

DULUTH FIRE DEPARTMENT
FIRE TRUCK
TRIPLE COMBINATION PUMPER

May 26, 2015

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The City of Duluth is requesting bids for a Fire Truck, triple combination pumper, 1500 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:

1.0 LETTER OF EXCEPTIONS

Any proposals 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 be substituted.

2.0 GENERAL REQUIREMENTS

It is the intent of these specifications to cover the furnishing and delivering to the City, 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 to 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 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.

4.0 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 be 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 cannot 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 their design experience/capabilities and manufacturing ability to carry out the terms of the contract.

5.0 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 firefighting 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.

6.0 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.

OPTIONS: Bidders may submit pricing based on extending this warranty period to three (3) years and to five (5) years.

25-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 TWENTY FIVE (25) 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.

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.

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.

7.0 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.

8.0 PROPOSAL SIGNATURES REQUIRED

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

9.0 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.

10.0 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.

11.0 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:

11.1 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.

11.2 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, hard suction hose 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.

NOTE: The floor of hosebed will be no more than 60" above the ground level.

11.3 PUMP ENCLOSURE & PUMP SYSTEM:

Mid-ship modular pump enclosure/compartments, 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.

11.4 ADDITIONAL OPTIONAL FEATURES:

Other optional features, as 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.

11.5 COMPLIANCE:

The drawing as described is part of the Bid Proposal.

12.0 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 City of Duluth reserves the right to waive informalities and to reject any and all bids. The City also reserves the right to accept any item in the bid found to be of superior quality or otherwise preferred by the purchaser.

Price will not be the only basis for award. The competency and responsibility of bidder along with the content of bid specification, accuracy/quality of bid drawing(s), prior experience with specified construction methods, and previous use of stainless steel as a construction material will also be considered. The City does not, in any way, obligate itself to accept the lowest or any bid.

Bidders must state any exceptions to the specifications in their Bid. 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 Purchasers 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

13.0 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.

14.0 WEEKLY DIGITAL PHOTOS PROVIDED TO CUSTOMER

The manufacturer will provide, on a weekly or as requested basis, from the time the chassis arrives 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.

15.0 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.

16.0 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.

17.0 ALTITUDE REQUIREMENTS:

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

18.0 ROADABILITY:

PER NFPA 1901.

19.0 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 **THREE 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 **THREE 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.

20.0 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.

21.0 PRODUCTION DRAWINGS:

Completed delivery manuals (3 Copies) shall also include production drawings of all individual apparatus body fabrication.

22.0 DELIVERY/CONSTRUCTION:

The period for construction of the vehicle shall be clearly stated, not to exceed 300 working days, and shall include the time required for delivery of the chassis to the bidder's factory.

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.

23.0 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.

24.0 APPARATUS SIZE - CAPACITY – SEATING

Total overall length of apparatus shall not exceed 30 ft., highest point of apparatus shall not exceed 120 inches, total overall width of apparatus shall not exceed 101 inches, chassis wheelbase shall not exceed 180 inches (cab to axle of approx 70”), and GVWR shall be a minimum of 42,000 lbs.

A total of four (three with SCBA) seating positions to be provided, "Fully Enclosed", with approved seat belts. Two seating positions to be located inside forward chassis cab and two (2) 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.

25.0 CUSTOM STYLE CHASSIS

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

CHASSIS: New; 4 Door Custom-built “tilt style” LFD Cab Design

25.1 ENGINE

The chassis engine shall be a Cummins ISL9 engine. The ISL9 engine shall be an in-line six (6) cylinder, four cycle diesel powered engine. The engine shall offer a rating of 450 horse power at 2100 RPM and shall be governed at 2200 RPM. The torque rating shall feature 1250 foot pounds of torque at 1400 RPM with 543 cubic inches (8.9 liters) of displacement.

The ISL9 engine shall feature a VGT™ Turbocharger, a high pressure common rail fuel system, fully integrated electronic controls with an electronic governor, and shall be EPA certified to meet the 2013 emissions standards using cooled exhaust gas recirculation and selective catalytic reduction technology.

The engine shall include an engine mounted combination full flow/by-pass oil filter with replaceable spin on cartridge for use with the engine lubrication system. The engine shall include Citgo brand Citgard 500, or equivalent SAE 15W40 CJ4 low ash engine oil which shall be utilized for proper engine lubrication.

A wiring harness shall be supplied ending at the back of the cab. The harness shall include a connector which shall allow an optional harness for the pump panel. The included circuits shall be provided for a tachometer, oil pressure, engine temperature, hand throttle, high idle and a PSG system. A circuit for J1939 data link shall also be provided at the back of the cab.

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.

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

25.1.1 CAB ENGINE TUNNEL

The cab interior shall include an integrated engine tunnel constructed of 5052-H32 Marine Grade, 0.19 of an inch thick aluminum. The tunnel shall be a maximum of 41.50 inches wide X 25.50 inches high.

25.1.2 DIESEL PARTICULATE FILTER CONTROLS

There shall be two (2) controls for the diesel particulate filter. One (1) control shall be for regeneration and one (1) control shall be for regeneration inhibit.

25.1.3 ENGINE PROGRAMMING HIGH IDLE SPEED

The engine high idle control shall maintain the engine idle at approximately 1000 RPM when engaged.

25.1.4 ENGINE HIGH IDLE CONTROL

The vehicle shall be equipped with an automatic high-idle speed control. It shall be pre-set so when activated, it will operate the engine at the appropriate RPM to increase alternator output. This device shall operate only when the master switch is activated and the transmission is in neutral with the parking brake set. When automatically engaged the high idle shall disengage when the operator depresses the brake pedal, or the transmission is placed in gear, and shall be available to manually or automatically re-engage when the brake is released, or when the transmission is placed in neutral.

25.1.5 ENGINE PROGRAMMING ROAD SPEED GOVERNOR

The engine shall include programming which will govern the top speed of the vehicle.

25.2 AIR COMPRESSOR

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

25.3 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 to be furnished.

25.4 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 extent 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 Neiderman compatible. The exhaust system shall include a diesel particulate filter (DPF), a diesel oxidation catalyst, and a selective catalytic reduction catalyst (SCR) to meet current EPA standards. The selective catalytic reduction catalyst utilizes a diesel exhaust fluid solution consisting of urea and purified water to convert NOx into nitrogen, water, and trace amounts of carbon dioxide. The solution shall be injected into the system through the decomposition tube between the DPF and SCR.

The system shall utilize 0.07 inch thick stainless steel exhaust tubing between the engine turbo and the DPF. Zero leak clamps seal all system joints between the turbo and DPF. The DPF, the decomposition tube, and the SCR canister through the end of the tailpipe shall be connected with zero leak clamps. The discharge shall terminate horizontally on the right side of the vehicle ahead of the rear tires. The exhaust system shall be mounted under the frame with the DPF and the SCR canisters horizontally stacked with the SCR inboard of the DPF.

The exhaust tubing between the engine turbo and the diesel particulate filter (DPF) shall be wrapped with a thermal cover in order to retain the necessary heat for DPF regeneration. The exhaust wrap shall also help protect surrounding components from radiant heat which can be transferred from the exhaust

25.4.1 DIESEL EXHAUST FLUID TANK

The exhaust system shall include a molded cross linked polyethylene tank for Diesel Exhaust Fluid (DEF). The tank shall have a capacity of six (6) usable gallons and shall be mounted on the left hand side of the chassis frame behind the batteries below the frame.

The DEF tank shall be designed with capacity for expansion in case of fluid freezing. Engine coolant, which shall be thermostatically controlled, shall be run through lines in the tank to help prevent the DEF from freezing and to provide a means of thawing the fluid if it should become frozen.

The tank fill tube shall be routed under the rear of the cab with the fill neck and splash guard accessible in the top rear step.

25.5 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.

25.6 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 cocks shall be so designed as to not open accidentally due to vibration.

Radiator coolant and hot water type heater hoses to be of Gates blue stripe, with constant tension hose clamps.

A remote engine coolant overflow bottle shall be provided in the case of over filling the coolant system. The overflow bottle shall capture the expansion fluid or overflow rather than allow the fluid to drain on the ground. The overflow bottle provided on the cooling system shall only be a catch bottle and shall not return excess coolant back into the surge tank.

25.7 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.

25.8 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.

25.9 ENGINE BLOCK HEATER

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 on the drivers side of the apparatus.

25.10 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.

25.11 CAB PAINT:

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

Chassis, including: frame rails, cross members, axles, and suspension, to be painted Black.

26.0 TRANSMISSION

The transmission shall be a heavy duty Allison Gen IV model EVS 4000PR electronic, torque converting, automatic transmission with retarder, PTO provisions, and necessary filters shall be provided.

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

The transmission shall include two (2) internal oil filters and Castrol TranSynd™ synthetic TES 295 transmission fluid which shall be utilized in the lubrication of the EVS transmission. An electronic oil level sensor shall be included with the readout located in the shift selector.

The transmission, upon start-up, will automatically select a four (4) speed operation. The fifth speed over drive shall be available with the activation of the mode button on the shifting pad. The transmission retarder control shall be activated by letting off of the throttle pedal. Percentage of activation shall be determined after bid award but prior to ordering of the chassis by the Bidder. The retarder shall be activated 100% @2 PSI by applying the brake pedal.

The transmission retarder shall have a master "On/Off" switch on the instrument panel. A red indicator light shall be provided to warn that the transmission is being over worked.

The retarder shall be wired to the brake lights so they are energized when the retarder is slowing the vehicle down.

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.

26.1 TRANSMISSION ACCESSORIES

Transmission shall include a Fire/Emergency PTO provisions, mounting pads left and right sides, designed for (not factory equipped with) mounting of Chelsea 277 style of PTO.

Electronic Transmission Access Connector to be provided.

TranSynd synthetic automatic transmission fluid is to be furnished.

Transmission to include magnetic drain plug, Dash Mounted Push-Button Electronic shift controls, oil check/fill tube, and Electronic Oil Level Check feature.

