

FORM A: BID
(See B7)

1. Contract Title SUPPLY & DELIVERY OF A DEMONSTRATOR 100 FT. REAR MOUNT ALUMINIUM AERIAL LADDER/PLATFORM APPARATUS

2. Bidder

Name of Bidder

Street

City

Province

Postal Code

Facsimile Number

(Mailing address if different)

Street or P.O. Box

City

Province

Postal Code

The Bidder is:

(Choose one)

a sole proprietor

a partnership

a corporation

carrying on business under the above name.

3. Contact Person

The Bidder hereby authorizes the following contact person to represent the Bidder for purposes of the Bid.

Contact Person

Title

Telephone Number

Facsimile Number

E-mail Address

4. Definitions

All capitalized terms used in the Contract shall have the meanings ascribed to them in the General Conditions and D3.

5. Offer

The Bidder hereby offers to perform the Work in accordance with the Contract for the price(s), in Canadian funds, set out on Form B: Prices, appended hereto.

6. Commencement of the Work

The Bidder agrees that no Work shall commence until he is in receipt of a notice of award from the Award Authority authorizing the commencement of the Work.

7. Contract

The Bidder agrees that the Bid Opportunity in its entirety shall be deemed to be incorporated in and to form a part of this offer notwithstanding that not all parts thereof are necessarily attached to or accompany this Bid.

8. Addenda

The Bidder certifies that the following addenda have been received and agrees that they shall be deemed to form a part of the Contract:

No.	_____	Dated	_____
	_____		_____
	_____		_____

9. Time

This offer shall be open for acceptance, binding and irrevocable for a period of sixty (60) Calendar Days following the Submission Deadline.

10. Signatures

The Bidder or the Bidder's authorized official or officials have signed this _____ day of _____, 20____.

Signature of Bidder or
Bidder's Authorized Official or Officials

(Print here name and official capacity of individual whose signature appears above)

(Print here name and official capacity of individual whose signature appears above)

FORM B: PRICES
 (See B8)

**SUPPLY & DELIVERY OF A DEMONSTRATOR 100 FT. REAR MOUNT ALUMINIUM AERIAL
 LADDER/PLATFORM APPARATUS**

UNIT PRICES

ITEM NO.	DESCRIPTION	SPEC. REF.	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT
1.	Demonstrator 100 ft. Aerial Device Vehicle	08079	Each	(1)	\$ _____	\$ _____
2.	Thermal Imager	08079	Each	(1)	\$ _____	\$ _____
3.	Parts manuals, CD's preferred	08079	Each	(1) Set	\$ _____	\$ _____
4.	Technical service manuals, CD's preferred	08079	Each	(1) Set	\$ _____	\$ _____
TOTAL BID PRICE (GST and MRST extra) (in figures) \$ _____ (in words) _____ _____						

 Name of Bidder

FORM N: DETAILED SPECIFICATIONS 08079

(WFPS)

1.0 INSTRUCTIONS FOR COMPLETION OF SPECIFICATIONS

- 1.1 The **Supply & Delivery of a Demonstrator 100 ft. Rear Mount Aluminium Aerial Ladder/Platform Apparatus shall be a 2007 or newer model year with less than 500 hours.** The vehicle shall be furnished complete and ready for use by the Contractor. All parts not specifically mentioned but which are required to complete and place the vehicle into successful operation shall be furnished as though specifically mentioned in these specifications.
- 1.2 It will be the responsibility of the Bidder to inform the City of any errors or omissions in these specifications, for under this Contract the Contractor shall be held responsible for the satisfactory operational function of the vehicle.
- 1.3 All items in these specifications must be answered indicating compliance or non-compliance. **Bidders shall state "yes" for compliance or state deviation,** or give a reply where requested to do so. Deviations shall be clearly stated and fully detailed. Alternatives will be considered subject to evaluation.
- 1.4 Each bidder is required to fill in every blank. **Failure to do so may be used as a basis for rejection of bid.**
- 1.5 All applicable SAE standards form an integral part of these specifications and shall have precedence in any conflict concerning minimum acceptable standards.
- 1.6 The completed unit and all its components shall comply with all C.M.V.S.S. Canadian Motor Vehicle Safety Standards, M.H.T.A. Manitoba Highway Traffic Act, S.S.A Safety Standards Act, F.M.V.S.S Federal Motor Vehicle Safety Standards, D.O.T Department of Transportation, regulations and requirements as applicable, including but not limited to, a Manitoba Government Inspection with Safety Sticker on the driver's side window.
- 1.6.1 National Fire Protection Association Standard NFPA 1901 (current edition), with the latest revisions, form an integral part of these specifications and any conflict with the specifications shall be brought to the attention of the person listed in Clause B1:5 General Inquiries, Bidding Instructions, of the tender documents, in accordance with Clause B1:6 of the bidding instructions. The Bidder shall submit within 48 hours of the request of the Contract Administrator, proof of compliance with NFPA 1901 (current edition, including test results, certified by an independent registered Professional Engineer and satisfactory to the Contract Administrator. The complete unit shall be ULC tested and certified.

2.0 SERVICE FACILITY

- 2.1 For the purpose of warranty repairs, the supplier shall have an authorized service facility located within 10 kilometres of the boundaries of the City of Winnipeg. The facility, or a portion thereof, shall be dedicated to the service and maintenance of the type equipment being offered. Further to B9.1, Bidders shall provide a description of the service facility including, but not limited to, number of qualified service staff, years of service experience, and general service capabilities within three (3) Business Days upon request of the Contract Administrator.
- 2.2 If a suitable warranty facility is not available within 10 km of the boundaries of the City of Winnipeg, the Bidder may propose that the City of Winnipeg Repair Facility perform warranty work. Any Work performed by the City of Winnipeg Repair Facility shall be charged to the

Contractor at the Facility's shop rate in effect at the time the work is performed (for example, shop rate for 2008: \$98.00/hour and \$ 149.00/hour for overtime and callout).

2.3 Location of the service facility located within 10 km of the boundaries of the City of Winnipeg.

The Bidder shall choose and fill in **one** of the Clauses listed below. --- **2.3.1) OR 2.3.2)**

2.3.1 Bidder's own facility location. State the location of the service facility below.

2.3.2 Bidder elects to have warranty work be performed by the City of Winnipeg Repair Facility.

3.0 STATE MAKE AND MODEL BEING BID- _____

4.0 INTENT

4.1 It is the intent of these specifications to describe a telescopic, 100 ft rear mounted aluminium rescue ladder/platform apparatus with a waterway system mounted on a chassis supplied by the manufacturer.

4.2 The NFPA 1901 standard for Automotive Fire Apparatus Chapter 18 sections 18-7 through 18-13 and sections 18-17 through 18-25, Chapter 20 sections 20.7 through 20.12 and 20.17 through 20.25 shall serve as guidelines for the configuration.

4.3 The ratings specified herein state the minimum values acceptable to the City, not implying that these values are sufficient for the design of the particular unit being bid.

4.4 The telescopic, rescue ladder with waterway and platform, hereinafter referred to as the unit or apparatus, shall be a new or a "Demo Unit" (with no more than five hundred (500) hours of operation) 2007 or 2008 model as may be modified by these specifications. The apparatus, including all necessary components, shall be furnished complete and ready for use by the Contractor. All parts not specifically mentioned but which are required to complete and place the apparatus into successful operation shall be furnished as though specifically mentioned in these specifications.

4.5 Bidders shall include a written statement within 48 hours upon request of the Contract Administrator, certifying that the apparatus being bid complies with all requirements of the standards referred to in this document. The Bidders shall also include Approval Drawings (general arrangements) depicting the vehicles appearance from the left side, right side, front and rear elevation views. Drawings shall also depict location and arrangement of the pump controls scaled the same as the elevation views.

