.41 LADDER SECTION CONSTRUCTION

The elevating ladder shall consist of four (4) steel or aluminum ladder sections referred to as the base section, lower mid section, upper mid section and fly section.

The design and construction criteria for these ladder sections shall be:

- Each section shall be fabricated using ultra high strength 100,000 psi steel or approved

equal, welded together to form a structural unit.

- All welding shall be done by welders that have been certified in accordance with the American Welding Society Standard specifications.
- Each ladder section shall be constructed in an assembly fixture to ensure uniformity and interchangeability.
- K-bracing at each rung shall be utilized to minimize side deflection of the ladder.
- All rungs shall be 1-1/2" in diameter, spaced at 14" centers and be covered with serrated, replaceable rubber sheaths held in place with contact cement and metal clips for ease of replacement. Rungs must be round No Exception
- All rungs, K-braces, and diagonals shall be positioned so that they are continuously welded to the ladder section.
- All side rails shall be protected from interior corrosion by coating the interior of the rail with a corrosion preventative film that meets military specifications number MIL-C-16173D.

Each rung shall be equipped with a heavy duty serrated, replaceable rubber sheath to provide an anti-slip surface for fire fighting personnel. For additional safety, the covers shall be constructed from a soft rubber to allow ice buildup to easily break off when the rung is stepped on by fire fighting personnel. This shall be an added safety feature during water tower operation in cold weather conditions.

Ladder designs that do not utilize rubber covers shall not be acceptable due the high cost and difficulty to replace the anti-slip surface and the inability to provide a safe surface during icing conditions.

Ladder handrails and diagonal material are to be constructed from square or rectangular tubing, which provide a larger square inch welding surface were the materials are attached to each other. Use of round material is not desired due to less square inches of welding area associated with round materials.

61.42 BASE SECTION

Due to forces created by elevation and rotation, torsional or twisting moment is present in all aerial device designs. The two (2) rails shall be welded together with diagonal sections, creating a truss structure which shall support all weight and forces imposed by the lower mid, upper mid and fly sections.

Internal stress reinforcements shall not be allowed because they cannot be welded continuously to the interior of the base side rail components and the welds cannot be visually inspected after the ladder section is put into service.

61.43 BASE SECTION STOKES BASKET STORAGE

A storage compartment shall be furnished and installed for storage of a stokes basket. Storage box shall have a tarp cover to protect the stokes basket from the weather.

61.44 BASE SECTION STORAGE 14' ROOF LADDER

A storage compartment shall be furnished and installed for storage of a 14' roof ladder on the base section of the aerial. Storage box shall have a tarp cover to protect the ladder from damage and the weather.

61.45 LOWER MID SECTION

Each base rail for the mid section shall be formed structure to provide a full length integral channel for the upper mid ladder section to interlock to the mid ladder section.

The mid section shall be designed with sufficient internal clearances to house the extension cylinders. This shall allow the extension cylinder rods to be 100% enclosed and protected at all times from damage from icing, road dirt, water spray or fire fighting personnel from stepping on the cylinders when climbing the ladder.

This design shall also keep the extension cylinder from obstructing the underside of the ladder.

61.46 UPPER MID SECTION

The upper mid section shall be designed to transfer all loads from the fly section to the lower mid section.

61.47 FLY SECTION

The fly section shall be designed specifically for the purpose of supporting fire personnel and related equipment for effective firefighting. To assist in positioning of the ladder tip, the last six (6) feet of the fly section shall be equipped with orange ScotchLite material on the ladder handrails, diagonal braces and ladder base rail.

61.48 FLY SECTION LOAD LIFTING / RAPPELLING EYES

The aerial ladder shall be equipped with two (2) load lifting / rappelling eyes at the tip of the fly section. The load lifting / rappelling eyes, as a pair, shall be rated at 500 LBS. or the max tip load of the aerial.

61.49 LADDER EGRESS

The tip of the fly section shall be equipped with a bolt-on egress section to minimize the distance from the ladder tip to a window or roof when the waterway monitor is positioned at the ladder tip. The egress section shall extend from the end of fly section 14" and taper down approximately 12-degrees. The egress shall be designed to fully support the rated capacity of the ladder.