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

27.0 INDEPENDENT FRONT SUSPENSION AND EQUIPMENT

Independent Front Suspension shall be provided with a minimum weight rating of 18,000 lbs. or rating suggested by manufacturer awarded bid. Front axle shall have all heavy duty parts for long life and shall have the largest brakes allowed on for that system. Camber at load shall be zero degrees for optimum tire life.

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 disc brakes shall be used.

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.

28.0 REAR AXLE, SUSPENSION AND EQUIPMENT

The rear axle shall be a Meritor brand “single” rated at no less than 27,000 lbs. 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 65 miles per hour.

Driver controlled traction differential, with differential lock control valve, will be furnished. Control will be 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”.

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

The rear suspension shall be a Hendrickson Model FMX 242 air ride suspension with a ground rating of 24,000 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

28.1 TIRE CHAINS

Onspot brand six (6) strand automatic ice chains shall be installed on the rear axle of the chassis to provide instant traction while traveling on ice and snow at speeds below 35 MPH.

28.2 TIRE CHAINS ACTIVATION

The tire chain system shall be activated by a locking switch on the dash to deter accidental activation. The light on the switch shall illuminate when the tire chains are engaged. The tire chains shall be interlocked with the transmission and shall engage only if the vehicle is traveling 30 MPH or less. After traveling over 30 MPH, the vehicle must be reduced to a speed below 5 MPH for the tire chains to be engaged or re-engaged.

In addition 2 sets of 2 tire chains (total of 4 chains), one for each of the outside rear duals, built specifically for the size tires of this apparatus shall be supplied. Chain cross links to be “V” bar style.

29.0 FRONT AND REAR TIRES AND WHEELS

Front tires shall be Continental HSU2 315/80R 22.5. The front tire stamped load capacity shall be 17,640 pounds per axle with a speed rating of 75 miles per hour.

Rear tires shall be GOODYEAR 12R-22.5 16PR “H” tubeless radial G622 RSD mixed service tread.

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. Rear inside duals to have air valve extensions provided and installed.

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.

29.1 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.

29.2 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.

30.0 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.

FMVSS-121 compliant brakes must be furnished, Wabco 4S/4M ABS (without traction control enhancement) 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.

30.1 HEATED AIR DRYER

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

30.2 AIR RESERVOIRS

Steel air reservoirs shall be furnished that are sized to handle the braking system. One (1) additional air tank with approximately 1400 cubic inch displacement shall be provided for the use of powering air tools.

30.3 BRAKING PERFORMANCE AND PARKING BRAKE

The apparatus parking brakes shall operate the FRONT and 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. 28 degree street) when the vehicle is performing any of its designed stationary functions.

31.0 FRAME AND WHEELBASE

Chassis outboard SINGLE 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 175", with a minimum cab-to-axle distance of 65". Rear of axle frame rails shall be "square-end", extending at least 60" behind centerline of rear axle.

32.0 BUMPER/TOW HOOKS

The chassis shall be equipped with a severe duty front bumper constructed from structural steel channel. The bumper material shall be 0.38 thick ASTM A36 steel which shall measure 12.00 inches high with a 3.05 inch flange and shall be 99.00 inches wide with angled front corners.

The bumper shall be primed and painted as specified:

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 3/4" rubber jacket hose, couplings, and nozzle. Bumper extension shall be heavy duty built to resist sagging and fatigue.

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 attached to the top bumper flange with stainless steel bolts 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) tow hooks, front frame mounted shall be included.

33.0 FUEL TANK

One (1) minimum 50 gallon capacity stainless steel fuel tank 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 located as close to the engine as possible.

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

34.0 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 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. The cab tilt control receptacle shall be located under the Federal Q siren platform to prevent cab tilt without tipping siren.

All cab and crew entry doors shall have electric windows controlled at the window and at the driver side instrument panel.

All cab glass shall be tinted, with front doors to have heated glass if available.

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

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 an access cover at the side or rear 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.

Four (4) cup holders to be provided and installed. Two (2) in front and two (2) in rear.

35.0 CAB EXTERIOR

Four (4), exterior NFPA compliant tubular hand-grab rails shall be furnished. 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.

Handle type, placement, and options to match existing engine company. Handrail brackets shall have 3" standoff to allow for fire gloves and stainless scuff plates attached to cab.

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.

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

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

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

Paint schematic, single color, red, to match existing fleet. Paint numbers to be provided upon award. Chassis, including: frame rails, cross members, axles, and suspensions, to be painted black.

35.1 MIRRORS

Retrac Aerodynamic West Coast style dual vision mirror heads model 613315 shall be provided and installed each of the front cab doors. The mirrors shall be mounted via 1.00 inch diameter tubular stainless steel arms to provide a rigid mounting to reduce vibration. The mirrors shall measure 8.00 inches wide X 19.00 inches high and shall include an integral convex mirror in the mirror head below the flat glass to provide wider field of vision. The flat and convex mirrors shall be motorized with remote horizontal and vertical adjustment. The control switches shall be mounted within easy reach of the driver. The flat and convex mirrors shall be heated for defrosting in severe cold weather conditions. The mirror backs shall be constructed of vacuum formed chrome plated ABS plastic housings that are corrosion resistant and shall include an amber marker light. The mirrors shall be manufactured with the finest quality non-glare glass. The heat for the rearview mirrors shall be controlled through a rocker switch on the dash in the switch panel.

35.1.1 AUXILIARY EXTERIOR MIRRORS

The cab exterior shall include three (3) Retrac convex mirrors. The mirrors shall measure 5.50 inches X 7.50 inches.

Three (3), (1) passenger side down-view mirror shall be furnished above officer's door. Two (2), one on each side in front of rear passenger doors to allow for occupants to see oncoming traffic before exiting vehicle.

35.2 SIDE SCENE LIGHTS

The cab shall include two (2) Whelen model Pioneer PCPSM1C semi-recess mount lights installed one (1) on each side of the cab. Each lamp head shall have two (2) 12 volt high intensity LED panels. Each lamp head shall be mounted within a semi-recessed fifteen (15) degree housing featuring a chrome flange. The lamp heads shall be powder coated white.

35.2.1 SIDE SCENE LIGHT LOCATION

The scene lighting located on the left and right sides of the cab shall be mounted rearward of the cab "B" pillar in the 10.00 inch raised roof portion of the cab between the front and rear crew doors.

35.2.2 SIDE SCENE ACTIVATION

The scene lights shall be activated by two (2) rocker switches located in the switch panel, one (1) for each light. The two door switches on each side of the cab and with setting the parking brake.

36.0 CAB INTERIOR AND SEATING

The cab and dash fascia shall be a flat faced design to provide for ease of maintenance. The engine tunnel shall be padded and covered with a material that is resistant to oil, grease, and mildew. 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.

Extreme Climate thermal cab insulation shall be provided.

Heater, defroster and air conditioner to be furnished for cab. Air conditioner components shall be on cab roof.

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

A separate rearward facing heater that is mounted on the floor in the rear of the cab under the specified interior cabinet shall be provided and installed with heat and fan controls on the unit.

Drivers seat shall be a H.O Bostrom Sierra Air or approved equal with 5" travel option, fore and aft adjustment, suspension cover, and Black Duracoat Vinyl seat covering. Space below seat shall incorporate the largest heater possible with an on/off switch on the dash within easy reach of the driver similar to current engine.

Officers seat shall be a H.O. Bostrom Tanker 450 Air or approved equal with 5" travel option, fore and aft adjustment suspension cover, cavity cover, and Black Duracoat Vinyl seat covering. SCBA bracket shall be Smartdock Gen 2 for Scott 4.5 SCBA. Space below seat shall incorporate the largest heater possible with an on/off switch on the dash within easy reach of the officer similar to current engine.

Rear outboard forward facing seats shall be two (2) H.O. Bostrom Tanker 400 Air or approved equal. They shall have cavities for Scott 4.5

SCBA, with cavity covers, and suspension covers. The seat covering shall be Black Duracoat Vinyl. 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.

Rear outboard rear facing seats shall be two (2) H.O. Bostrom firefighter series. The seat shall feature a tapered and padded seat and cushion. The seat and cushion shall be spring load hinged and compact in design for additional room and shall remain in the stored position until occupied.

Five (5), large 7" 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.

Adjustable "tilt" and "telescope" steering wheel column is to be furnished with steering wheel.

36.1 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

36.2 RADIO

One AM/FM/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/Weatherband Radio so as to support preset stations and clock, if any.

37.0 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:

37.1 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.

37.2 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%.

37.3 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.

37.4 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.

37.5 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.

37.6 NON-REMOVABLE IGNITION DEVICE

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

38.0 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.

38.1 "OPEN DOOR" INDICATOR

An indicator light shall be furnished, installed on cab dashboard, 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".

38.2 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.

38.3 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.

- Engine Oil
- Engine Coolant
- Chassis Transmission Fluid
- Pump Transmission Lubrication Fluid
- Pump Primer Fluid
- Drive Axle Lubrication Fluid
- Air Conditioning Refrigerant
- Air Conditioning lubrication oil
- Power Steering Fluid
- Cab Tilt Mechanism Fluid
- Transfer Case Fluid
- Equipment Rack Fluid
- Air Compressor System Lubricant
- Generator System Lubricant
- Front Tire Cold Pressure
- Rear Tire Cold Pressure

38.4 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.

38.5 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.

39.0 CHASSIS MODIFICATIONS SPECIFIC FOR PUMPER APPLICATION:

39.1 SPEED GOVERNOR TEST

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

39.2 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.

39.3 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.

39.4 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.

39.5 SUSPENSION LUBRICATION ACCESS

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

39.6 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.

39.7 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.

39.8 SCBA BRACKETS FOR FORWARD FACING SEATS

Three (3), each, Smartdock Gen 2 SCBA mounting brackets to be furnished, installed in recessed area of each forward facing seat back cushion of the chassis that is intended for SCBA use. NFPA compliant collision restraint straps or brackets as qualified for forward facing seating positions to be provided on each bracket.

39.9 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 aluminum treadplate and have a grip strut insert in the bottom step.

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

A large slip resistant handrail shall be provided adjacent to all door openings to assist entrance and exit of the cab.

A handrail shall 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.

39.10 STAINLESS STEEL UNDER STRUCTURES

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

39.11 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.