4.6 The chassis being supplied for the apparatus shall be the same model that has been tested to demonstrate that it meets the requirements of the European Crash Test Standards, **ECE R-29, Addendum 28, Revision 1, Uniform Provisions Concerning the Approval of Vehicles With Regard to the Occupants of the Cab of a Commercial Vehicle.** The Bidder shall submit within 48 hours of the request of the Contract Administrator, proof of compliance with E.C.E. Reg 29, including test results, certified by an independent registered Professional Engineer and satisfactory to the Contract Administrator.

5.0 QUALIFICATIONS OF MANUFACTURER

5.1 The manufacturer of the apparatus shall have a minimum of three (3) years continuous experience manufacturing equipment of the types being offered. The type of apparatus being offered, or one similar in nature, shall have an incident free, manufacturing history. The manufacturer shall have in effect a complete and documented quality control program ensuring compliance with all applicable standards.

Note Bidders shall include a detailed description of the manufacturers experience and qualifications within 48 hours upon the request of the Contract Administrator. A list of at least five (5) references for the type of apparatus being offered shall be included. The list shall include the five departments name, location, contact person, telephone number and the length of time the apparatus has been in service.

The manufacturer of the apparatus shall have successfully demonstrated the operation of the type of apparatus being offered in cold weather climatic conditions.

6.0 CHASSIS

6.1 The apparatus shall be provided with a custom fire service chassis meeting the following requirements.

7.0 TORQUE BOX CHASSIS

7.1 The chassis frame shall utilize an integral torque box type design. The integral torque box shall combine the chassis frame and aerial torque box into a single structure. Certified welders shall construct the torque box. The design shall utilize 100% welded joints for a totally sealed box. Skip welding shall not be acceptable. Complete Finite Element Analysis and strain gauge testing shall be employed to verify minimum safety factors for road traveling (5:1) and aerial operation (2.5:1).

7.2 The completed torque box shall have the following attributes:

i) Resistance to bending moment, 14.1 million in.lbs.

ii) Section modulus 282.1 cu. in.

7.2.1 The frame section immediately forward of the torque box shall have the following attributes:

i) Resistance to bonding moment 5.1 million in. lbs.

ii) Section modulus 102.1 cu. in.

7.2.2 The torque box shall incorporate a stainless steel schedule 40 4" water pipe through the torque box for the aerial waterway discharge. In addition, the torque box shall have two- (2) 3" conduits full length to encapsulate the hydraulic, air and electrical lines.

7.2.3 The entire assembly shall be sand blasted and painted black before chassis assembly. A full lifetime warranty against defects in materials or workmanship shall be supplied by the apparatus manufacturer.

8.0 BUMPER

8.1 The vehicle shall be equipped with a one-piece 10" high bumper, made from 10-gauge (0.135" nominal) polished stainless steel for corrosion resistance, strength, and long-lasting appearance. It shall be mounted directly to the front

frame extensions for maximum strength. The bumper shall incorporate two (2) stiffening ribs and shall extend 12" to 24" forward of the front of the cab per customer specification to provide additional protection against low-speed frontal impacts.

- 8.2 The space between the bumper and the front of the cab shall be covered on the top and on each side with 1/8" aluminum diamond plate.
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9.0 FUEL SYSTEM

- 9.1 One (1) 65-gallon fuel tank shall be provided. The tank shall be of an all-welded, aluminized-steel construction with anti-surge baffles and shall conform to all applicable Federal Highway Administration (FHWA) 393.65 and 393.67 standards. The tank shall be mounted below the frame rails at the rear of the chassis for maximum protection. The tank shall be secured with two (2) wrap-around T-bolt type steel straps. Each strap shall be fitted with protective rubber insulation and shall be secured with grade 8 hardware.
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- 9.2 The fuel tank shall be equipped with a 2" diameter filler neck. The filler neck shall extend to the rear of the vehicle behind the rear tires and away from the heat of the exhaust system as required by NFPA 1901 Standard for Automotive Fire Apparatus. The open end of the filler neck shall be equipped with a twist-off filler cap with a retaining chain.
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- 9.3 The tank shall be plumbed with top-draw and top-return fuel lines in order to protect the lines from road debris. Bottom-draw and/or bottom-return fuel lines are not acceptable. A vent shall be provided at the top of the tank. The vent shall be connected to the filler neck to prevent splash-back during fuelling operations. A 1/2" NPT drain plug shall be provided at the bottom of the tank.
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- 9.4 The tank shall have a minimum useable capacity of 65 gallons of fuel with a sufficient additional volume to allow for thermal expansion of the fuel without overflowing the vent.
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- 9.5 A mechanical fuel pump shall be provided and sized by the engine manufacturer as part of the engine.
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- 9.6 A 2" fuel fill inlet with a chained cap shall be provided on each side of the apparatus in the rear wheel well rearward area.
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- 9.7 An auxiliary 12 volt fuel pump shall be included in the fuel system. The electric pump shall permit re-priming of the fuel lines and engine. The pump may be manually operated with a switch located on the cab dash. The electric pump shall also automatically operate in conjunction with the mechanical fuel pump as long as engine oil pressure is present. The system shall be plumbed to allow full flow to bypass the pump.
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- 9.8 A shut-off valve shall be supplied to prevent drain back of fuel into the main supply line during filter changes. The valve location shall be as specified.
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10.0 FRONT AXLE / SUSPENSION

- 10.1 The vehicle shall utilize an ArvinMeritor FL-943, 5" drop beam front axle with a rated capacity of 21,500 lbs. It shall have "easy steer" knuckle pin bushings and 68.83" kingpin centers. The axle shall be of I-beam construction and utilize grease-lubricated wheel bearings.
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- 10.2 The front axle shall be furnished with two (2) heavy-duty, double acting shock absorbers, one (1) on each side. _____
- 10.3 The vehicle shall have a nominal cramp angle of 45 degrees, plus two (+ 2) degrees to minus three (- 3) degrees including front suction applications. _____
- 10.4 The front axle hubs shall be made from ductile iron and shall be designed for use with 10 hole hub-piloted wheels. _____
- 10.5 The front axle shall be equipped with 16-1/2" x 6" S-cam brakes with Arvin Meritor automatic slack adjusters. _____
- 10.6 The front springs shall be parabolic tapered, minimum 4" wide x 54" long (flat), minimum three (3) leaf, progressive rate with bronze bushings and a capacity of 21,500 lbs. at the ground. _____
- 10.7 The vehicle shall be equipped with a Sheppard model M-110 integral power steering gear, used in conjunction with a power assist cylinder. The steering assembly shall be rated to statically steer up to a maximum front axle load of 21,500 lbs. Relief stops shall be provided to reduce system pressure upon full wheel cut. _____
- 11.0 FRONT TIRES**
- 11.1 The front tires shall be two (2) Michelin 425/65R 22.5 tubeless type 20 PR radial tires with XTE2 highway tread mounted on 22.5 x 13.00 steel hub-piloted disc wheels. The tires with wheels shall have the following weight capacity and speed rating: 21,500 lbs. @ 65 MPH _____
- 12.0 REAR AXLE / SUSPENSION**
- 12.1 The vehicle shall utilize an ArvinMeritor RT-50-160, 54,000 lb. capacity rear tandem axle with single reduction hypoid gearing, 16-1/2" cam type brakes, and ArvinMeritor automatic slack adjusters. _____
- 12.2 The axle shall be equipped with oil-lubricated wheel bearings with Arvin Meritor oil seals. _____
- 12.3 The rear suspension shall be a Hendrickson RT-523 54,000 lb. steel leaf spring suspension, utilizing "bar pin" type beam end connections. The spring hangers shall be used in a four point mounting arrangement. Equalizer beams with bronze center bushings, cross tubes, and torque rods shall be provided to maintain proper alignment. _____
- 13.0 REAR TIRES**
- 13.1 The rear tires shall be Michelin 12R22.5 tubeless type 16 PR radial tires with XZE highway tread mounted on 22.5 x 8.25 hub-piloted steel disc wheels. The tires with wheels shall have the following weight capacity: 54,000 lbs. (dual) @ 65 MPH _____
- 14.0 AIR BRAKE SYSTEM**
- 14.1 The vehicle shall be equipped with air operated brake system. The system shall meet or exceed the design and performance requirements of current FMVSS-121 and test requirements of current NFPA 1901 Standard. _____
- 14.2 Each wheel shall have a separate integral brake chamber. A dual treadle valve shall

split the braking power between the front and rear systems. Air-lines shall be constructed of color-coded nylon tubing routed in a manner to protect from damage. Brass fittings shall be provided. The chassis air system shall be equipped with a Bendix-Westinghouse AD-9 air dryer.