61.50 LADDER SECTION DIMENSIONS

All bidders shall state in the space provided below their dimensions on the unit proposed. Dimensions proposed must be approved equal or exceed those specified.

	Side Rail Dimensions [L x W x H]	Side Rail Wall Inside	Outside Thickness	Handrail Height	Handrail Width
Base Section	321" x 3" x 10"	0.188"	0.125"	28.25"	40.25"

Lower Mid Section	316" x 5" x 6.75"	0.188"	0.125"	23.25"	33.75"
Upper Mid Section	346" x 1.5" x 3"	0.188"	0.188"	19.5"	27.5"
Fly Section	346" x 1.5" x 3"	0.188"	0.188"	16.5"	22"

61.51 MINIMUM OVERLAP SURFACES BETWEEN SECTIONS

Base to Lower Mid Section	84"
Lower Mid to Upper Mid Section	84"
Upper Mid to Fly Section	84"

61.52 FLY TIP STEPS

Two (2) sets of folding steps shall be conveniently located at the end portion of the fly section. These shall be used for one person to place his feet so that he is positioned parallel to the ladder. The steps shall fold into proper position for usage and fold toward the sides of the ladder when not in use to provide adequate clearance when the ladder is being climbed. The steps shall be placed approximately 70" & 98" from the center of the last rung toward the base of the aerial.

61.53 AERIAL TRAVEL SUPPORT

A heavy duty rest shall be provided to support the aerial in the travel position. Stainless steel bedding plates shall be attached to the aerial base section to protect the aerial when the unit is in the travel position. Bolt-in diagonal bracing shall be installed on the support structure in an "X" pattern to restrict to side movement. This design shall allow for a pre-determined amount of flex preventing premature failure that can be found in an overly rigid structure.

61.54 CRADLE ILLUMINATION LIGHTS

Two (2) 12 volt Grote Whitelight LED lights shall be mounted near the ladder travel support to illuminate this area during night time operation. The lights shall be wired and activated by the ladder power circuit.

61.55 ELEVATION SYSTEM

Two (2) double acting lift cylinders shall be attached between the turntable and the base. The cylinders shall function only to elevate the aerial device and not as a structural member to stabilize the ladder sideways. The lift cylinder rods shall be attached to the base section with self aligning swivel bearings which prevent side loading on the lift cylinders resulting in longer cylinder seal life. They shall provide smooth precise elevation from at least -5 degrees below horizontal to +80 degrees above horizontal.

The lift cylinders shall be equipped with integral (on the cylinder) holding valves which prevents the ladder from lowering should a hydraulic line be ruptured at any point within the hydraulic system. They shall also have a manifold line with velocity fuses between the cylinders to prevent uneven cylinder lift and they shall have both rod and piston hydraulic cushions. These cushions shall decelerate the cylinder near the end of its stroke creating a smooth stop at full stroke.

61.56 LADDER INTERLOCK SYSTEM

A limit switch at the aerial travel support shall be provided to prevent operation of the outriggers once the aerial has been elevated from the nested position. This system must prevent operation of the outriggers once the ladder has been elevated from the nested position.

61.57 ROTATION SYSTEM

A minimum 41" diameter external tooth bearing shall be provided for 360 degree continuous rotation of the aerial device. The bearing shall be bolted to the turntable and bolted to the pedestal bearing plate using 3/4" diameter SAE Grade 8 bolts to secure the bearing to the turntable and 3/4" diameter SAE Grade 8 bolts to secure the bearing to the pedestal bearing plate.

Both upper and lower bearing surfaces shall be milled to ensure a true mounting surface for the rotation bearing. Units that weld the bearing to their mounting plates shall not be acceptable due to the tremendous cost and down time involved in replacing a damaged or defective bearing. Shims shall not be acceptable as they shall reduce the surface contact area significantly thereby causing a concentration of forces at the shims.