40.0 CHASSIS MODIFICATIONS

40.1 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.

40.2 SWITCH PANEL WITH POWER CONTROL

This vehicle/apparatus shall be equipped with a HED 8-Button lighted switch panel with Multiplexed relay control or approved equal. 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.

40.3 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.

40.4 GRILLE 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.

There shall also be TWO (2) Whelen 500 series TIR6 rectangular flush mounted emergency LED lights complete with associated 5E chrome surround flanges to be furnished and installed on radiator grille guard. Lights to be activated by the same switch as above.

Final location to be determined at preconstruction meeting.

40.5 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.

40.6 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.

Four (4), 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 at rear edge of cab near roof and runningboard. Lights to be activated by a same illuminated rocker switch as above lights.

Lights to be completely sealed for weather resistance.

40.7 LIGHTBAR

One (1) Whelen FN72VLED 72" lightbar with permanent mounting brackets installed on the forward portion 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.

One (1) Opticom Emitter shall be provided and installed in the center of the above light bar 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.

40.8 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).

40.9 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.

40.10 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.

40.11 SIREN ACTIVATION

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

40.12 UNDER CAB LIGHTING

Six (6), 12" LED strip light 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. Lights to be completely sealed for weather resistance. Lights to be activated by setting of the parking brake.

40.13 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.

40.14 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. A light shall be provided above the rear wheel also to aid in visibility. The lights shall turn on with activation of the turn signal switch.

40.15 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.

40.16 800 MHz RADIO, ANTENNA & CABLE

One (1) each, radio quarterway whip style antenna shall be furnished, along with appropriate cable, both to be compatible with the furnished radio. 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. Furnish and install the following Motorola:

Model#	Description
M21URM9PW1AN	XTL 2500 "MANTAREY" Main Model
G442	ADD: XTL 2500 Control Head, (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(2)Two
G335	Antenna ¼ Wave (764-870MHZ)
G114	Enhanced Digital ID Display
G24	2 Year E.S.P. (3-year total warranty)

40.17 MOBILE DATA COMPUTER 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 (including p/n 70288-70-TMS & 62474)

Associated mounting hardware to mount as specified

40.18 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) 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.

One (1) multichannel base station and two (2) headsets with chargers for the firefighter positions will also be included. The firefighter positions do not need to talk to dispatch they shall be intercom only. Final mounting and locations shall be decided at preconstruction. Headsets shall be the UHW (Under the Helmet) model.

Headset system shall be direct connected to the battery system so as to have minimal delay connecting when turning on headsets.

40.19 INTERIOR COMPARTMENTS

One (1) interior compartment shall be furnished and installed. The approximate size shall be determined at the pre bid meeting. Compartment shall be located between rear facing seats. It shall have mesh fronts with non-snapping fasteners. One (1) shelf shall be provided for each compartment.

41.0 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 dual battery system. Battery charger to provide 40 amps for a dual 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".

41.1 120 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.

41.2 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", and "BLOCK HEATER". Customer will determine location, upon installation of the electrical console.

41.3 REAR INTERIOR 120-VOLT DUPLEX SHOREPOWER RECEPTACLES

One (1), 120-volt duplex plug-in receptacle boxes shall be furnished, inside the chassis cab, on the rear interior wall, between forward facing seats, 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 SHOREPOWER." There shall also be a dual power outlet in the passenger side #1 compartment for plugging in medical equipment for charging.

42.0 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.

42.1 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.

42.2 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.

43.0 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.

43.1 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 EXCHANGE OEM FRONT SEATS, WITH H.O. BOSTROM AIR RIDE SEATS

Two (2) each, Bostrom air-ride bucket style seats with 5" travel option shall be furnished, in exchange for the OEM chassis driver and passenger's air ride front bucket style seats. Driver seat to be Sierra Air non-SCBA style, and passenger's (officer's) seat to be Tanker-450 Air SCBA type with Smartdock Gen 2 SCBA bracket. Seats to be provided with black or dark gray Duracoat Vinyl seat covering, a suspension cover, and a passenger's seat SCBA cavity cover. Original Equipment Manufacturer's (OEM) 3-point lap/shoulder straps in RED, as qualified for forward facing seating positions to be employed.

Officer seat shall receive 5" fore-aft adjustment tracks.

Two (2) each, Bostrom Tanker-400 CT fixed bucket style seats shall be furnished, in exchange for the chassis original equipment rear crew seats. Both of the H.O. Bostrom replacement crew seats to be SCBA type with **Smartdock Gen 2** SCBA bracket, provided with black or dark gray Duracoat Vinyl seat covering and recessed cavities to accommodate Scott 4.5 SCBA's. Original Equipment Manufacturer's (OEM) 3-point lap/shoulder straps in RED, as qualified for forward facing seating positions to be employed. The seats will be forward facing with at least 20" between them. They will be set back as far as possible to the rear wall.

NOTE: THE BASES OF THE REAR FORWARD FACING CREW SEATS ARE "AIR-RIDE".

45.0 FIRE PUMP SYSTEM:

45.1 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 running boards always remaining in alignment with apparatus body rubrails.

45.2 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.

45.3 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. The discharge manifold itself shall contain a minimum of the following outlets:

Four (4), 8-bolt flanged large flow capacity outlets

Two (2), 4-inch Victaulic mechanical pipe joint outlets

One (1), 3" TIPT threaded riser outlet

Seven (7), 2-1/2" TIPT threaded riser outlets

One (1), 2" TIPT threaded riser outlet

NOTE: Due to the likelihood of high pressure deformation, manifolds fabricated of square or rectangular tubings 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.

46.0 WATEROUS TWO-STAGE 1500 GPM CMU MODEL PUMP

A 1500 gallon per minute, Waterous 2-stage Model CMC10-1500, 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 its 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

46.1 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.

46.2 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.

46.3 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.

46.4 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.

46.5 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.

46.6 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".

46.7 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.

46.8 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.

46.9 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.

46.10 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.

46.11 FLAME PLATED IMPELLER HUBS

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

46.12 PUMP SEALS

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

46.13 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.

46.14 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.

46.15 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.

46.16 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.

46.17 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 matching location on the doghouse of current engine company. 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.

46.18 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.

46.19 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".

46.20 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.

46.21 DEACTIVATE WITH PUMP SHIFT

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

46.22 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.

46.23 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 officer's 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.

46.24 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.

47.0 PUMP PLUMBING

47.1 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.

47.2 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.

47.3 INTAKE CAPS

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

47.4 INTAKE STRAINERS

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

47.5 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.

47.6 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.

48.0 PUMP INTAKES

48.1 PASSENGER SIDE 6" ELECTRONIC 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: 5" 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 electric gate valve with crank override 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 pre-connected inlet adapter. Manual override wrench to be provided. Manual override 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.

48.2 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,

48.3 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 pre-connected inlet adapter.

49.0 PUMP DISCHARGES:

49.1 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.

49.2 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.

49.3 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 running board riser. Rear body discharge outlets, where specified, will have bleeder valves inboard rear body panel, and control exterior above tailboard.

49.4 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.

49.5 SELF-BLEEDING DISCHARGE CAPS

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

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

One (1), 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.

49.7 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.

49.8 REAR 2 1/2" DISCHARGE, PASSENGER SIDE OUTBOARD, 2-1/2" NST OUTLET

One (1), rear outboard (passenger'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" stainless steel plumbing assembly (extending through tank and rear body panel), 3/4" bronze bleeder valve located inboard rear body panel with control knob and with bleeder discharge exterior below body, 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 located on driver's side operator's panel and appropriate cast iron pump discharge fitting.

49.9 REAR 2 1/2" DISCHARGE, DRIVER SIDE INBOARD, 1-1/2" NST OUTLET

One (1), rear (inboard driver's side) 2 1/2" discharge to be provided with: 1-1/2" NST chrome plated brass rocker lug cap with chain, 1-1/2" NST male x 2 1/2" iron pipe female chrome plated brass outlet adapter, 2 1/2" stainless steel plumbing (extending through tank and rear body panel), 3/4" bronze bleeder valve located inboard rear body panel with control knob and with bleeder discharge exterior below body, 2 1/2" Waterous FULL FLOW 1/4-turn discharge valve with chrome plated ball (located inside pump compartment), push-pull chrome T-handled "twist-to-lock" discharge control handle located on driver's side operator's panel and appropriate cast iron pump discharge fitting.

49.10 REAR 1 3/4" DISCHARGE, DRIVER SIDE OUTBOARD, 1-1/2" NST OUTLET

One (1), rear (outboard driver's side) 2 1/2" discharge to be provided with: 1-1/2" NST chrome plated brass rocker lug cap with chain, 1-1/2" NST male x 2 1/2" iron pipe female chrome plated brass outlet adapter, 2 1/2" stainless steel plumbing (extending through tank and rear body panel), 3/4" bronze bleeder valve located inboard rear body panel with control knob and with bleeder discharge exterior below body, 2 1/2" Waterous FULL FLOW 1/4-turn discharge valve with chrome plated ball (located inside pump compartment), push-pull chrome T-handled "twist-to-lock" discharge control handle located on driver's side operator's panel and appropriate cast iron pump discharge fitting.

49.11 DELETE

49.12 TOP DELUGE DISCHARGE, 3-1/2" ELECTIRC VALVE, 3" PIPE OUTLET

One (1), center top (above pump) gated deluge discharge to be provided with: 3" threaded outlet, 3" i.d. threaded pipe riser, 3/4" bronze "auto-drain" valve located inboard pump panel with discharge below pump compartment, 3-1/2" Waterous "ELECTRIC ACTUATOR OPERATED" 1/4-turn discharge valve with chrome plated ball spring loaded self-adjusting seal assembly (located inside pump compartment), operator's panel mounted valve control console with spring loaded open/close toggle switch and "OPEN/MULTIPLE-TRANSITION/CLOSE" indicator lights, and appropriate identification nameplate. Where the "optional" extendible deluge riser pipe is not purchased (see following option), the exposed deluge riser piping and base of monitor shall be covered with a polished 4-way aluminum treadplate cylindrical shroud.