14.3 The air system shall be provided with a rapid build-up feature, designed to meet current NFPA 1901 requirements. A ¼" brass quick-release air inlet with male connection shall be located inside the driver door on the left side of the cab. The inlet shall allow a shoreline air hose to be connected to the vehicle, discharging into the wet tank.

14.4 A pressure protection valve shall be installed to prevent use of air horns or other air- operated devices should the air system pressure drop below 80 PSI.

14.5 Two (2) air pressure needle gauges, for front and rear air pressure, with warning light and buzzer shall be installed at the driver's instrument panel.

15.0 AIR TANK RESERVOIRS

15.1 One (1) reservoir shall serve as the wet tank and a minimum of one (1) tank shall be supplied for each of the front and rear axles. The total system shall carry a sufficient volume of air to comply with FMVSS-121.

15.2 The following tank sizes shall be installed:

Wet 1738 cubic inches.

Front 1738 cubic inches.

Rear 2988 cubic inches.

15.3 A heated automatic drain valve shall be installed on the wet tank. All other tanks shall be equipped with manual drain valves.

16.0 EMERGENCY / PARKING BRAKE

16.1 Spring-actuated emergency/parking shall be installed on the rear axle.

16.2 One (1) Bendix-Westinghouse PP-1 parking brake control shall be supplied on the lower dash panel within easy reach of the driver.

16.3 A Bendix-Westinghouse SR-1 valve, in conjunction with a double check valve system, shall provide automatic spring brake application at 40 PSI.

17.0 ANTILOCK BRAKING SYSTEM

17.1 A Wabco ABS system shall be provided to improve vehicle stability and control by reducing wheel lock-up during braking. This braking system shall be fitted to axles and all electrical connections shall be environmentally-sealed, water-, weather-, and vibration-resistant.

18.0 ISOLATION AIR RESERVOIR

18.1 The air system shall have an additional 1738 cu. in. isolated reservoir. The reservoir shall be equipped with a valve that automatically closes when the ignition is turned off. This shall effectively protect the reservoir from any leaks in the air system. It shall be located under the battery tray officer's side if not equipped with front suction. It shall be located underneath front air tank if equipped with front suction.

19.0 ENGINE

19.1 The apparatus shall utilize a Detroit Diesel engine as described below: (all)

- Series 60 14.0 liter turbocharged
 - Air-to-air after cooled 4cycle diesel
 - Six (6) Cylinder
 - 855 cu.in. displacement
 - 515 gross BHP @ 1800 RPM
 - Gross torque of 1550 lb. ft. at 1200 RPM
 - DDEC V (Detroit Diesel Electronic Controls)
 - Detroit Diesel coolant filter and conditioner treatment
 - Bore and stroke shall be 5.24 x 6.61
 - Compression ratio shall be 16:1
 - Engine lubrication system, including filter, shall have a minimum capacity of 36 quarts
 - Delco-Remy 42MT 12-volt starter
 - 16.5 cubic foot per minute air compressor
 - Cooled Exhaust Gas Re-circulation (EGR)
 - Ember separator compliant with 2003 NFPA 1901 standard
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20.0 ENGINE BRAKE

20.1 One (1) Jacobs model 795 engine brake shall be installed as required by NFPA 1901 for vehicles with gross vehicle weight ratings (GVWR) of 36,000 lbs. or greater.

21.0 TRANSMISSION

21.1 The vehicle shall utilize an Allison EVS4000P, electronic, 5-speed automatic transmission.

21.2 A push button shift module Allison model #29538373 shall be located right side of the steering column, within easy reach of the driver.

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

21.4 The transmission shall have a gross input torque rating of 1600 lb. ft. and a gross input power rating of 540 HP.

21.5 The transmission shall be equipped with a fluid level sensor (FLS) system, providing direct feedback of transmission oil level information to the operator.

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

21.7 The automatic transmission shall be equipped with a power lock-up device. The transmission lock-up shall prevent down shifting of transmission when engine speed is decreased during pump operations, thereby maintaining a constant gear ratio. Transmission lock-up shall be automatically activated when placing pump in gear. Transmission lock-up shall be automatically deactivated when disengaging pump for normal road operation.

22.0 DRIVELINE

22.1 Drivelines shall have a heavy-duty metal tube and shall be equipped with Spicer

1810HD universal joints to allow full-transmitted torque to the axle(s). Drive shafts shall be axially straight, concentric with axis and dynamically balanced. _____

23.0 COOLING SYSTEM

23.1 The cooling system shall have a tube-and-fin radiator with a minimum of 1,288 square inches of frontal area. _____

23.2 All radiator and heater hoses shall be silicone. Pressure compensating band clamps shall be used to eliminate hose pinching on all hoses over 1". _____

23.3 The cooling system shall be filled with a 50/50 mixture of water and antifreeze/coolant conditioner to provide freezing protection to minus 40 (- 40) degrees F for operation in severe winter temperatures. _____

23.4 The system shall include a charge air cooler with a minimum of 888 square inches of frontal area. _____

23.5 Charge air cooler hoses shall be made from high-temperature, wire-reinforced silicone. _____

23.6 Charge air cooler hose clamps shall be heavy-duty, constant-torque, T-bolt clamps. _____

23.7 The fan shall be 30" in diameter. _____

24.0 "T" SHIFTER HANDLE

24.1 A T-handle shift module shall be located right side of the steering column, within easy reach of the driver. The shift position indicator shall be indirectly lit for after dark operation. The shift module shall have a "Do Not Shift" light and "Service" indicator light. The shift module shall have means to enter a diagnostic mode and display diagnostic data. A transmission temperature gauge with warning light and buzzer shall be installed on the cab instrument panel. _____

25.0 CANADIAN CMVSS PACKAGE

25.1 Dashboard gauges shall be calibrated in metric units:

- Speedometer – kph
 - Air pressure – kpa
 - Oil pressure – kpa
 - Water pressure - degrees C
 - Transmission oil temperature - degrees C
- _____

26.0 CAB CONSTRUCTION

26.1 The vehicle shall have an all-welded aluminium, fully enclosed tilt cab designed exclusively for the fire service to ensure long life. It shall incorporate a welded substructure of high-strength aluminium alloy extrusions that surrounds and protects the perimeter of the occupant compartment for increased safety. _____

26.2 The cab shall be constructed from 3/16" (0.188") 3003 H14 aluminium alloy plate roof, floor, and outer skins welded to a high-strength 6063-T6 aluminium alloy extruded sub frame. Wall supports and roof bows are 6061 T6 aluminium alloy. _____

26.3 The inner structure shall be designed to create an interlocking internal

"roll-cage" effect by welding two (2) 3" x 3" x 0.188" wall-thickness 6063-T5 aluminium upright extrusions between the 3" x 3" x 0.375" wall-thickness 6061-T6 roof crossbeam and the 2.25" x 3" x 0.375" wall-thickness 6063-T6 sub frame structure in the front. An additional two (2) aluminium upright extrusions within the back-of-cab structure shall be welded between the rear roof perimeter extrusion and the sub frame structure in the rear to complete the interlocking framework. The four (4) upright extrusions -- two (2) in the front and two (2) in the rear-- shall be designed to effectively transmit roof loads downward into the sub frame structure to help protect the occupant compartment from crushing in a serious accident. All joints shall be electrically seam welded internally using aluminium alloy welding wire.