All rotation bearing bolts shall be able to be torqued from the top side of the turntable without the bolt or nut being held under the turntable by a person. This shall require a design that shall stop all chance of the bolt "spinning" while torque is being applied to the fastener. Application of Loctite or a similar compound alone, without any other means provided to hold the fastener; shall not be acceptable. Additionally, this design feature shall not incorporate drilling, bending, welding on, or in any way; modifying the structural fastener, nut, or washers

61.58 ROTATION MOTOR AND BRAKE

A hydraulic driven planetary swing drive system shall provide smooth and precise rotation. A spring applied, hydraulically released, disc type brake shall be furnished on each gear box to provide positive braking of the turntable assembly against reactionary forces such as water and gravity. The drive motor shall be positioned on the turntable so it shall not obstruct any walking area or stepping surface on the turntable deck. Provisions shall be made for manual operation of the rotation system should complete loss of hydraulic power occur. These provisions shall include a hand crank supplied with the unit.

The hydraulic system shall be equipped with pressure relief valves which shall limit the rotational torque to a nondestructive power. All moving parts of the rotation gear reduction box shall be enclosed or under the turntable decking so that no safety hazards are present.

61.59 ROTATION INTERLOCK SYSTEM

The aerial device shall be equipped with a rotation interlock system to prevent the ladder from being rotated to any side where the stabilizers are not sufficiently extended to provide for the full tip load rating.

The system shall monitor the stabilizers for extension. When a stabilizer is not sufficiently extended (short-jacked) to provide full tip load rating, the system shall prevent the aerial from being rotated more than 12 degrees past the front or rear centerline into the short-jacked side of the apparatus.

Once activated, the system shall prevent the aerial from being rotated past the front or rear corner of the apparatus where a stabilizer is not properly deployed.

A slowdown feature shall be built into the rotation interlock system. When the aerial is operating in a short-jacked mode, the rotational speed shall be automatically reduced, by approximately 50%, when the aerial is rotated to within approximately 10 degrees of the front or rear centerline of the apparatus. The rotational speed shall remain reduced throughout an arc of approximately 20-degrees over the front or rear of the apparatus, regardless of the direction of the rotation movement.

The rotation function shall automatically stop when the aerial approaches the front or rear corner area of the short-jacked side of the apparatus.

The rotation interlock system shall allow for normal operation on the side of the apparatus where the stabilizers are sufficiently extended for full tip load rating.

An override system, activated by Push/Pull knobs within the main turntable control pedestal, shall be provided that allows the operator to rotate the aerial into the non-recommended (short-jacked) side of the apparatus, should the situation absolutely demand it.

Push/Pull knobs shall be utilized to activate the manual override. Once the manual override is activated the aerial shall be capable of rotating to the side where a stabilizer is not fully deployed.

Whenever the manual override is activated and aerial is rotated into the short-jack side of the apparatus, the rotation speed shall be automatically reduced by approximately 50%. All secondary controls, other than those on the main pedestal, shall be locked out and become inoperative when the rotation interlock override is activated.

61.60 EXTENSION/RETRACTION SYSTEM

A dual system of hydraulic cylinders and cables shall provide full power operation of the extension and retraction modes. Each system shall be capable of supporting the ladder in the event of failure of one of the systems. They cylinders shall be used to extend and retract the mid-fly section and a cable system shall be used to extend and retract the fly

section.

Both cylinders shall be equipped with two integral holding valves to protect both extension and retraction movement during water tower operations or in the event of a severed hydraulic line. Also, the cylinder barrels containing the hydraulic fluid must be anchored in the base section to keep the transfer of weight at full extension to a minimum. To keep maintenance at a minimum, both cylinders shall be completely enclosed and protected inside the mid section side rail beams. This shall ensure that the cylinder rods shall never be exposed to the elements even at full extension. To minimize downtime, both cylinders shall be easily removable from the rear of the vehicle by unbolting and sliding out. Both cylinders shall be completely independent of the cable extension retraction system for the fly section, thus eliminating the need to disturb the cable system should cylinder maintenance be required.

The dual cable system shall utilize cables routed via two (2) pulley sets located on the forward and rear ends of the mid sections from ten front end of the base section to the rear end of the fly section. The cables shall have a safety factor based on breaking strength of 8:1.

61.61 APPARATUS BODY DAMAGE CONTROL INTERLOCK SYSTEM

A safety feature shall be included in the aerial operational system that minimizes the possibility of damage to the apparatus body at all angles for all standard (non-override) operational modes.