49.13 ELKHART COBRA RF - REMOTE WIRELESS CONTROLLED MONITOR

One (1) Elkhart Cobra wireless remote deluge monitor shall be furnished and installed. Monitor package shall be equipped with standard duty monitor, 7010 panel controller, 7015 hand held controller, stacked tips, and stream shaper. Monitor shall be equipped with 3" flange.

One (1), Elkhart 12-volt electric actuator operated "Extender" telescoping deluge riser mount to be furnished, with Victaulic inlet and side wall clamp kit. Extender to be installed on specified deluge riser piping, designed to vertically elevate the specified deluge monitor, 18" above the retracted position. Flow capacity of the Extender shall be up to 1250 GPM.

49.14 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.

49.15 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.

49.16 HOSE REEL DISCHARGE(S)

49.16.1 HOSE REEL 1" DISCHARGE

One (1) booster hose reel(s) 1" gated discharge to be provided, each with: 1" i.d. high pressure wire reinforced discharge hose extending from hose reel inlet to hose reel discharge valve, one (1), 1" ball style 1/4-turn full flow bronze bodied self-locking discharge valve (located inside pump compartment), and push-pull chrome "twist-to-lock" discharge control handle with recessed color coded nameplate located on the pump operator's control panel.

49.16.2 HOSE REEL AIR BLOW-OUT LINE

One (1), 1/4" i.d. hose reel "blow-out" air line(s) to be furnished, each to include: pump panel mounted Class One 3/8" 1/4-turn blow-out valve, and necessary 1/4" nylon air line piping to a point immediately down stream of specified booster hose reel discharge valve. Hose reel blowout system to be piped to chassis air system, with a manual emergency shut-off valve located inside pump compartment, a one-way check valve located upstream blow-out valve, and second one-way check valve at booster discharge valve.

49.16.3 HANNAY REEL

One (1), Hannay electric rewind type 1" i.d. booster hose reel to be furnished. Reel is to be steel construction with 12-volt electric motor rewind and friction brake. Electric rewind push button switch to be furnished, located adjacent to hose reel per Customer approval.

49.16.4 MOUNTING LOCATION

Reel is to be permanently mounted interior of the passenger side upper pump enclosure. Hose reel is to be positioned above the fire pump system, with deployment available to the passenger side of vehicle.

49.16.5 HOSE

150 ft. of 1" i.d. Fire Department 800 psi booster hose, coupled in one (1) 100-ft. length and one (1) 50 ft. length, with 1" CHT couplings to be furnished.

49.16.6 NOZZLE

One (1) Elkhart model SM-3FG 1" pistol grip nozzle to be furnished.

49.16.7 HOSE REEL INBOARD A HINGED DOOR PANEL

The specified booster hose reel is to be located inboard of a horizontally hinged reel access door.

Door is to have a horizontal slotted opening, in horizontal and vertical alignment with the top layer of booster hose, so that hose may be deployed and be rewound without difficulty.

49.16.8 HOSE REEL ACCESS DOOR

The booster hose reel is to be accessed through an overlapping horizontally hinged hose reel cavity access door. Reel door is to remain closed during hose deployment to the left, right, and downward away from the apparatus.

Door is to be provided with positive stainless steel latch assembly, and stainless steel piano hinge.

49.16.9 HOSE ROLLERS & NOZZLE BRACKET

A polished stainless steel 4-way "encapsulated" hose roller assembly is to be furnished, surrounding the slotted opening on the exterior surface of the reel access door. Roller assembly is to provide guidance for booster hose deployment. A fabricated stainless steel nozzle mounting bracket is to be provided, located adjacent to the hose reel access door, conveniently positioned so as to positively retain the nozzle and attached booster hose, accessible while standing at ground level.

49.16.10 4-WAY HOSE ROLLER GUIDES

One (1) each chrome and polished stainless steel 4-way "encapsulated" hose roller assembly(ies) are to be furnished outboard of the hose reel, providing roller guide for booster hose deployment.

Each roller assembly shall consist of four (4) chrome corner brackets, two (2) vertical, and two (2) horizontal 1-1/4" diameter stainless steel roller tubes with end bearings. Width of encapsulated opening shall be the same as or greater than the width between hose reel discs.

49.17 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.

49.18 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.

49.19 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.

50.0 PUMP CONTROLS/ACCESS/LIGHTS

50.1 CAPTAIN ELECTRONIC PRESSURE GOVERNOR

The apparatus shall be equipped with a Class 1 "Captain" model #105244 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.

50.2 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.

50.3 PUMP ENCLOSURE – DRIVERS/PASSENGER 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 44", with "side-to-side" 82", and height (above running boards) 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.

Pump controls shall be covered by a full height roll up door enclosure. Door shall be ROM Robinson roll up shutter and match other doors on the apparatus.

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

The passenger side of the pump enclosure shall be covered by a full height roll up door enclosure. Door shall be ROM Robinson roll up shutter and match other doors on apparatus including door bundle enclosure. Enclosure shall consider access and use of cord reel and booster line.

50.4 PUMP PANEL OVERLAYS - DRIVER SIDE AND PASSENGER SIDE

Driver's and passenger's side pump panels to be stainless steel overlaid with black Line-X style coating, 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. All mounting holes and control holes drilled

prior to finish painting and final installation. All discharge outlet and suction inlet holes to be concentric/custom-fit around extension fittings, trimmed with extruded rubber channel.

50.5 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.**

50.6 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.

50.7 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.

50.8 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.

50.9 PUMP COMPARTMENT LIGHT

Two (2), 6" round surface mount 12-volt LED interior pump compartment light to be furnished, mounted ceiling of interior pump compartment. Lights to be clear. Light to be activated by light lens mounted push-button switch.

50.10 DRIVER AND PASSENGER SIDE PUMP PANEL LED STRIP LIGHTS

Lighting shall be LED Night Stik lighting. It shall 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.

The driver side light fixture shall be activated by shifting the pump into gear or pump panel door switch, the specified passenger side pump panel lights shall be activated by a pump panel door switch.

Provided lighting will be capable of clearly illuminating all pump panel controls in total darkness.

50.11 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.

51.0 PUMP PANEL GAUGES/LABELING

51.1 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.

51.2 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."

51.3 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)

51.4 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.

51.5 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."

51.6 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."

51.7 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.

51.8 INDIVIDUAL DISCHARGE OUTLET GAUGES

Eight (8), 2-1/2" diameter NoShok compound style discharge pressure gauges to be furnished, registering -30 x 600 psi, black numerals on white background. Gauge needle shall have a "bright orange" tip for improved visibility. Gauges to be located in a uniform manner no more than 6" from its respective discharge valve control. Each gauge and respective discharge valve control to be equipped with color coded permanently engraved identification nameplate to describe numerical sequence, location, type and size of outlet.

All above specified pressure gauges to be analog style, liquid filled, vibration dampened, and capable of operations to -40 degrees F.

51.9 GAUGE LINES - TUBING

The specified engine monitors, pump suction and discharge gauges, and individual gated discharge pressure gauges shall be installed on the specified gauge panel. Pressure gauges to be piped to the individual discharge valves and pump suction and discharge volutes using high pressure clear nylon tubing with brass fittings.

51.10 WATER LEVEL INDICATOR - TANK VISION

One (1), FRC, "Tankvision" water tank level indicator to be furnished with: weatherproof encapsulated high intensity LED light indicator, one (1), FRC, model WLC-30A, 30-ft sensor cable extension for water tank level indicator, tank level sensing probe, and protected wiring loom. Water tank level indicator to be mounted on pump control panel. Tank level sensing probe to be located front of specified water tank to properly sense water capacity.

There shall be two (2) Whelen PSTANK water level light strips surface mounted vertically, one (1) on each side of the cab behind the front cab doors.

The light strips shall feature four (4) colors of LED lights to indicate the fluid level of a tank. The colors from top to bottom shall be green, blue, amber, and red.

51.11 FOAM LEVEL - INDICATOR – TANKVISION

One (1), FRC, "Tankvision" foam tank level indicator to be furnished with: weatherproof encapsulated high intensity LED light indicator, 30-ft sensor cable extension for foam tank level indicator, tank level sensing probe, and protected wiring loom. Foam tank level indicator to be mounted on pump control panel. Tank level sensing probe to be located in front of specified foam tank.

51.12 DISCHARGE NAMEPLATES

Discharge nameplates shall be provided at control, pressure gauge, outlet, and bleeder. Discharge nameplates to be individually color coded and permanently engraved, text to indicate: numerical sequence, location, and size (hose size). Additionally, if the discharge outlet is foam capable, the name plate shall so state.

#1 Front Bumper	1-1/2" Discharge/Foam	Orange with White Letters
#2 Driver Side	2-1/2" Discharge	Red with White Letters
#3 Passenger Side	4" Discharge	Yellow with Black Letters
#4 Deck Gun		Silver with Black Letters
#5 Passenger Side	2-1/2" Discharge/Foam	Tan with Black Letters
#6 Rear Passenger	2-1/2" Preconnect/Foam	Blue with White Letters
#7 Rear Drivers	1-1/2" Preconnect/Foam	Black with White Letters
#8 Rear Drivers	1-1/2" Preconnect/Foam	Green with White Letters

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.

52.0 PUMP HEAT PACKAGE:

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

52.1 HEATER CASING, STAINLESS STEEL CONSTRUCTION

A removable swirled stainless steel heater casing, completely enclosing the underside of the pump compartment to be provided. The casing shall bolt to 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.

52.2 AUXILIARY COOLANT TYPE PUMP ENCLOSURE & COMPARTMENT HEATERS

Two (2) 36,000 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 and the other set of ducts extending into the passenger side forward compartment. Heater placement shall allow for circular movement of heated air, within the pump module.

A separate small heater will be placed in the passenger side front compartment on the body to keep medical gear and oxygen warm during winter months. Heater will be activated by the same switch as the pump compartment heater.

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

53.0 PUMP FOAM SYSTEM:

53.1 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.