- 26.4 The sub frame structure shall be constructed from high-strength 6061-T6 aluminium extrusions welded together to provide a structural base for the cab. It shall include a side-to-side C-channel extrusion across the front, with 3/4" x 2-3/4" (.75" x 2.75") full-width cross member tubes spaced at critical points between the front and rear of the cab.
- 26.5 The cab floor shall be constructed from 3/16" (0.188") 3003 H14 smooth aluminium plate welded to the sub frame structure.
- 26.6 The cab roof shall be constructed from 3/16" (0.188") 3003 H14 aluminium tread plate supported by a grid of fore-aft and side-to-side aluminium extrusions.
- 26.7 The cab roof perimeter shall be constructed from 4" x 6-5/8" (4" x 6.625") 6063-T5 aluminium extrusions with integral drip rails. Cast aluminium corner joints shall be welded to the aluminium roof perimeter extrusions to ensure structural integrity. The roof perimeter shall be continuously welded to the cab roof plate to ensure a leak-free roof structure.
- 26.8 The cab rear skin shall be constructed from 3/16" (0.188") 3003 H14 bright aluminium tread plate with the diamonds on the exterior to provide added durability. Structural extrusions shall be used to reinforce the rear wall.
- 26.9 The left-hand and right-hand cab side skins shall be constructed from 3/16" (0.188") 3003 H14 smooth aluminium plate. The skins shall be welded to structural aluminium extrusions at the top, bottom, and sides for additional reinforcement.
- 26.10 The cab front skins shall be constructed from 3/16" (0.188") 3003 H14 smooth aluminium plate. The upper portion shall form the windshield mask, and the lower portion shall form the cab front. Each front corner shall have a full 9" outer radius for strength and appearance. The left-hand and right-hand sides of the windshield mask shall be welded to the left-hand and right-hand front door frames, and the upper edge of the windshield mask shall be welded to the cab roof perimeter extrusion for reinforcement. The cab front shall be welded to the sub frame C-channel extrusion below the line of the headlights to provide protection against frontal impact.
- 26.11 The exterior of the cab shall be 94" wide x 130" long to allow sufficient room in the occupant compartment for four (4) to six (6) personnel. The cab roof shall be approximately 101" above the ground. The back-of-cab to front axle length shall be a minimum of 58".
- 26.12 Front axle fenderette trim shall be brushed aluminium for appearance and corrosion resistance. Bolt-in front wheel well liners shall be constructed of 3/16" (0.188") composite material to provide a maintenance-free, damage-resistant surface.

26.13 Two (2) Ramco model 6001FFR remote controlled polished aluminium mirrors shall be installed. The mirrors shall incorporate a full face main section with a convex mirror with housing , model CAS750, mounted to the top . The adjustment of main sections shall be through dash mounted switches.

26.14 The cab windshield shall be of a two-piece replaceable design for lowered cost of repair. The windshield shall be made from ¼" (0.25") thick curved, laminated safety glass with a 75% light transmittance automotive tint. A combined minimum viewing area of 2,700-sq. in. shall be provided. Forward visibility to the ground for the average (50th percentile) male sitting in the driver's seat shall be no more than 11 feet 7 inches from the front of the cab to ensure good visibility in congested areas.

26.15 Cab door assist handrails shall consist of four (4) 1.25" diameter x 18" long 6063-T5 anodized aluminium tubes mounted directly behind the door openings, two (2) each side of the cab. The handrails shall be machine extruded with integral ribbed surfaces to assure a good grip for personnel safety. Handrails shall be installed between chrome end stanchions and shall be positioned at least 2" from the mounting surface to allow a positive grip with a gloved hand.

27.0 CAB MOUNT AND TILT SYSTEM

27.1 The cab shall be independently mounted from the body and chassis to isolate the cab structure from stresses caused by chassis twisting and body movements. Mounting points shall consist of two (2) forward-pivoting points, one (1) on each side; two (2) intermediate rubber load-bearing cushions located midway along the length of the cab, one on each side; and two (2) combination rubber shock mounts and cab latches located at the rear of the cab, one (1) on each side.

27.2 An electric-over-hydraulic cab tilt system shall be provided to provide easy access to the engine. It shall consist of two (2) large-diameter, telescoping, hydraulic lift cylinders, one (1) on each side of the cab, with a frame-mounted electric-over-hydraulic pump for cylinder actuation.

27.3 Safety flow fuses (velocity fuses) shall be provided in the hydraulic lift cylinders to prevent the raised cab from suddenly dropping in case of a burst hydraulic hose or other hydraulic failure. The safety flow fuses shall operate when the cab is in any position, not just the fully raised position.

27.4 The hydraulic pump shall have a manual override system as a backup in the event of an electrical failure. Lift controls shall be located in a compartment to the rear of the cab on the right side of the apparatus. A parking brake interlock shall be provided as a safety feature to prevent the cab from being tilted unless the parking break is set.

27.5 The entire cab shall be tilted through a 40-degree arc to allow for easy maintenance of the engine, transmission and engine components. A positive-engagement safety latch shall be provided to lock the cab in the full tilt position to provide additional safety for personnel working under the raised cab.

27.6 In the lowered position, the cab shall be locked down by two (2) automatic, spring-loaded cab latches at the rear of the cab. A "cab ajar" indicator light shall be provided on the instrument panel to warn the driver when the cab is not completely locked into the lowered position.

28.0 CAB INTERIOR

- 28.1 The interior of the cab shall be of the open design with an ergonomically designed driver area that provides ready access to all controls as well as a clear view of critical instrumentation. _____
- 28.2 The engine cover between the driver and the officer shall be a low-rise contoured design to provide sufficient seating and elbow room for the driver and the officer. The engine cover shall blend in smoothly with the interior dash and flooring of the cab. An all-aluminium sub frame shall be provided for the engine cover for strength. The overall height of the engine enclosure shall not exceed 23" from the floor at each side and 27" in the centre section. The engine cover shall not exceed 41" in width at its widest point. _____
- 28.3 The rear portion of the engine cover shall be provided with a lift-up section to provide easy access for checking transmission fluid, power steering fluid, and engine oil without raising the cab. The engine cover insulation shall consist of ¾" dual density fibre glass composite panels with foil backing manufactured to specifically fit the engine cover without modification to eliminate "sagging" as found with foam insulation. The insulation shall meet or exceed DOT standard MVSS 302-1 and V-0 (UI subject 94 Test). _____
- 28.4 Externally, the engine cover is a molded 18 lb/cu.ft (+/-0.5) flexible integral skinned polyurethane foam at a Durometer of 60 (+/- 5.0) per ASTM F1957-99 and with a minimum skin thickness of 0.0625 inches and shall be provided to reduce the transmission noise and heat from the engine. There shall be molded integral arm rests provided for both the driver and the officer as well as large cup holders. _____
- 28.5 All cab floors shall be covered with a black rubber floor mat that provides an aggressive slip-resistant surface in accordance with current NFPA 1901. _____
- 28.6 A minimum of 57.25" of floor-to-ceiling height shall be provided in the front seating area of the cab and a minimum of 55.25" floor-to-ceiling height shall be provided in the rear seating area. A minimum of 40" of seated headroom shall be provided over each fender well. _____
- 28.7 The floor area in front of the front seat pedestals shall be no less than 20.5" side to side by 25.0" front to rear for the driver and no less than 20.5" side to side by 26.0" front to rear for the officer to provide adequate legroom. _____
- 28.8 Battery jumper studs shall be provided to allow jump-starting of the apparatus without having to tilt the cab. _____
- 28.9 All exposed interior metal surfaces shall be pretreated using a corrosion prevention system. _____
- 28.10 The interior of the cab shall be insulated to ensure the sound (dbA) level for the cab interior is within the limits stated in the current edition of NFPA 1901. The insulation shall consist of 2 oz. wadding and ¼" (0.25") foam padding. The padding board shall be backed with ¼" (0.25") thick reflective insulation. The backing shall be spun-woven polyester. Interior cab padding shall consist of a rear cab headliner, a rear wall panel, and side panels between the front and rear cab doors. _____
- 28.11 All surfaces subject to repeated contact and wear -- the dash, overhead console, windshield posts, headliner, door panels, and door post trim -- shall be covered with thermoformed, non-metallic, non-fiber trim pieces or panels to provide excellent scuff and abrasion resistance, as well as chemical stain resistance. The thermoformed material shall comply with Federal Motor Vehicle Safety Standard (FMVSS) 302 for flammability of interior materials. _____