The system shall automatically stop the downward movement of the aerial at a preset angle of elevation unless the aerial has been rotated at least 80-degrees, left or right, from the center of the ladder support. Once this rotation point is reached, full range downward movement (to minus 8 degrees) shall be allowed.

The aerial manufacturer shall determine and set the angle of elevation where downward aerial movement is stopped. The highest point of an apparatus, in relation to the distance from the turntable, shall be used to determine the preset elevation angle stopping point.

The system shall also minimize the possibility of accidental damage to the apparatus body from aerial rotation whenever the aerial elevation is below the preset elevation angle stopping point.

Rotational speed shall be reduced by approximately 50% when the aerial is rotated to within a minimum of 10 degrees of a body avoidance stopping point. Aerial rotation shall automatically stop before the aerial contacts the body of the apparatus.

The body damage interlock system shall have no effect on aerial operation when the aerial is raised above the preset downward movement stopping point.

The body damage interlock system shall not eliminate the possibility of damage to components such as telescopic lights that are in a raised position.

61.62 LADDER SLIDE MECHANISM

Slide pads shall be used between the telescoping ladder sections. Slides are required because of greater surface area for load transfer between the telescoping sections. Slide pads shall also be used to control side play between the ladder sections.

Stainless steel adjustment screws shall be provided on the wear pads to permit proper side tension. Plates shall be installed on the side(s) of the slide pads where adjustment screws come into contact with them. **No Exceptions** shall be allowed to this requirement to keep the adjustment screws from embedding themselves into the pads which may cause the pad to crack and fail.

61.63 LADDER EXTENSION NUMBERS

ScotchLite numerals shall be furnished on the inside of the ladder base section handrail, each side, to help the operator determine the distance the ladder is extended. The numbers shall read in five foot increments.

61.64 LADDER CABLE AND HOSE ROUTING SYSTEM

All lines to the ladder tip shall be enclosed and protected from the turntable to the ladder tip. All lines shall be routed through the base section side rails and then through flexible aluminum conduits that travel under and over the mid section and end at the base of the fly section.

There shall be no exception to this requirement due to the increased maintenance problems associated with slip tubes and take-up pulleys.

Ladder designs where electrical lines, air lines and hydraulic line are exposed on the interiors of the ladder handrails shall not be acceptable.

61.65 AERIAL 120 VOLT SYSTEM

Two (2) 120 volt 20 amp electrical circuits utilizing 12 gauge five strand electrical cable shall be provided to the tip. Circuits shall be wired from the tip to the turntable through the collector ring assembly.

61.66 TIP RECEPTACLE

One (1) 120 volt weatherproof outlet, Nema 5-20R, household type and an environmental cover shall be furnished near the end of the fly section.

61.67 LADDER 12 VOLT CIRCUIT

All 12 volt electrical lines to the ladder tip shall be enclosed and protected from the turntable to the ladder tip. All 12 volt electrical lines shall be routed through the base section rails and then through flexible aluminum conduits the travel under and over the mid section(s) and end at the base of the fly section.

Ladder designs where electrical, air, or hydraulic lines are exposed on the interiors of the ladder handrails shall not be acceptable.

61.68 TURNTABLE HEEL PIN STEP LIGHTS

Two (2) Grote model #60571, shielded LED body step lights shall be installed at the base of the ladder in the turntable heel pin step.

61.69 TURNTABLE CONSOLE STEP LIGHT

One (1) Grote model #60571, shielded LED body step lights shall be installed the front face of the turntable console facing the operator, to illuminate the step area in front of the control console. The light shall be mounted no lower than 18" from the step deck.

61.70 TURNTABLE CONSOLE LIGHTING

A sealed 12" Nite Stik LED light shall be used to illuminate the turntable control console. The light shall be mounted across the top of the control panel to assure proper illumination of all controls. The light shall be wired to the ladder power circuit.

Two (2) Unity spotlights shall be mounted at the rear of the base ladder section, one on each handrail. The lights shall be equipped with a swivel base and an on/off switch on the light head itself.