53.2 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:

- Provide push-button control for foam proportioning rates from 0.1% to 9.9% in 0.1% increments.
- Show current gallon per minute water flow rate.
- Show total gallons of water discharged, during and after foam operations are completed.
- Show total gallons of foam concentrate consumed.
- Simulate flow rates for manual operation.
- Perform set-up and diagnostic functions for the computer control microprocessor.
- Flash a "low concentrate" warning when the foam concentrate tank(s) run low.
- 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.

53.3 FOAM CELL

One (1), 20-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. 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.

53.4 CLASS - A FOAM CAPABLE DISCHARGE OUTLETS

The following discharges to be Class A foam capable are: Rear Driver Side Outboard 1-1/2" discharge, Rear Driver Side Inboard 1-1/2" discharge, Rear Passenger Side 2-1/2" discharge, 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.

54.0 APPARATUS BODY AND COMPARTMENTATION:

54.1 APPARATUS BODY 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 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).

54.2 PASSENGER'S SIDE COMPARTMENTATION:

Passenger's side compartments shall be provided full height ahead of, upper level above, and full height behind rear wheel well housing.

The passenger's front side compartment segment (ahead of rear wheels) shall be 22" interior width x 69" interior height x 13" upper level interior depth/27" lower level interior depth. Compartment segment to be fully enclosed and weather sealed, equipped with one (1) roll-up compartment door, size of 22" wide x 65" high, (clear opening size of 19" wide x 61" high).

The passenger's side over-the-wheels upper level compartment segment shall be 62" interior width x 42" interior height x 13" upper level interior depth. Compartment to be fully enclosed and weather sealed, equipped with one (1) roll-up compartment door, size of 56" wide x 37" high, (clear opening size of 53" wide x 33" high).

The passenger's rear side compartment segment shall be 42" interior width x 69" interior height x 13" upper level interior depth/27" lower level interior depth. Compartment to be fully enclosed and weather sealed, equipped with one (1) roll-up compartment door, size of 42" wide x 65" high, (clear opening size of 39" wide x 61" high).

54.3 REAR BODY COMPARTMENTATION:

A rear body compartment shall be furnished, located running board level ahead of tailboard, to rear of water tank, between back wall of driver's and passenger's rear side compartment segments. Compartment to be 42" interior width x 38" interior height x 28" interior depth, or larger if possible, fully enclosed and weather sealed, equipped with one (1) compartment door, size of 42" wide x 26" high. Door shall be hinged lap style with double panel construction and be a minimum 1.50" thick. Door shall be provided with a closed cell rubber gasket around the surface that laps onto the body. A second heavy duty automotive rubber molding with a hollow core shall be installed on the door framing that seals into the interior panel, to ensure a weather resisting compartment. Compartment shall have a polished stainless steel continuous hinge with a pin diameter of .25", that is bolted or

screwed on with stainless steel fasteners. A strip of dielectric isolation tape shall be provided between the hinge and door jamb.

All double lock mechanisms shall be fully enclosed within the door panels to prevent fowling of the lock in the event equipment inside shifts into the lock area. Door shall be latched with recessed, polished stainless steel "D" ring handles. A rubber gasket shall be provided between the "D" ring handle and the 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, bolted in position and removable.

54.4 DRIVER'S SIDE COMPARTMENTATION:

Driver's side compartments shall be provided full height ahead of, upper level above, and full height behind rear wheelwell housing.

The driver's front side compartment segment (ahead of rear wheels) shall be 22" interior width x 69" interior height x 13" upper level interior depth/27" lower level interior depth. Compartment segment to be fully enclosed and weather sealed, equipped with one (1) roll-up compartment door, size of 22" wide x 65" high, (clear opening size of 19" wide x 61" high).

The driver's side over-the-wheels upper level compartment segment shall be 62" interior width x 42" interior height x 13" upper level interior depth/27" lower level interior depth. Compartment to be fully enclosed and weather sealed, equipped with one (1) roll-up compartment door, size of 56" wide x 37" high, (clear opening size of 53" wide x 33" high).

The driver's rear side compartment segment shall be 42" interior width x 69" interior height x 13" upper level interior depth/27" lower level interior depth. Compartment to be fully enclosed and weather sealed, equipped with one (1) roll-up compartment door, size of 42" wide x 65" high, (clear opening size of 39" wide x 61" high).

54.5 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

54.6 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).

Ten (10) each, compartment pan style shelves shall be furnished, constructed of .125" 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 100 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 Two each: D1 (driver forward side), D3 (driver back side), P1 (passenger side forward), P3 (passenger side back), and One each: D2 (driver side upper) P2 (passenger side upper).

Shelves shall be built to accommodate PAC TRAC mounting boards on rear wall while keeping infinite adjustability.

54.7 DEEP COMPARTMENT SHELVING

One (1) each, aluminum compartment pan style shelves shall be furnished, constructed of .188" 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 along vertical Quad-Rail tracks.

Each compartment shelf shall have three (3) angular clamp brackets bolted to under side shelf floor, six (6) aluminum heavy flat bar track clamps with threaded stainless steel carriage bolts and self-locking nuts, and mounting holes for the specified under shelf 12-volt interior compartment light fixture. 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.

Each shelf shall be furnished with adjustable tracks on both sides and rear (inboard) of shelf for total of three (3) attachment points.

Shelf to be located in lower level of D1, P1 compartment. (Driver/Passenger side forward).

54.8 ALUMINUM ROLL-OUT TRAYS-GRANT SLIDES;

Two (2), each fabricated "swirl finish" aluminum roll-out trays shall be furnished, located on the floor of D3 (driver back side) and floor of P3 (passenger back side) compartments. Roll-out trays shall include full width and full depth front-to-rear x 2-1/2" deep aluminum pan style tray, two (2) 100 lb. (200 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 of specified compartment, using self-locking stainless steel fasteners. NOTE: Trays shall provide full extension from the designated compartment and be as wide as allowed by door jambs.

54.9 COMPARTMENT SHELVING TURTLE TILES

Turtle Tile brand black section vinyl tiles shall be furnished, installed on top surface of all interior compartment horizontal shelves and compartment floors. 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.

54.10 FIRE EXTINGUISHER MOUNTING:

Three individual sleeve style brackets shall be provided and mounted in P3 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.

54.11 PAC TRAC EQUIPMENT PANELING

The upper portions of the D1, D2, and P2 compartments shall have PAC TRAC mounting boards on the rear and sides (between shelve rails) of the compartments for tool mounting.

The upper portions of the D3 and P3 compartments shall have PAC TRAC mounting boards on the rear wall of the compartment only.

54.12 SCBA BOTTLE RACK - DRIVER WHEELWELL

Driver's side bottom portion of over-the-wheel compartment shall be recessed into a minimum of 27" deep x 8" high x full width of compartment (62"), and equipped with a Polyprene rack of individual sleeves to accommodate seven (7) Scott 4.5 SCBA cylinders. 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. A full width permanent shelf shall be furnished above SCBA sleeves, lined with brushed stainless steel.

54.13 COMPARTMENT DOORS AND DOOR ACCESSORIES:

The following specified roll-up style compartment door tracks/extrusions to be "flush" with exterior body panels/door jambs. NOTE: Specified compartment doors shall be manufactured in the United States of America.

Specified compartment door jambs, integral with front and rear body corners, removable above wheelwell housings shall be fabricated with inboard flanges which are machined for screw type fasteners and mounting of specified roll-up compartment door aluminum side track extrusions.

All side compartment doors shall be **ROM Robinson** roll-up shutter style, complete with: Extruded aluminum shutter slats which are Urethane painted to match apparatus color, anodized tubular bar style bottom rail latch, painted extruded aluminum vertical side tracks with removable neoprene rubber weatherstripping, urethane painted top door opening extrusions with removable neoprene rubber weatherstripping, and spring loaded "front roll" door lift/roll-up mechanism.

Each individual roll-up extruded aluminum door shall be of maximum size for the available door opening. Front and rear extruded aluminum door tracks shall be furnished, bolted to vertical door jambs and interior compartment bulkheads so as to be easily removable for repairs or modifications. All roll-up style compartment doors shall be installed and adjusted during body construction. 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.

Weatherproof magnetic reed style proximity switches, as provided by the door's manufacturer (for ease of future parts availability) shall be used, on all roll-up compartment doors.

54.14 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, 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.

54.15 COMPARTMENT LIGHTS

Lighting for compartments shall be LED Night Stik lighting. It shall 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.

55.0 APPARATUS PUMPER BODY SUBFRAME:

An apparatus body forward "yoke" style subframe 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.

The rear body tailboard subframe assembly shall be welded construction, with horizontal members 3" x 4" x .188" wall rectangular stainless steel tubing. Horizontal tubing shall be welded to vertical 3/4" x 8" steel plate chassis frame drops with bottom integral tow eyes, frame drops to be bolted to side web of rear chassis frame rails.

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.

56.0 APPARATUS BODY CONSTRUCTION MATERIALS:

56.1 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 shelves, 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, full width single piece rear tailboard, 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.

Rear body steps shall be stainless steel.

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).

56.2 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.

57.0 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.

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.

Full height rear compartment vertical beavertail corners shall be furnished, driver's side and passenger's side, cantilevered over a single piece "removable" rear step. 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 bottom push-up telescoping, or removable/de-mountable tri-pod type quartz light poles 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.

58.0 APPARATUS BODY FEATURES:

58.1 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 hollow core door weatherstripping. Polished stainless steel rubrails shall be bolted in position and easily removable, fasteners concealed below body and inside compartment.

58.2 POLISHED WHEEL WELL TRIM

Polished stainless 25" radius wheelwell moldings shall be furnished, bolted in position surrounding driver's side and passenger's side rear body wheelwell cut-outs. Fasteners shall be concealed beneath the extrusion. Wheelwell moldings shall be flush with specified body rubrails.

58.3 STAINLESS STEEL WHEEL WELL LINER

A circular interior wheelwell liner shall be furnished, driver and passenger side wheelwell housings, bolted to and removable from a radius ring flange, designed to provide ease of cleaning and repairs. Wheelwell liners to be fabricated of stainless steel. There shall be sufficient room in this area for the use of rear tire chains.

58.4 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.

58.5 POLISHED DRIP CAP

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

58.6 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.

58.7 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.

58.8 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.

58.9 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.