- 28.12 The vehicle shall use a seven-position tilt and telescopic steering column to accommodate various size operators. An 18" padded steering wheel with a centre horn button shall be provided. _____
- 28.13 A full-width overhead console shall be mounted to the cab ceiling for placement of siren and radio heads, and for warning light switches. The console shall be made from a thermoformed, non-metallic material and shall have easily removable mounting plates. _____
- 28.14 Storage areas, with hinged access doors, shall be provided below the driver and officer seats. The driver side compartment shall be approximately 20" x 12" x 3.5" high and the officer side compartment shall be approximately 20.25" x 22.75" x 11" high. _____
- 28.15 The front cab steps shall be a minimum of 8" deep x 24" wide. The first step shall be 18.0" above the ground with standard tires in the unloaded condition. The rear cab steps shall be a minimum 12" deep x 21" wide. The first step shall be 20.5" above the ground with standard tires in the unloaded condition. The rear steps shall incorporate intermediate steps for easy access to the cab. The steps are to be located inside the doorsill, where they are protected against mud, snow, ice, and weather. The step surfaces shall be aluminium diamond plate with a multi-directional, aggressive gripping surface incorporated into the aluminium diamond plate in accordance with current NFPA 1901. _____
- 28.16 A black rubber grip handle shall be provided on the interior of each front door below the door window to ensure proper hand holds while entering and exiting the cab. An additional black rubber grip handle shall be provided on the left and right side windshield post for additional handholds. _____
- 29.0 CAB DOORS**
- 29.1 There shall be reflective signs on each cab door in compliance with all NFPA requirements. _____
- 29.2 Four (4) side-opening cab doors shall be provided. Doors shall be constructed of a 3/16" (0.188") aluminium plate outer material with an aluminium extruded inner framework to provide a structure that is as strong as the side skins. _____
- 29.3 Front cab door openings shall be approximately 36" wide x 71.5" high, and the rear cab door openings shall be approximately 33.75" wide x 73" high. The front doors shall open approximately 75 degrees, and the rear doors shall open approximately 80 degrees. _____
- 29.4 The inner door panels shall be made from a thermoformed, non-metallic, non-fibre material for increased durability and sound deadening. The cab door panels shall incorporate an easily removable panel for access to the latching mechanism for maintenance or service. _____
- 29.5 The doors shall be securely fastened to the doorframes with full-length, stainless steel piano hinges, with 3/8" (0.375") diameter pins for proper door alignment, long life, and corrosion resistance. Mounting hardware shall be treated with corrosion-resistant material prior to installation. For effective sealing, an extruded rubber gasket shall be provided around the entire perimeter of all doors. _____
- 29.6 Stainless steel paddle-style door latches shall be provided on the interiors of _____

the doors. The latches shall be designed and installed to protect against accidental or inadvertent opening as required by NFPA 1901. "L"-type door handles shall be provide on the exteriors of the doors.

29.7 Aluminium bright-finish tread plate scuff panels shall be provided on the lower interior portion of all doors to protect the door panels from wear. The scuff panels shall extend from the bottom of the door to approximately 4" above the floor line on the front doors and from the bottom of the door to approximately 8.5" above the floor line on the rear doors.

29.8 The front door windows shall provide a minimum viewing area of 530 sq. in. each. The rear door windows shall provide a minimum viewing area of 500 sq. in. each. All windows shall have 75% light transmittance automotive safety tint. Full roll-down windows shall be provided for the front cab doors with worm gear drive cable operation for positive operation and long life. Scissors or gear-and-sector drives are not acceptable. Rear cab doors shall be provided with full roll down windows.

30.0 INTERIOR LIGHTING

30.1 Interior cab lighting shall include four (4) individually switched lights in the ceiling, two (2) in the front and two (2) in the rear. Each light shall be white and be 7" in diameter.

30.2 Four (4) step lights, one (1) in each of the four (4) cab doors, shall be installed to provide downward illumination of the steps and the surrounding ground.

30.3 The cab ceiling lights and the step lights shall be wired through the "door ajar" switch to provide interior lighting when the battery power is on and any cab door is opened.

30.4 An engine compartment light with a switch shall be installed to illuminate the engine compartment.

31.0 CAB INSTRUMENTS AND CONTROLS

31.1 Two (2) pantograph-style windshield wipers with two (2) separate electric motors shall be provided for positive operation. Air-operated windshield wipers are not acceptable. The wipers shall be a wet-arm type with a one (1) gallon washer fluid reservoir, an intermittent-wipe function, and an integral wash circuit. Wiper arm length shall be approximately 28", and the blade length approximately 20". Each arm shall have a 70 degree sweep for full coverage of the windshield.

31.2 An in-dash mounted heater and defroster with a minimum capacity of 42,000 BTU/hr and all necessary controls shall be mounted in the cab. The airflow system shall consist of three (3) levels, defrost, cab, and floor, and shall have fresh air and defogging capabilities.

31.3 Cab instruments and controls shall be located on the cab instrument panel in the dashboard on the driver's side where they are clearly visible and easily reachable. Gauges and emergency warning light switches shall be installed in removable panels for ease of service. The following gauges and controls shall be provided:

Speedometer/Odometer
Tachometer with integral hour meter
Engine oil pressure gauge with warning light and buzzer
Engine water temperature gauge with warning light and buzzer
Two (2) air pressure gauges with a warning light and buzzer (front air and rear air)
Fuel gauge
Voltmeter
Master battery switch/ignition switch (rocker with integral indicator)
Starter switch/engine stop switch (rocker)
Heater and defroster controls with illumination
Marker light/headlight control switch with dimmer switch
Self-canceling turn signal control with indicators
Windshield wiper switch with intermittent control and washer control
Master warning light switch
Transmission oil temperature gauge
Air filter restriction indicator
Pump shift control with green "pump in gear" and "o.k. to pump" indicator lights
Parking brake controls with red indicator light on dash
Automatic transmission shift console
Electric horn button at centre of steering wheel
Cab ajar warning light on the message centre enunciator
Door ajar warning light on the centre section of the overhead console _____

31.4 Instrument controls and switches shall be identified as to their function by backlit wording adjacent to each switch, or indirect panel lighting adjacent to the controls. _____

32.0 FAST IDLE SYSTEM

32.1 A fast idle system shall be provided and controlled by the cab-mounted or pump panel-mounted switch. The system shall increase engine idle speed to a preset RPM for increased alternator output. (The cab dash has a position for the switch by default, if the switch is to be located on the pump panel it must be annotated in "Location".) _____

33.0 ELECTRICAL SYSTEM

33.1 The cab and chassis system shall have a centrally located electrical distribution area. All electrical components shall be located such that standard operations shall not interfere with or disrupt vehicle operation. An automatic thermal-reset master circuit breaker compatible with the alternator size shall be provided. Automatic-reset circuit breakers shall be used for directional lights, cab heater, battery power, ignition, and other circuits. An access cover shall be provided for maintenance access to the electrical distribution area. _____

33.2 A 6 place, constantly hot, and 6 place ignition switched fuse panel and ground for customer-installed radios and chargers shall be provided at the electrical distribution area. radio suppression shall be sufficient to allow radio equipment operation without interference. _____

33.3 A 6 place, constantly hot, and 6 place ignition switched fuse panel and ground for customer-installed radios and chargers shall be provided at the electrical distribution area. radio suppression shall be sufficient to allow radio equipment operation without interference. _____