61.71 LADDER TIP STROBE/SCENE LIGHT

Two (2) Whelen L31HRFN series flashing LED beacon lights shall be provided on the left and right side of the ladder tip. The lights shall give the operator at the turntable a visual indication of the ladder tip location, when the ladder is in smoke or steam. The light shall be equipped with an amber lens and shall be activated by the ladder power circuit.

Two (2) FRC Optimum 750 watt 120 volt scene lights with a swivel base shall be mounted near the tip of the ladder. They shall be controlled by a switch on the turntable console. They shall also be enclosed by a cage device to protect the lights from damage due to low hanging branches.

61.72 AERIAL ILLUMINATION LIGHTS

The ladder sections shall be equipped with red LED ribbon style lighting that shall be installed to illuminate the ladder rungs for night time operations. The lights shall be wired to the ladder power circuit with a disabling switch at the turntable control console.

61.73 CONTROL STATION

There shall be a control station at the turntable. All elevation, extension and rotation operational controls shall operate from this position. These controls shall be arranged to permit the operator to regulate the speed of these operations within the safe limits as determined by the manufacturer. Load instruction plates shall be located at the control station to show the recommended safe load of the ladder. The control devices shall be clearly marked and suitably lighted.

The turntable control station shall be located on the left side of the turntable such that the operator can easily observe the ladder tip while operating the controls.

61.74 TURNTABLE CONTROL STATION

The lower part of the console shall be angled away from the operator, to provide as much foot room as possible for the operator.

An access door shall be provided on the front of the console to provide complete access to the electrical and hydraulic components mounted inside the console.

The console shall be illuminated for night operations, and shall have the following controls/indicators:

The following items shall be clearly marked:

- IQAN, MD III display
- Three (3) manual direct ladder control levers.
- A foot operated "dead man switch". That electrically opens the aerial control valve shall protect against accidental movement of the control handles.
- Master electrical power switch with emergency shutdown capabilities.
- Rung alignment indicator light for ladder climbing operations.
- Cradle alignment indicator light.
- Engine fast idle control switch.
- Emergency pump power switch.
- 5,000 psi hydraulic oil pressure gauge (Liquid filled).
- Intercom controls
- Illuminated load chart on front of console.
- Hinged aluminum tread plate console cover over controls
- Electric Monitor Controls
Painted pivoting/hide away console cover

61.75 FIRE RESEARCH FLOWMETER

The apparatus shall be equipped with a Fire Research digital flowmeter "DF-4000", at the turntable console which shall give the operator or engineer an indication of actual volume of water (in gallons) being discharged through the aerial waterway.

The display case shall be constructed on non-glare black anodized aluminum, with bright red LCD digits, acrylic lens and totalizer feature. The totalizer has the ability to store and display the total gallons of water pumped through the discharge when the "Total" button is pushed. The totalizer function shall automatically reset to zero anytime the vehicle's electrical system is shut down. A calibration slot shall be provided on the front face of the display to make field calibration easy.

A flow sensor paddle wheel shall be installed on the discharge piping with a machined housing or clamp.

61.76 REMOTE LADDER "CREEPER CONTROLS"

There shall be a remote ladder "creeper control" at the tip of the fly section. The control shall consist of three (3) spring loaded, triple pole double throw, return to center switches, one for each main ladder function. Each function switch shall be labeled on a black and white label that is located adjacent to the switches. Each switch shall be encircled by a rubber boot to protect the switch box from collecting moisture. The creeper control shall allow the crew member on the tip of the ladder to operate these three functions within the speed limitations as set forth in NFPA Pamphlet 1901, latest revision.

A momentary switch shall be installed at the lower control station to activate the system. When in the normal position, the system shall be de-energized. When the switch is held in the on position, power shall be available to the person at the tip.

61.77 BUBBLE ANGLE INDICATOR

One (1) bubble type angle indicator shall be provided on the base section of the ladder, near the turntable control console.

The bubble type angle indicator shall be illuminated with one (1) Grote model #60571, shielded LED body step light.

61.78 TURNTABLE CONSOLE COVER

The turntable control console shall be designed with a painted aluminum cover. The cover shall be designed with a radius shape that pivots over the top of the control panel and does not obstruct visibility for the operator when the ladder is operated at low angles. The cover shall be painted to match the color of the ladder.