58.10 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.

Tubular railings shall be provided: passenger's side and driver's side vertically rear body corners, and horizontally full width of hosebody below hosebed gratings.

58.11 RUNNINGBOARDS AND TAILBOARD:

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

A full width 101" rear step/tailboard shall be furnished, at least 16" deep (between rear compartment corners), constructed of stainless steel material. Rear step shall be single piece fabrication, spaced 1/2" away from rear face of body and 1" below specified rear corner beavertails.

58.12 LED REAR STEP LIGHTS

Three (3)each, 12-volt Tecniq model E03-W000-1 LED courtesy step lights are to be furnished, located to illuminate step surfaces at the rear of the body, where individual steps are specified. Light fixture to have polished stainless bezel and shielded clear polycarbonate lens. Lights to be activated by parking brake set.

NOTE: One (1) of above specified lights shall be installed under driver dash to illuminate area of regen switches and diagnostic port. Light to be activated with ignition switch.

Each outboard rear corner to be 45-degree angle flanged bevel with back side 12-volt marker light. Center rear flange of tailboard shall have three (3) diamond cut-outs, exposing under flange mounted center marker light cluster. 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 cannot 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.

58.13 DEPLOYED HOSE RESTRAINT

The tailboard shall be equipped with a full width black nylon restraint for deployed hose, consisting of strap netting with quick-release draw-tight clips. Tailboard shall be equipped with flush mounted loops or eyes to allow latching of restraint. Final configuration to be determined at prebuild.

58.14 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.

58.15 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.

59.0 APPARATUS BODY COMPARTMENTATION REAR/HOSEBED AREA:

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

59.1 MAIN HOSEBED AREA

The apparatus body hosebed area, located between passenger's body side and driver's body side, to rear of front body cross-panel, and above water tank, shall be 54" wide x 90" long x at least 36" deep. **NOTE: The floor of hosebed shall be no more than 60" from ground level..**

A forward hosebed cross divider shall be furnished, located immediately to rear of specified water tank fill stack, full width of main hosebed area, providing full hosebed width travel of specified adjustable hosebed dividers. Cross divider to be perimeter flanged (triple broke top), full depth of hosebed sides, bolted in position and easily removable.

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 reinforcement 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). Fabricated polished stainless steel grating retainers/hosebed adjustable divider slide tracks to be furnished at rear of hosebed, designed to prevent snagging of hose or couplings during unloading and loading operations.

59.2 HOSEBED CAPACITY

The main hosebed shall be designed to accommodate: passenger side outboard 200 ft. of 2-1/2" double jacket fire hose pre-connected, 500 ft. of 2-1/2" double jacket fire hose dead-lay, 1000 ft. of 4" large diameter hose dead-lay, driver side inboard 200 ft. of 1-3/4" double jacket fire hose pre-connected, and driver side outboard 200 ft. of 1-3/4" double jacket fire hose pre-connected.

59.3 HOSEBED DIVIDERS

Three (3), full length infinitely adjustable hosebed divider(s) shall be furnished, fabricated of .250" unpainted "swirl finish" smooth aluminum with integral front vertical flange and bottom horizontal base flange. **Height of hosebed dividers shall be determined by Fire Department and cut to that height.** Top rear corner of divider panel to be 3" radius, sanded and deburred to prevent hose damage. Upper and lower polished stainless steel horizontal channel tracks shall be furnished, bolted to specified forward cross divider. An additional polished stainless steel channel

track to be provided at rear bottom of hosebed. Forward and bottom stainless channel tracks to be provided with sliding clamps and threaded studs with acorn nuts allowing infinite adjustment of hosebed divider location.

59.4 HOSEBED COVERS -- ALUMINUM 4-WAY

One (1), full length/full depth main hosebed divider shall be furnished, bolted in position and easily removable. Divider shall be located center line of vehicle, fabricated with triple formed top horizontal breaks providing rigid mounting surface for both specified hinged aluminum hosebed covers. A full depth forward hosebed cross divider shall be furnished, immediately to rear of water tank fill stack, with triple top flange, bolted in position and removable. NOTE: Two (2) additional hosebed cover handrails shall be provided.

Two (2), individual polished 4-way aluminum treadplate hosebed covers to be furnished, extending from front hosebed cross divider to rear of body. Hosebed covers to be triple fabricated construction for maximum strength, equipped with polished stainless steel full length piano hinges bolted to top flange of specified hosebed divider and hosebed covers. Back end plates of hosebed covers to be equipped with horizontal 1-1/4" diameter knurled railings with chrome plated bolted brackets. Driver's side hosebed cover railing to include Velcro strap design to hold adjacent cover in the opened position. Polished stainless steel fabricated rear coupling guides to be furnished horizontally at rear under cover areas and vertically rear divider flange, designed to prevent snagging of hose and couplings.

Two (2) individual **RED** vinyl coated nylon hosebed cover end flaps (tarps) shall be furnished with weighted bottom seams, permanently attached to bottom rear flange of hosebed covers. NOTE: There shall be a way to secure this flap to the rear of the apparatus body to help secure fire nozzles in bedded position.

Center fixed hosebed divider shall be positioned to put hose in following order, from drivers side to passengers side.

- 200' of 1-3/4" preconnected
- 200' of 1-3/4" preconnected
- 500' of 2 1/2" deadlay
- 1000' of 4"
- 200' 2-1/2" preconnected

Hosebed risers shall be notched directly rear of tank to make hinged hosebed covers flush with forward portion of risers. "Spare hosebed" over suction hose compartment shall be eliminated and capped with treadbrite to match compartment roof overlays.

59.5 HOSEBED RISERS

Driver's side and passenger's side full length hosebed risers shall be furnished, with triple-formed top horizontal flange, forward sloping rear triple-formed flange, and mitered top rear corner. A forward transverse hosebed riser shall be furnished, with triple-formed top flange, extending between and flush with driver's side and passenger's side hosebed risers. Front transverse hosebed riser shall be bolted to front body cross panels, easily removable. Driver's and passenger's side hosebed risers shall be bolted to compartment roof tops, flush with hosebed side, easily removable. Transverse and side hosebed risers shall be designed to provide additional hosebed depth, easily removable for future adjustments to hosebed depth. Hosebed risers shall be flush with top of pump compartment.

59.6 SLIDE-IN STORAGE FOR LADDERS, PIKE POLES, AND BACK BOARD

A completely sealed storage compartments to be furnished, passenger's side outboard water tank side, full length of body. Storage compartment shall accommodate: sleeve and tray mountings for specified extension ladder/roof ladder/folding ladder/two (2) pike poles and one (1) roof hook. The 2-section and roof ladder trays shall be bottom lined with nylon, for "free-slide" surface. Compartment to be approximately 38" above rear tailboard equipped with vertically hinged access door with large D-ring stainless steel 1/4-turn latch and stainless piano hinge. There shall also be a slot for back board storage as well.

59.7 HARD SUCTION HOSE STORAGE

One (1) completely sealed hard suction hose compartment/storage cavity area shall be furnished, located in the far right (passenger side) portion of the main hosebed area, above the ladders. Compartment shall be minimum 12" wide x 20" high x 130" long, designed to accommodate two (2) hose troughs for the specified suction hose. Suction hose compartment shall be enclosed on sides, front, and top. Top to be same height as the main hosebed treadbrite

covers. Side-swing door shall be furnished with large D-ring ¼ turn polished stainless single point latch assembly and full length polished stainless piano hinge.

Polished aluminum drip rail shall be provided across top of suction hose compartment.

59.8 REAR BODY STEPS - NO SLIP GRIP

Six (6), individual stainless steel rear body steps shall be furnished, mounted three (3) on each side, evenly spaced, no more than 18" apart, up rear body corners. Steps to include integral riser toe-stop to protect rear corner finish. Fabricated steps to be of maximum width to allow for mounting of specified tail, turn and back-up lights underneath step areas. Steps to be bolted in position and removable. Top treadplate step surfaces to be pattern-cut, puncture fabricated non-slip, upper step 8"/middle step 9"/bottom step 10" deep x 4" narrower than rear compartment corner width (at least 10"), step fabrications to be single piece construction.

The steps which are located above the tailboard, and located above the intermediate steps, are to be provided with multiple element LED 12-volt light fixtures. Six (6) light fixtures are to be provided, positioned to illuminate the step surface below.

59.9 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 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.

59.10 TRAFFIC DIRECTING LIGHT BAR - REAR OF BODY

A traffic bar, Whelen 500 Series TIR 6 consisting of eight (8) recessed (6 Amber & 2 Red) led lights shall be furnished with traffic bar sequencer for left, right, spread, and random flash patterns. The light bar is to be installed at center rear of body, between hand rail and compartment door. The 2 red lights shall come on with the master warning switch on dash. Control head is to be installed inside driver's compartment, location as designated by Customer.

59.11 REAR BODY TRAFFIC BAR PROTECTION

The specified rear body mounted traffic light bar is to be surface mounted to rear face of the apparatus body, beneath a tubular rear horizontal handrail which is located so as to protect the light bar and lenses.

60.0 NFPA EQUIPMENT:

The following loose equipment shall be provided and mounted.

60.1 TWO SECTION LADDER

One (1), Duo-Safety 24 ft. model 900-A 2-section aluminum ladder shall be furnished, with rope hoist.

60.2 ROOF LADDER

One (1), Duo-Safety 14 ft. model 775-A aluminum roof ladder shall be furnished with folding roof hooks.

60.3 ATTIC LADDER

One (1), Duo-Safety 10 ft. model 585-A aluminum folding attic ladder shall be furnished.

60.4 PIKE POLE (S)

One (1) six (6) foot Fire Hooks Unlimited Ash Handle National Hook (Hook #3) Style with iron end pike pole shall be furnished.

60.5 PIKE POLE (S)

One (1), eight (8) foot Fire Hooks Unlimited Ash Handle National Hook (Hook #3) Style with iron end pike pole shall be furnished.

60.6 DELETED

60.7 SUCTION HOSE - 6"

Two (2), 10 ft. length(s) of 6" i.d. Maxi-Flex or equivalent flexible suction hose shall be furnished, complete with 6" NST lightweight rocker lug couplings, swivel female one end, rigid male opposite end, and strainer.