33.4 All wiring shall be mounted in the chassis frame and protected from impact, abrasion, water, ice, and heat sources. The wiring shall be color-coded and

functionally-labeled every 3" on the outer surface of the insulation for ease of identification and maintenance. The wiring harness shall conform to sae 1127 with GXL temperature properties. Any wiring connections exposed to the outside environment shall be weather-resistant. All harnesses shall be covered in a loom that is rated at 280 degrees f to protect the wiring against heat and abrasion. _____

33.5 A vehicle data computer (VDC) shall be supplied within the electrical system to process and distribute engine and transmission electronic control module (ECM) information to chassis system gauges, the message center, and related pump panel gauges. Communication between the VDC and chassis system gauges shall be through a 4 wire multiplexed communication system to ensure accurate engine and transmission data is provided at the cab dash and pump. The VDC shall be protected against corrosion, excessive heat, vibration, and physical damage. _____

33.6 Two (2) dual rectangular sealed beam halogen headlights shall be installed on the front of the cab, one (1) on each side, mounted in a polished chrome-plated bezel. The low beam headlights shall activate with the release of the parking brake to provide daytime running lights (DRL) for additional vehicle conspicuity and safety. The headlight switch shall automatically override the DRL for normal low beam/high beam operation. _____

33.7 Ground area lights shall be provided for each cab door and one (1) on each side under the front bumper area. Lights under the driver and crew area exits shall be activated automatically when the exit doors are opened. Ground area lights shall be switched from the cab dash with the work light switch. _____

34.0 SUNVISORS

34.1 Padded sunvisors shall be provided for the driver and officer matching the interior trim of the cab and shall be flush mounted into the underside of the overhead console. _____

35. SEATS

35.1 All seat cushions in the cab will manufactured by 911 Seats Incorporated and will be upholstered with FMVSS/302 flame-retardant, water repellent and wear resistant black and gray tweed, Imperial 1200 fabric. _____

35.2 One (1) Seats, Inc 911 air suspension seat shall be supplied for the driver's position. Features shall include:

Universal styling
High back seat back
Low profile air suspension assembly with rubber accordion cover
Weight, height and ride adjustment
Built-in back and lumbar adjustment
4" fore and aft adjustment _____

35.3 One (1) Seats, Inc. 911 Universal fixed SCBA seat shall be supplied for the officer's position in front of the cab to the right of the driver's position. Features shall include:

Universal styling.
High back seat back.
Built-in back and lumbar adjustment.
Easy exit, flip up, and split headrest for improved exit with SCBA. _____

35.4 Two (2) Seats, Inc. 911 Universal SCBA seats shall be provided rear facing located in both wheel wells. Features shall include:

Universal styling.
High back seat back.
Easy exit, flip up, and split headrest for improved exit with SCBA.

- 35.5 Two (2) Seats, Inc. 911 Universal SCBA seat backs and a two (2) person bench style seat bottom with a single cushion shall be mounted on the rear wall of the cab. Each side of the seat riser shall be angled, providing sufficient legroom while entering and exiting the cab. Features shall include:

Universal styling
Easy exit, flip up, and split headrest for improved exit with SCBA.
Bench cushion shall be constructed of high-density foam with a heavy-duty wear resistant material.

- 35.5.1 All seat positions shall have a bright red retractable 3-point lap and shoulder harness, providing additional safety and security for personnel. Extensions shall be provided with the seat belts so the male end can be easily grasped and the female end easily located while sitting in a normal position.
-

36.0 INTERIOR COLOUR

- 36.1 Cab instrument panel, overhead console, trim panels, headliner, and door panels shall be grey.
-

37.0 SCUFF PLATES

- 37.1 A stainless steel scuff plate shall be installed at each cab door "L" handle for added paint protection.
-

38.0 AIR PACK BOTTLE BRACKETS

- 38.1 A Ziamatic bottle bracket model # KD-ULLH consisting of a backplate, short footplate, two non-mar double-coated seats and a "Load & Lock" adjustable strap assembly shall be provided. The backplate and footplate will be black thermo-plastic coated. The clips will be double coated as to not mar cylinders. The bracket shall fit all U.S. made 30 to 60 minute rated self-contained breathing apparatus.
-

39.0 HEATED MIRRORS

- 39.1 Heated rear view mirrors shall be mounted on each side of the cab. A mirror heater control shall be mounted in the dash.
-

40.0 MUDFLAPS

- 40.1. Black linear low density polyethylene (proprietary blend) mudflaps shall be installed on the rear of the cab front wheelwells. The design of the mudflap shall have corrugated ridges to distribute water evenly.
-

41.0 REAR CAB HEATER

- 41.1 Dual 25,000 BTU water heaters with diamond plate covers shall be supplied on the rear of the cab wall to heat the rear cab section. A single control switch shall be located on the cab instrument panel.
-

42.0 AIR CONDITIONING

- 42.1 A dual in-cab evaporator system with condenser shall be provided. It shall be a

three level air control system. _____

42.2 There shall be five (5) adjustable multidirectional comfort air outlets, four (4) main defrost outlets, and two (2) auxiliary corner defrost outlets. The knob control panel shall actuate the air-distribution system with air cylinders, which are separated from the brake system by an 85-90 psi pressure protection valve. A three-speed blower switch shall control air speed. Airflow is to be approximately 490 cfm on high speed. _____

42.3 The rear evaporator shall be mounted to the headliner and have a three-speed blower switch. There shall be eight (8) adjustable multidirectional air vents with airflow approximately 325 cfm on high speed. _____

42.4 The front evaporator shall be mounted overhead and capable of 24,000 BTU's maximum. The rear evaporator shall also be mounted overhead and capable of 38,000 BTU's. The front heater shall produce 40,000 BTU's. _____

42.5 Both evaporators shall have block type expansion valves and be thermostatically protected to prevent freeze up. _____

42.6 There shall be two condensers roof mounted when a Detroit Series 60 engine is selected and have a maximum capacity of 32,500 BTU's each and have a fan and a built-in receiver/drier with moisture indicator. _____

42.7 The compressor shall be a ten-cylinder swash-plate type Seltec Model TM-31HD series with a capacity of 19.1 cu. In. per revolution. Compressor speed, dependent on engine drive pulley options, shall be approximately 1:5:1. _____

43.0 ALTERNATOR

43.1 There shall be dual 270 amp Leece Neville alternators installed. The alternators shall be Leece Neville pad mount brushless type with integral rectifiers and adjustable master/slave voltage regulators with a combined output of 480 amps per NFPA 1901 rating (540 amps per SAE J56). _____

44.0 BATTERIES

44.1 The manufacturer shall supply four (4) WestPenn Deka Model 1131XMF heavy-duty Group 31 12-volt maintenance-free batteries. Each battery shall be installed and positioned so as to allow easy replacement of any single battery. Each battery shall be equipped with carrying handles to facilitate ease of removal and replacement. There shall be two (2) steel frame-mounted battery boxes, one on the left frame rail and one (1) on the right frame rail. Each battery box shall be secured to the frame rail with Grade 8 hardware. Each battery box shall hold (2) batteries. The batteries shall have a minimum combined rating of 4,000 (4 x 1000) cold cranking amps (CCA) @ 0 degrees Fahrenheit and 820 (4 x 205) minutes of reserve capacity for extended operation. The batteries shall have 3/8-16 threaded stud terminals to ensure tight cable connections. The battery stud terminals shall each be treated with concentrated industrial soft-seal after cable installation to promote corrosion prevention. The positive and negative battery stud terminals and the respective cables shall be clearly marked to ensure quick and mistake-proof identification. _____

44.2 Batteries shall be placed on non-corrosive rubber matting and secured with hold-down brackets to prevent movement, vibration, and road shock. The hold-down bracket J-hooks shall be cut to fit and shall have all sharp edges

removed. The batteries shall be placed in plastic trays to provide preliminary containment should there be leakage of hazardous battery fluids. There shall be two (2) plastic trays, each containing (2) batteries. Each battery tray shall be equipped with a rubber vent hose to facilitate drainage. The rubber vent hose shall be routed to drain beneath the battery box. The batteries shall be positioned in well-ventilated areas.