61.79 COMMUNICATION SYSTEM

A Fire Research communication system shall be furnished between the ladder tip and the turntable operator's position. The communication speaker at the ladder tip shall require no operator attention to transmit or receive. The transmitting receiving volume controls shall be located at the turntable operator's position.

61.80 AERIAL WATER SYSTEM

The aerial waterway system shall be capable of being supplied by both a midship mounted pump and an external water source with the inlet on the rear of the apparatus. **The rear aerial inlet shall be plumbed to supply either the mid ship pump or the aerial waterway.**

The piping from the aerial discharge valve and the rear inlet to the turntable swivel shall be 4" stainless steel pipe. A 4" tee shall join the pump discharge line and the rear inlet line. A 4" water swivel shall be located in the riser pipe from the tee permitting 360 degree continuous rotation of the ladder.

A 4" heel pin swivel connection between the ladder waterway and the turntable swivel permitting water tower operations from -5 to +80 degrees shall be provided.

An anodized aluminum telescopic waterway shall be mounted beneath the center of the aerial ladder. The waterway shall have a 4 1/2" base section tube, 4" lower mid section tube, 3 1/2" upper mid section tube and a 3" fly section tube.

The waterway shall be secured to the ladder sections with cradle type mounts to provide a minimum of 2" of up and down movement in the waterway. This design shall protect the waterway from bending if the ladder comes in contact with a building or a water hammer is imposed to the waterway discharge.

An automatic drain shall be provided in aerial water way to automatically drain the system for freezing conditions. This valve shall also act as a vacuum relief valve for the waterway when extending the aerial device with the discharges in the closed position.

A 2-1/2" relief valve preset at 225 psi shall be located beneath the turntable to protect the water system from excessive pressures.

A 1-1/2" drain valve shall be installed and operated from the rear of the apparatus.

61.81 REAR INLET ADAPTER

The rear aerial inlet shall be equipped with a 4" NST adapter to 4" Storz adapter with cap and chain.

NOTE: A 2.5" No Shok pressure gauge shall be provided at the rear outrigger control panel of the vehicle to indicate waterway pressure.

61.82 AERIAL MONITOR AND NOZZLE

An Akron model #3578 "StreamMaster" electrically controlled monitor shall be installed on the outer end of the telescoping aerial waterway. The monitor relay box shall be located on at the tip of the aerial, adjacent to the monitor, and shall be easily accessible for service.

The monitor shall be capable of wireless remote operation.

- The monitor shall be equipped with a 3-1/2" outlet and a 4" inlet.
- The monitor shall have a vertical sweep of 135°, and a horizontal sweep of 348°.

An Akron model #1577 "SaberMaster" electrically controlled master stream nozzle shall be installed on the end of the monitor. The model #1577 has the ability to change from a 2" smooth bore to a fog pattern with the flip of a switch. This monitor shall allow a maximum flow rate of 1250 gpm @ 80 psi for fog.

The monitor and nozzle functions shall be controlled from the tip of the fly section and from each of the aerial control consoles. The monitor and nozzle controls at the tip, turntable, and pump panel station shall consist of three (3) individual spring-loaded, self-centering, weather resistant toggle switches.

The monitor shall be capable of wireless remote operator. The turntable operating position shall include an Akron SIT (switch interface transmitter) which shall allow for standard spring loaded toggle switches to be used as listed above.

The monitor and nozzle control functions shall be as follows:

- UP / DOWN
- LEFT / RIGHT
- STRAIGHT STREAM / FOG

The monitor shall be equipped with an "Auto Stow" feature that shall automatically deploy the monitor and shall also place the monitor into its stowed position when actuated by a toggle switch.

61.83 "RETRACTABLE" WATERWAY FEATURE

The waterway monitor shall be "retractable", allowing the monitor to be secured at the tip of the fly section for water tower operations, or at the end of the upper section for rescue operations. A steel, sliding monitor support assembly installed at the end of the fly section waterway tube shall guide the monitor along the base rails of the aerial fly section. A single, two position lever shall secure the monitor support assembly to either the fly section or mid section. The "monitor lock" shall be quickly movable and easily accessible at the tip of the aerial, when the ladder is fully retracted.