60.8 WHEEL CHOCKS

Two (2), each Ziamatic model AC-44 NFPA compliant cast aluminum "single-piece" wheel chocks shall be furnished. Chocks to be stored in the D1 compartment. Brackets to be constructed per Fire Department Instructions.

60.9 HAND LANTERNS - WITH CHARGERS

Three (3), Streamlight model 45107 LiteBox rechargeable hand lanterns to be furnished, complete with 12-volt "clip-in" charge rack.

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

61.0 BOOSTER TANK:

61.1 500 GALLON WATER TANK/ 20 GALLON FOAM RESERVOIR

The apparatus shall be equipped with a 500 gallon capacity water/20-gallon (separate tank) foam capacity polypropylene thermoplastic water tank. The foam reservoir shall be "notched" into the front corner of the specified booster tank. The foam reservoir shall include foam feed and taps, a fill stack with lift up cover and locking latch assembly. A 20 gallon capacity (matching tank material) foam cell/tank shall be furnished, complete with: top fill stack, vented fill cover, bottom drain spud, bottom foam suction spud, and accommodation for a Class-A direct discharge foam system low level sensor device.

The tank body and end bulkheads shall be constructed of minimum 1/2" thick, polypropylene, nitrogen-welded and tested inside and out. Tank construction shall conform to NFPA standards.

The transverse and longitudinal minimum 3/8" thick swash partitions shall be interlocked and welded to each other as well as to the walls of the tank. The partitions shall be designed and equipped with vent holes to permit air and liquid movement between compartments.

The minimum 1/2" thick cover shall be recessed approximately 3/8" from the top of the side walls. Hold down dowels shall extend through and be welded to both the covers and the transverse partitions, providing rigidity during fast fill operations. Drilled and tapped holes for lifting eyes shall be provided in the top area of the booster tank.

The tank shall rest on and into the specified rubber lined tank cradle, as recommended by the tank manufacturer.

The water fill tower shall be designed, sized and located as required by the needs of the tank. The 1/2" thick polypropylene fill and overflow tower shall be equipped with a hinged lid, latch, and a removable polypropylene screen. The overflow tube shall be installed in fill tower and piped with schedule 40 PVC pipe through the tank, exiting out tank bottom.

The water tank sump shall be a minimum of 8" x 8" x 3" deep and located in the forward area of the booster tank. There shall be schedule 40 minimum 3-1/2" diameter polypropylene tank suction pipe from the front of the tank to the tank sump. The tank drain and clean out shall be 3" NPT schedule 80 female flange with plug, located in the bottom of the tank sump.

61.2 TANK NOTCHED FOR RECESSED FOAM CELL

The passenger (right) side front corner of the water tank shall be "notched" to accommodate the specified isolated foam cell/tank. The notch shall be sized, such that the foam cell/tank fits down into the tank top corner, flush with top lid of water tank, so as to not conflict with the specified hosebed area.

This method of accommodating the foam cell/tank shall positively prevent any contamination of the water tank, or the foam tank, should one or the other leak its contents.

61.3 FOAM TANK DRAIN VALVE

One (1), 3/4" Class One 1/4-turn drain valve shall be furnished to allow drainage of the foam tank/cell. Valve to be mounted in the pump compartment connected to a discharge port on the foam tank with clear plastic hose and accessible through the specified pump panel removable overlays or access door

61.4 LIFETIME WARRANTY

The water tank, and its installed accessories, shall be covered by a "Lifetime" Warranty, against cracks, corrosion, or other failures caused by the tanks design and normal use of the same. The warranty shall be between the tank manufacturer, and the customer.

61.5 WATER TANK CAPACITY CERTIFICATION

The water tank capacity shall be documented, with a written Certification, from the Water Tank Manufacturer. This certification shall be included with the specified delivery documents.

61.6 STAINLESS STEEL TANK CRADLE

The tank mounting shall be simple style cradle. This cradle shall be designed for the specific tank, and shall provide support in the areas and locations specified by the tank manufacturer. All tank-to-cradle horizontal and vertical "mating" areas shall be lined with minimum 1/2" thick 60 DURO rubber cushion material. The cradle shall be 304 stainless steel for total protection against corrosion.

The tank cradle shall have a lifetime warranty, as provided by body builder.

62.0 12-VOLT ELECTRICAL EQUIPMENT

62.1 WIRING HARNESES

All apparatus body and pump compartment wiring for specified lights and electrical equipment shall be suitably protected inside heat resistant vinyl, forming multiple harnesses. Multiple harnesses to run from chassis cab, pump compartment, and apparatus body to a PDC (power distribution center). Harnesses shall consist of individual legend imprinted multi-stranded copper color coded SAE-J 1128 compliant automotive wires inside vinyl loom. Spare wires shall run throughout apparatus compartmented body and pump compartment, so as to allow future installations of electrical accessories, using original harnesses. **All wiring to be identified and "imprinted" with number and function.** Auto-reset circuit breakers to be furnished, of various amperage capacity, sized for intended load.

All 12-volt switches, relays, terminals, connectors, and wiring to have a direct current rating of 125% of maximum current for which the current is protected. All wiring terminals to be machine crimped, pull-tested during assembly.

62.2 POWER DISTRIBUTION CENTER

The power distribution center shall be located interior of driver's forward side compartment, and shall contain following specified engineered electrical components and waterproof pin/socket bulkhead connectors:

62.3 12-VOLT ELECTRICAL PANEL

A main electrical panel shall be located in a highly weather resistant compartment. The panel shall contain module quad relay boards with permanent sockets for relays, diode blocks, and automatic reset circuit breakers. The boards shall be screwed to the compartment and shall have permanent leads, each one routed to a predetermined pin of the correct main bulkhead connector. The bulkhead connectors shall be physically attached to the box in such a way as to afford easy access to the connectors. The connectors shall be the Deutsch series with sealing plugs for any sockets not containing a wire. An "O" ring seal shall be an integral feature of the bulkhead connectors to eliminate the chance of water entering the connection and causing corrosion.

A minimum of ten (10), spare circuit breaker sockets shall be supplied. All sockets and equipment shall be clearly labeled.

Any circuit, which draws 15 nominal amperes, shall be switched through relays. Individual loads shall be wired to individual circuit breakers as much as possible. The circuit breakers shall be sized for the individual load rather than selecting a large circuit breaker and ganging loads on until amperage rating of the circuit breaker is reached.

The main electrical panel shall be fed by multiple harnesses, for the cab, pump compartment, and body. The body harnesses shall be for the left and right side of the body. Each main body harness shall be equipped with several spare wires from one end of the harness to the other. At any place where the harness passes through metal, heavy grommets shall be installed to protect it.

62.4 BATTERY CABLE UPGRADE

A minimum 2-0 multi-stranded copper insulated battery cable shall run from specified battery switch to chassis frame mounted threaded stud terminal block, providing power to high amperage items such as: primer motor, electrical discharge valves, reel rewind motors, generator starter motor, etc.

62.5 VEHICLE SPECIFIC WIRING INFORMATION

"Vehicle Specific" wiring information shall be provided for this particular apparatus "as built" upon completed delivery of the same.

62.6 LOAD MANAGEMENT

A Load Management System (LMS) shall be furnished for performing electrical load management. The LMS shall have eight (8) programmable outputs to supply warning and load switching requirements. The load management system shall provide eight (8) output load shedding, low voltage warning, scene mode operation and response mode operation.

Outputs shall be independently programmable to activate during the scene mode, the response mode or both. These outputs can also be programmed to activate with the master warning switch and battery switch, or to sequence and shed along with priority.

An output shall provide a low voltage alarm that activates at the NFPA required 11.8 volts.

The LMS shall be protected against reverse polarity, shorts to grounds, and will be enclosed in a metal enclosure to enhance EMI/RFI protection.

When the emergency master switch is toggled to the "ON" position, the warning light loads will activate immediately.

The load management system shall automatically activate upon activation of the apparatus parking brakes. Predetermined load shall shed upon activation of load management thereby reducing the electrical demand of the apparatus to the preprogrammed "ON-SCENE" mode. **LOAD MANAGEMENT DURING APPARATUS RESPONSE WILL NOT BE ACCEPTABLE.**

Load management shall be prioritized according to least critical systems.

A system override switch shall be placed on the electrical console to allow total manual operation of ALL warning light switched electrical loads.

63.0 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.

The following specified rear body tail/stop, turn and back up lights to be positioned: Red (tail/stop) TOP, Amber (turn) MIDDLE, and Clear (back up) BOTTOM, driver's and passenger's side rear of body.

Two (2), round or rectangular surface mount midship LED, marker lights & turn lights, to be furnished; located one (1) driver's side midship vehicle and one (1) passenger's side midship vehicle. Lights to have Amber lens. Turn light (flashing element) to be activated by vehicle turn signals.

Two (2) additional flexible rubber arm surface mount 12-volt Model VS-L31RW LED bulb marker lights with acrylic lenses to be furnished, location to be designated by purchaser. Lenses to be Red. Marker lights to be activated by headlamp switch. Marker lights are to be in addition to previously specified vehicle marker lights.

Lights to be mounted per FMVSS 108 and CMVSS 108 requirements.

63.1 D.O.T. MARKER LIGHTS

Five (5), Truck-Lite 4" x 2" rectangular surface mount 12-volt LED marker lights with snap-on reflective lenses to be furnished, located: two (2) recessed into specified rear tailboard corner castings and three (3) recessed behind center rear tailboard flange diamond shape cut outs. Lenses to be Red. Marker lights to be activated by headlamp switch. Three (3) center light cutouts shall read DFD copying existing engine.

63.2 TAIL LIGHTING - SIX (6) EACH

Two (2), Whelen model 6OROOXRR, 5" x 8" rectangular chrome plated flange surface mount "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 5" x 8" rectangular chrome plated flange surface mount 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, 5" x 8" rectangular chrome plated flange surface mount 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.

Above specified lights to include appropriate 6EFLANGE(s) and be bolted in position, evenly spaced, driver's side and passenger's side rear body corners.