45.0 FRONT TURN SIGNALS

45.1 Two (2) Advanced Technology model 499 6" x 4" amber sealed-beam halogen turn signals shall be provided on the front of the cab, one (1) on each side above the headlights outboard of the front lower level warning lights.

45.2 There shall be a pair of Federal QL64XF LED (Light Emitting Diode) turn signal light heads with populated arrow pattern and amber lens mounted as specified and wired with weatherproof connectors.

46.0 DEFOGGER FANS

46.1 Two (2) adjustable windshield defogger fans with individual switches shall be mounted in the cab centered below the overhead console. The fans shall be 12 volt and shall each be rated at 250 CFM.

47.0 FORWARD AERIAL SUPPORT

47.1 The aerial ladder support shall be fabricated from A36 steel. It shall be located behind the rear wall of the cab and shall be bolted to the frame rails.

48.0 ALUMINIUM WHEELS

48.1 The vehicle shall have all ten (10) polished (on outer wheel surfaces only) aluminium disc wheels. They shall be forged from one-piece corrosion resistant aluminium alloy.

49.0 DRAWINGS

49.1 A general arrangement drawings depicting the vehicle's appearance shall be provided. The drawing shall consist of left side, right side, front, and rear elevation views.

49.2 Vehicles requiring pump controls shall include a general arrangement view of the pump operator's position, scaled the same as the elevation views.

50.0 FRONT TOW HOOKS

50.1 Two (2) ¾" heavy-duty painted front tow hooks shall be securely bolted to the front chassis frame rail extensions to allow towing (not lifting) of the apparatus without damage. They shall be mounted in the downward position.

51.0 AIR HORNS

51.1 Dual air horns shall be provided, connected to the chassis air system. The horns shall be mounted through the front bumper. The front bumper shall have two (2) holes punched to accommodate the horns. A pressure protection valve shall be installed to prevent the air brake system from being depleted of air pressure.

51.2 There shall be a "Y" style lanyard mounted in the centre of the cab that allows the driver and officer to operate the air horns. The lanyard shall activate an electrical

air switch.

52.0 REAR MUD FLAPS

52.1 Black linear low density polyethylene (proprietary blend) mud flaps shall be installed on the rear body wheelwells. A reflective logo shall be adhered to the flap itself. The design of the mud flap shall have corrugated ridges to distribute water evenly.

53.0 REAR TOW EYES

53.1 Two (2) heavy-duty tow eyes made of $\frac{3}{4}$ " (0.75") thick steel having 2.5" diameter holes shall be bolted directly to the rear of the frame to allow towing (not lifting) of the apparatus without damage. The tow eyes shall be protruding into the rear compartment or out the rear of the body. The tow eyes shall be painted chassis black.

54.0 BATTERY CHARGER

54.1 A 20-amp battery charging system shall be installed and connected directly to the shoreline to ensure the batteries remain fully charged while the vehicle is in the fire station or firehouse. The system shall provide a visual signal if battery voltage drops below 11.5 volts. The microprocessor shall be continuously powered from the battery to provide the charge status. Equalization charge shall only occur when necessary, not with every cycle. The system shall fully charge the batteries while allowing up to 8 amps of additional load for onboard systems. The shoreline connection and remote charge indicator panel shall be located outside of the cab at the driver door area.

55.0 AERIAL EQUIPMENT BODY

55.1 The aerial body shall be designed to permit the reloading of fire hose without raising the aerial from the stored position.

55.2 The apparatus body shall be constructed entirely of aluminium extrusions with interlocking aluminium plates.

55.3 The apparatus shall incorporate a rescue style body design to maximize compartment space. The rescue style left and right side body shall combine upper and lower compartments to provide more efficient use of body storage capacity.

55.4 The entire vehicle shall be constructed of aluminium extrusions. Body designs that incorporate steel sub-frames connected to aluminium compartments are not acceptable.

56.0 BODY MAINFRAME

56.1 The body mainframe shall be entirely constructed of aluminium. The complete framework shall be constructed of 6061T6 and 6063T5 aluminium alloy extrusions welded together using 5356 aluminium alloy welding wire.

56.2 The mainframe shall incorporate a series of vertical frame components connected in series. Each vertical frame assembly shall be constructed with 3" x 3" extrusions welded together in a square frame configuration. The open centre shall permit the installation of a tunnel for ground ladder storage. The mainframe shall be held together from front to rear by two (2) solid $\frac{1}{2}$ " x 3" aluminium braces on each side of the vertical frame components. The braces shall also serve as the connection point between the torque box and body frame. The body side compartments

shall be connected and supported by the extruded aluminium mainframe assembly.

57.0 BODY SIDE ASSEMBLIES

57.1 The left and right side body assemblies shall be framed with 6063T5 1 ½" x 4" 3/16" wall extrusions. The left side body compartments shall be framed to make full height compartments ahead and behind the wheel well opening. The body side assemblies shall be designed so that the compartment walls are not required to support the body. The compartments shall be interlocked and welded to the side assembly extrusions.

57.2 The top of the body side assemblies shall be supplied with embossed diamond plate covers with polished corners to minimize maintenance and provide service access to electrical components.

58.0 WHEEL WELL OPENING

58.1 The wheel well frame, constructed from 1-1/2" x 4" 6063T5 aluminium extrusions shall be slotted the full length to permit an internal fit of 1/8" aluminium tread plate above the tandem wheel well openings.

58.2 The wheel well liners shall be a high strength composite material with a black finish. The liners shall be bolted in for easy service and repair.

59.0 STABILIZER OPENINGS

59.1 The body shall be designed to accommodate a four (4) stabilizer aerial system. One (1) opening shall be supplied behind the rear axle as close to the wheel well opening as possible to maximize rear angle of departure and to prevent the stabilizer pads from contacting the ground during driving. The second set shall be mounted just behind the pump compartment. The openings shall be framed in aluminium extrusions. A stabilizer cover made from tread plate shall be supplied on the extendable stabilizer. The cover shall provide mounting location for a red stabilizer warning light as outlined in NFPA 1901 20.21.4.4.

59.2 The stabilizer openings shall be supplied with clear lights to illuminate the stabilizers and the ground surrounding the openings. The lights shall illuminate when any stabilizer is moved from the stored position.

60.0 BODY MOUNTING SYSTEM

60.1 The body shall attach to the integral torquebox with grade 8 bolts connected through steel mounts welded on the side of the torque box. To isolate dissimilar metals a ¼" fibre-reinforced rubber dielectric barrier between the aluminium body and steel torque box shall be supplied. Body designs that weld to the aerial torque box or chassis frame rails shall not be acceptable due to the stress imposed on the vehicle during road travel and aerial operations.

61.0 REAR BODY DESIGN

61.1 The rear body shall be designed to provide ground ladder storage, hose deployment, and service access to aerial components. The centre rear of the body shall be open for ground ladder storage. The area below the ground ladder storage shall be for a waterway inlet, the stabilizer control panel and have access doors to hydraulic components.

61.2 The aerial master control panel that is located on the rear of the body shall consist of a master switch, interlock light, and indicators that illuminate when

each stabilizer is deployed. The stabilizer controls shall be divided into two (2) boxes located one (1) each side on the rear body so the operator may observe the stabilizers being deployed on each side of the apparatus as outlined in NFPA 1901.

62.0 SIDE AERIAL ACCESS STAIRCASE

62.1 A single access staircase shall be supplied on the driver's side of the apparatus to the aerial turntable. The staircase shall incorporate a pocket-style drop-down step in the body rub rail to reduce ground to staircase step height when the unit is up on jacks. The angled staircase shall be supplied with extruded aluminium handrails on both sides of the staircase frame.