In "rescue mode", this feature shall allow the tip of the fly section to be placed very close to the edge of a building or window, minimizing the working and access heights "on" and "off" the ladder tip, without worrying about the monitor being damaged. Permanent monitor guards installed below the tip of the aerial are unacceptable.

To accommodate the movement of the "retractable" electric remote monitor, the monitor power/control cable for the electric monitor shall be equipped with a slide track to eliminate the need for plugs or reels.

Movable monitor designs that require a spring-rewind cord reel for the monitor power/control cord are unacceptable due to the additional cost, maintenance, weight and unattractive appearance associated with a cord reel permanently installed on the outside of the aerial base section.

61.84 LADDER CAPACITIES

The following ladder tip load capacities or approved equal shall be established with the truck level, the stabilizers fully extended and lowered to relieve the chassis weight from the axles. Capacities are based upon full extension and 360 degree rotation.

LADDER CAPACITIES IN POUNDS
(50 MPH WIND CONDITIONS / UNCHARGED WATERWAY)

DEGREES OF ELEVATION

	-5 to 20	20 to 30	30 to 40	40 to 80
Base Section	---	250	250	250

Lower Mid Section	---	---	250	250
Upper Mid Section	---	---	---	250
Fly Tip	500	500	500	500

61.85 WATER TOWER OPERATION

The ladder and water system shall be designed to permit the following or approved equal flows:

- 1000 GPM at 90 degrees to ladder centerline either side.
- 1000 GPM parallel to ladder centerline and as far below horizontal as nozzle design allows.
- 1000 GPM above ladder centerline as far as deck gun design allows.

**LADDER CAPACITIES IN POUNDS
(50 MPH WIND CONDITIONS / CHARGED WATERWAY)**

DEGREES OF ELEVATION

	-5 to 20	20 to 30	30 to 40	40 to 80
Base Section	---	250	250	250
Lower Mid Section	---	250	250	250
Upper Mid Section	---	---	---	250
Fly Tip	500	500	500	500

Due to the demand of firefighting situations, units that do not allow at least these aerial and water tower capacities shall not be acceptable.

61.86 AERIAL DEVICE SPECIFICATION PLACARD

A permanent label shall disclose the following information relative to the aerial device:

- Make
- Model
- Insulated or non-insulated
- Serial number
- Date of manufacture

- Rated capacity (s)
- Rated vertical height
- Rated horizontal reach
- Maximum hydraulic system pressure
- Hydraulic oil type and capacity

All other appropriate labels to ensure safe operation of the aerial device shall be permanently affixed in conspicuous locations.

61.87 AERIAL LADDER SIGNS

There shall be two (2) signs measuring approximately 16" tall x 133" long installed on the base section of the aerial ladder, one on each side. The signs shall be fabricated of 1/8" aluminum plate and shall be painted to match the aerial. The signs shall be large enough to accept a maximum lettering size of 12" high. Scotch-Lite without drop shadow lettering shall be provided on the signboard per the fire department requirements. The design of the lettering on the signboard shall be designed with a maximum text height of 12" and fit in the available area.

61.88 SPECIAL TOOLS PACKAGE

Special tools required for periodic maintenance of the aerial device shall be provided with the apparatus at the time of delivery. These tools shall be as follows:

- One (1) 1/2" drive, torque wrench
- One (1) 1/2" drive, 15/16" socket
- One (1) 1/2" box end wrench
- One (1) 9/16" box end wrench
- One (1) set of allen wrenches (5/64", 3/32", 1/8", 5/32", 3/16", 7/32", 1/4")

The special tools package above shall be provided as standard equipment by the aerial manufacturer.

61.89 MANUAL ROTATION DRIVE TOOL

As required by NFPA 1901, newest revision, one (1) manual rotation drive tool shall be provided as a means to rotate the turntable in the unlikely event of power loss. This drive tool shall be provided as standard equipment, and shall not be "optional" equipment.

61.90 AERIAL LADDER COLOR

The color of the aerial ladder shall be white IF APPLICABLE

61.91 OPERATIONS ON GRADES

The aerial unit can be operated in any plane up to 3.5 degrees out of level at full capacities. Operation beyond this limit shall be at operator's discretion.