63.3 BACK-UP ALARM

One (1), 12-volt electronic 97db back-up alarm to be furnished, mounted at rear below body, activated by reverse gear of truck transmission.

63.4 LED REAR STEP LIGHTS

Three (3)each, 12-volt Tecniq model E03-W000-1 LED courtesy step lights are to be furnished, located to illuminate step surfaces at the rear of the body, where individual steps are specified. Light fixture to have polished stainless bezel and shielded clear polycarbonate lens. Lights to be activated by parking brake set.

63.5 LICENSE PLATE CAST ALUMINUM BRACKET, OVERHEAD LIGHT

A polished cast aluminum license plate bracket, with 12-volt overhead light will be furnished and installed on the rear of the vehicle.

63.6 UNDER BODY LIGHTING

Six (6), 12" LED Night Stik under body 12-volt ground lights to be furnished, located: two (2) each driver's side ahead of and behind rear wheels, two (2) each passenger's side ahead of and behind rear wheels, two (2) each rear underside tailboard. Lights to be completely sealed for weather resistance. Lights to be wired for activation by setting of the parking brake.

64.0 APPARATUS BODY OPTICAL WARNING DEVICES

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.

64.1 LOWER LEVEL EMERGENCY BODY LIGHTING

Six (6), Whelen model LED 600 series 4" x 6" rectangular flush mounted emergency LED lights complete with associated 6E flanges to be furnished, located one (1) driver's side midsection in front of wheel well, one (1) passenger's side midsection in front of wheel well, one (1) driver's side rear side and one (1) passenger's side rear

side behind wheel well, and two (2) rear of body; one (1) driver's side and one (1) passenger's side, (as close to rear lower corners as practical). Light lens to be 4" x 6" (all Red) and activated by a single illuminated rocker switch, identified as "**LOWER LEVEL EMERGENCY LIGHTS**".

64.2 REAR & REAR SIDE FLASHERS – UPPER

Six (6), Whelen 500 series TIR6 rectangular flush mounted emergency LED lights complete with associated 5E chrome surround flanges to be furnished, located one (1) driver's side upper rear body corner side, one (1) passenger's side upper rear body corner side, and four (4) on rear surface of body corners; two (2) driver's side and two (2) passenger's side, (as close to top as practical). Lights to be all Red and activated by a single illuminated rocker switch, identified as "**UPPER LEVEL FLASHERS**".

The rear facing upper level lights shall be programmed to flash randomly from each other.

65.0 120V/240V ELECTRICAL SYSTEM AND ACCESSORIES

The following 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.

65.1 HYDRAULIC GENERATOR

One (1), Smart Power Systems model 1700008 hydraulic pump driven generator shall be furnished, rated at 8000-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.

The system will generate power as standard 120VAC and/or 240VAC, 60 hertz, and handle loads up to 8,000 watts.

65.2 GENERATOR LOCATION

The above specified hydraulic generator shall be located in the driver's side dunnage area above the pump panel with allowances made for proper venting.

65.3 ELECTRIC CORD REEL/LOCATION

One (1), push button rewind 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. Reel to be mounted, passenger side, inside the pump compartment module, with roller fairlead located exterior the compartment, above the specified pump interior access door.

65.4 GENERATOR / CORD REEL COVER

A brushed stainless steel hinged protective cover shall be provided over the generator and cord reel mounted in the pan above the pump compartment. The cover shall be constructed of aluminum tread brite. A hinged, louvered side access panel shall be provided on the drivers side of the dunnage area. A hinged side access panel shall be provided for access to the cord reel.

65.5 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.

65.6 INTERIOR COMPARTMENT 20-AMP TWIST-LOCK RECEPTACLES, TWO (2)

Two (2) single 120-volt 3-wire Non-NEMA #7310B twist-lock weatherproof plug-in receptacles to be furnished, mounted inside circuit breaker panel compartment, accessible through open compartment door. Receptacles to include: metal duplex cover plate, cast aluminum electrical receptacle box, #7310B twist-lock receptacle, screw type conduit connector, and flexible non-metallic electrical conduit with appropriate size multi-stranded THHN insulated copper wiring extending from receptacle to specified generator circuit breaker panel. Receptacles to be provided with individual manual reset circuit breakers. Receptacle outlets to be labeled with permanently engraved nameplate, to read: "120-VOLT/20-AMP GENERATOR POWER"

65.7 BODY COMPARTMENT INTERIOR - 120-VOLT/20-AMP RECEPTACLES

One (1), 120-volt, 20-amp household plug-in receptacles shall be furnished, interior of compartment P1, with: surface mounted cast aluminum receptacle box, duplex 120-volt 3-wire household plug-in receptacle, metal duplex cover plate, wired from battery and shore power to be labeled; "SHORE POWER RECEPTACLE"

65.8 RECEPTACLE BOXES

One (1), Duluth Fire compatible cast aluminum electrical receptacle boxes to be furnished, mounted on end of specified reel cords, equipped with: two (2) individual single Non-NEMA #7310B 3-wire 20-amp, twist-lock female receptacles, cord clamp, metal receptacle box plates with spring loaded receptacle covers. One (1) receptacle to be wired to each 120-volt circuit (2 circuits) for use with specified 4-conductor cord.

A receptacle box bracket shall be furnished, on passenger side exterior pump panel.

65.9 FLOODLIGHTS

Four (4) each, Fire Research "Optimum" model OPA530-S75, Focus 750-watt 120-volt quartz floodlights to be furnished. Insulated 120-volt coil cord to be permanently wired to recessed body mounted electrical junction box. Light/coil cord to be wired and powered by generator circuit breaker panel mounted 12-volt/120-volt relay with remote illuminated 12-volt rocker switch located on chassis console. Lights to be mounted: on front body corners and rear body corners, driver and passenger sides with fixed top mount brackets.

65.10 BROW LIGHT - 120V

One (1), Fire Research Optimum Series 750W/120V Contour Mount Brow Light shall be furnished, designed for mounting on radius surface. Light to be mounted: centerline, above windshield, with remote illuminated 12-volt rocker switch located on chassis console. Light shall be mounted as to not block the chassis lightbar.

65.11 67.11 CAB INTERIOR 12VOLT POWER SOURCE

Three (3) 12-volt power sources shall be furnished, exact location to be determined at pre-build meeting. Power to originate from the battery and specified battery conditioner, hot when shorepower is plugged-in to 120-volt source.

66.0 FINISHING:

During the apparatus body construction, all permanently mounted components shall be hand sanded, back primed with zinc chromate primer, coated with tectyl rustproofing and/or seal caulked with butyl sealant after "de-burring" and prior to final assembly.

66.1 PAINT PROCESS

Body surfaces to be painted shall be cleaned using DX436 wax & grease remover. Then the entire surface shall be sprayed with F3963 Etching Primer which exhibits very good adhesion and corrosion resistance. A high build primer surfacer, F3975, will then be applied directly over the etch primer. After allowing the primer surfacer to air dry, the entire unit will be sanded using dual action sanders leaving a very smooth surface to be painted.

The paint applied to the apparatus shall be PPG Industries Delfleet® Evolution brand, applied throughout a multi-step process including at least two coats of each color and clear coat finish.

Special attention will be given to proper application of coatings according to the specified film build (wet and dry) recommendations of PPG. Product or technical data bulletins should be consulted for any needed information above that which has been outlined herein. All paint materials shall be prepared and applied in accordance with this specification and the paint manufacturer's latest written recommendation prior to paint application.

The coating shall be baked or air dried. The coatings shall provide full gloss when finished curing and must be suitable for application by conventional pressure air atomizing spray.

Body panels and sub-frame area which cannot be painted after assembly shall be pre-primed and painted prior to main painting process.

The coatings shall not contain lead, cadmium or arsenic. The polyisocyanate component shall consist of only aliphatic isocyanates, with no portion being aromatic isocyanate in character. The solvents used in all components and products shall not contain ethylene glycol, mono-ethyl ethers, or their acetates (commercially recognized as cellosolves), nor shall they contain any chlorinated hydrocarbons. The products shall have no adverse health effects or present any unusual hazard to personnel when used according to manufacturers recommendations for handling and proper protective safety equipment, and for its intended use.

The coating system, as supplied and recommended for application, shall meet all applicable federal, state and local laws and regulations now in force or at any time during the courses of the bid.

The specified painted surfaces (excluding roll-up doors) shall receive the primer coats and the finish coats. The apparatus body painted surfaces shall have a finish with no runs, sags, craters, pinholes or other defects.

66.2 HIGH LUSTER BUFFING

The specified color painted components (except roll-up door slats) shall be "wet" color sanded with ultra-fine media, machine buffed with rubbing compound and wool pad, machine buffed with glaze and foam pad, and hand wiped to remove residue.

66.3 PAINT COLOR

Finish color to match major chassis cab exterior color.

66.4 DISSIMILAR METALS

During assembly all 4-way aluminum treadplate components, shall be seal coated where mated to non-aluminum components. 4-way aluminum fabrications to be installed using stainless steel button socket head cap screw fasteners. Edges of 4-way aluminum, where meeting exterior body painted fabrications, shall be properly caulked with G.E. or equal silver metallic body sealant to prevent moisture accumulation between metal layers.

66.5 TOUCH-UP PAINT

One (1), full quart of original finish color top coat paint material shall be provided for use as future touch-up paint.

66.6 ADDITIONAL APPARATUS BODY AREAS TO BE PAINTED

In addition to the above specified painted surfaces, the apparatus body forward full height, and upper level vertical door jambs shall be painted to match the roll-up doors and chassis cab.

The exterior surface of apparatus body wheelwell housings shall be painted to match the chassis cab.

66.7 REFLECTIVE STRIPING/LETTERING

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 running board/rubrail level, to conform with NFPA 1901 reflectivity requirement. Striping shall continue around to front of apparatus and shall be full width under grille with 1" striping being cut out where needed

The lettering and stripping package shall be coordinated with the Duluth Fire Department and existing apparatus.

67.0 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.

68.0 CHANGE ORDERS

All Change Orders will be documented in writing and will be accompanied by either a City of Duluth Purchase Order number or 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).

END OF SPECIFICATION