62.0 DELIVERY:

Final delivery of the completed apparatus shall be made via drive-away F.O.B. City of Duluth Fleet Services, at which time Fleet and Fire Department personnel shall be instructed as to the proper use of the fire pump systems, as well as component systems by a Factory Representative. Factory training shall include intensive fire pump training session by a delivery engineer with extensive experience giving such sessions.

The Purchaser shall make all housing arrangements for the Delivery Engineer and provide him with transportation to and from lodging and nearest available airport or rental car agency (if it applies). The cost of all housing and other living expenses are to be paid for by the Delivery Engineer.

63.0 CHANGE ORDERS

All Change Orders will be documented in writing and will be accompanied by either a City of Duluth Purchase Order number of a properly signed requisition. Change Orders are to have the approval of the Fleet manager and the Duluth Fire Department Project Manager (Deputy Fire Chief).

64.0 SERVICE

Due to the importance of keeping this vital piece of firefighting apparatus in service with a minimum of downtime, the manufacturer of the aerial device shall maintain a network of service centers with factory trained personnel.

The aerial manufacturer shall also have a separate facility for service of units so they do not conflict with production units. The service facility shall carry an inventory of parts, separate from production parts.

65.0 WARNING DECALS

Warning decals shall be provided in appropriate locations to alert the operator of potential hazards and operating instructions. All warning labels shall be in general compliance with A.N.S.I. Z34.1 recommendations.

66.0 MANUALS

The aerial manufacturer shall provide the following manuals pertaining to the aerial device:

- Two (2) Operator's manuals
- Two (2) Parts manuals
- Two (2) Complete Electrical and Hydraulic Diagrams specific to this apparatus

67.0 OPTION #1

HYDRALIC REELS

Two (2) Hannay, Model 2016-17-18 electric rewind Hydraulic reel(s) with a capacity of 100 feet of twin hydraulic hose shall be provided and mounted at a location determined by the customer.

Two (2) Hannay 4-way stainless steel roller assembly(s) shall be provided on the specified reel(s). The roller assembly opening shall be the full width of the reel drum. Support brackets for the roller assembly shall be bolted to the hose reel.

HYDRAULIC HOSE - FEED LINE 6'

Two (2) 6' length(s) of twin hydraulic hose with quick-connect fittings and spring hose retainer shall be provided to allow the reel(s) to be powered by the hydraulic power unit.

One hundred feet (100') of Parker, high pressure, twin hydraulic hose for Hurst equipment shall be provided on the hydraulic reel.

Reels shall have rewind buttons attached to the forward and rearward corresponding compartment walls.

GENERATOR 240 VOLT RECEPTACLE

One (1) 240 volt twist-lock female receptacle with spring activated cover shall be provided and installed on the rear wall of the D1 compartment. Receptacle power shall be acquired from the apparatus generator and turned on by a switch located in the compartment.

68.0 OPTION #2

Bidder shall provide complete descriptive literature and a sample of the hose being bid along with price for the following. Hose sample shall be at least 6 inches in length:

1000 feet (10-100 foot lengths) of fire service 4 inch supply hose with Storz quick connect couplings. Couplings shall have a locking mechanism to prevent accidental uncoupling of hose. Coupling shall be easily removable with Allen wrench or similar tool. Supply hose to be yellow in color.

700 feet (14-50 foot sections) of fire service 2 ½" double jacketed polyester, rubber lined or approved equal supply/attack hose. Couplings shall be aluminum or other lightweight material with National Standard Thread. Couplings to be attached to hose via internal brass expander rings or other approved system. Hose to be White in color

400 feet (8-50 foot sections) of fire service 1 ¾" double jacketed polyester, rubber lined or approved equal attack hose. Couplings shall be aluminum or other lightweight material with National Standard Thread. Couplings to be attached to hose via internal brass expander rings or other approved system. Hose to be White in color

150 feet (3-50 foot sections) of fire service 1 3/4" rubber or approved equal attack hose. Couplings shall be aluminum or other lightweight material with National Standard Thread. Couplings to be attached to hose via internal brass expander rings or other approved system. Hose to be Yellow in color

69.0 OPTION #3

Bidder shall provide a guaranteed price for second identical apparatus if vehicle is ordered before December 31, 2012.