63.0 WATER TANK MOUNTING SYSTEM

63.1 The body design shall allow the booster tank to be completely removable without disturbing or dismounting the apparatus body structure. The water tank shall rest on top of a 3" x 3" frame assembly covered with rubber shock pads and corner braces formed from 3/16" angled plate to support the tank.

63.2 The booster tank mounting system shall utilize a floating design to reduce stress from road travel and vibration. To maintain low vehicle centre of gravity, the water tank bottom shall be mounted within 5" of the frame rail top. Designs that store ground ladders under the water tank and raise centre of gravity shall not be acceptable.

64.0 COMPARTMENTS

64.1 All body compartment walls and ceilings shall be constructed from 1/8" formed aluminium 3003 H14 alloy plate. Each compartment shall be modular in design and shall not be part of the body support structure.

64.2 Compartment floors shall be constructed of 1/8" aluminium diamond plate welded in place. Compartment floors that are over 15" deep shall be supported by a minimum 1.5" x 3" x 1/8" walled aluminium extrusions. The compartment seams shall be sealed using a permanent pliable silicone caulk. A series of louvers shall be supplied to facilitate ventilation of each compartment. Each louver shall be 3" wide by 3/4" tall and 1/2" deep.

65.0 HANDRAILS

65.1 Access handrails shall be provided at all step positions, including, but not limited to, the rear corner tailboard and installed to NFPA 1901 15.8. All body handrails shall be constructed of maintenance-free, corrosion-resistant, extruded aluminium. Handrails shall be a minimum of 1.25" OD and shall be installed between chrome end stanchions at least 2" from the mounting surface to allow for access with a gloved hand. The extruded aluminium shall be ribbed to assure a good grip for personnel safety.

65.2 The handrails shall be installed as follows:

Two (2) 48" handrails, one (1) each side, located on the aerial access stair case.

66.0 STEPS, STANDING AND WALKING SURFACES

66.1 The maximum stepping distance shall not exceed 18", with the exception of the ground to first step. The ground to first step shall not exceed 24". The ground to first step shall be maintained when the stabilizers are deployed by an auxiliary set of steps installed at the aerial access staircase. All steps or ladders shall sustain

a minimum static load of 500 lbs. without deformation as outlined in NFPA 15.7.2.

67.0 APPARATUS WARNING LABELS

67.1 A label shall be supplied on the rear body to warn personnel that riding in or on the rear step is prohibited as outlined in NFPA 1901 15.7.4. A label shall be applied to both sides of the apparatus and the rear to warn operators that the aerial is not insulated.

68.0 RUB RAIL

68.1 The body shall have a rub rail along the length of the body on each side and at the rear. The rub rail shall be constructed of minimum 3/16" thick anodized aluminium 6463T6 extrusion. The rub rail shall be a minimum of 2.75" high x 1.25" deep and shall extend beyond the body width to protect compartment doors and the body side.

68.2 The rub rail shall be of a C-channel design to allow marker and warning lights to be recessed inside for protection. The top surface of the rub rail shall have a minimum of five (5) serrations raised .1" high with cross grooves to provide a slip-resistant edge for the rear step and running boards. The rub rail shall be spaced away from the body using 3/16" nylon spacers. The ends of each section shall be provided with a rounded corner piece. The area inside the rub rail C-channel shall be inset with a white reflective material for increased side and rear visibility.

69.0 AERIAL SPECIFICATIONS

69.1 The apparatus shall be designed and built to operate on a continuous duty basis in the climatic conditions common to the City of Winnipeg. The City of Winnipeg has four seasons with ambient temperatures ranging from approximately 95 F (35 C) to -40 F (-40 C), with an average annual snow fall of approximately 42 inches. The apparatus when not in use will be stored in a heated building.

70.0 AERIAL DEVICE

70.1 It is the intent of these specifications to describe a telescopic elevating platform of the open truss design that is compliant with NFPA 1901 (2003 edition) Chapter 20 sections 20.7 through 20.12 and sections 20.17 through 20.25. Some portions of this specification exceed minimum NFPA recommendations and are to be considered a minimum requirement to be met.

70.2 The elevating platform shall consist of three (3) extruded aluminium telescopic ladder sections operating from approximately -6 degrees to 80 degrees and designed to provide continuous egress for firefighters and civilians from an elevated position to the turntable.

70.3 The elevating platform shall have a vertical height of not less than 100' at full extension and elevation. The measurement of height shall be consistent with NFPA 1901 section 20.7.2. The rated horizontal reach shall be 91'-6". The measurement of horizontal reach shall be consistent with NFPA 1901 20.7.3. The measurement shall be from the outer edge of the platform handrail at full extension to the centerline of turntable rotation.

70.4 The aerial shall be able to rotate 270 degrees at -6 degrees elevation and a full 300 degrees at -3 degrees elevation.

- 70.5 The aerial shall have a maximum stabilizer spread of 15'-6" from pin to pin with the stabilizers deployed to maximum extension. The aerial platform shall be rated to provide full operating capacities in up to 35 mph wind conditions. _____
- 70.6. The aerial ladder shall exceed the requirements of NFPA 1901 20.7 Elevating Platform Requirements as detailed in these specifications. To ensure a high strength-to-weight ratio and an inherent corrosion resistance, the aerial device shall be completely constructed of high strength aluminium. All side rails, rungs, handrails, uprights, and K-braces shall be made of structural 6061T6 aluminium alloy extrusions. All material shall be tested and certified by the material supplier. All ladder sections shall be semi-automatically welded by inert gas shielded arc welding methods using 5356 aluminium alloy welding wire. Structural rivets or bolts shall not be utilized in the ladder weldment sections. _____
- 70.7 Due to the unpredictable nature of fire-ground operations, a minimum safety factor of 2.5 to 1 is desired. This structural safety factor shall apply to all structural aerial components including turntable and torque box stabilizer components. Definition of the structural safety factor shall be as outlined in NFPA 1901 A.20.20.1:
- DL** = Dead load stress. Stress produced by the weight of the aerial device and all permanently attached components.
RL = Rated capacity stress. Stress produced by the rated capacity load of the ladder.
WL = Water load stress. Stress produced by nozzle reaction force and the weight of water in the water delivery system.
FY = Material yield strength. The stress at which material exhibits permanent deformation.
 $2.5 \times \mathbf{DL} + 2.5 \times \mathbf{RL} + 2 \times \mathbf{WL}$ equal to/less than **FY**
- The minimum NFPA specification is exceeded in this paragraph by requiring safety margin above 2 to 1 while flowing water.
- The stability factor or tip over safety margin shall be a minimum of 1.5 to 1 as defined by NFPA 1901 20.21. _____
- 70.8 An independent engineering firm shall verify the aerial safety factor. Design verification shall include computer modeling and analysis, and extensive strain gauge testing performed by an independent registered professional engineer. _____
- 70.9 Verification shall include written certification from the independent engineering firm made available within 48 hours by the bidder upon request from the Contract Administrator. **NO EXCEPTIONS.** _____
- 70.10 All welding of aerial components, including the aerial ladder sections, turntable, torque box and outriggers shall be performed by welders who are certified to American Welding Society Standards D1.1, D1.2 and D1.3 as outlined in NFPA 1901 20.22.3.1. _____
- 70.11 The weldment assemblies of each production unit shall be tested visually and mechanically by an ASNT certified level II non-destructive test technician to comply with NFPA 1901 20.22.2. Testing procedures shall conform to the American Welding Society Standard B1.10 Guide for non-destructive testing. Test methods may include dye penetrate, ultrasound, and magnetic particle where applicable. _____
- 70.12 Each ladder section shall consist of two (2) heavy extruded aluminium side rails and a combination of aluminium rungs, tubular diagonals, verticals, and two (2) full-length handrails. The rungs on all sections shall be K-braced for maximum lateral stability. This K-bracing shall extend to the

center of each rung to minimize ladder side deflection.

70.13 The ladder rungs shall be designed to eliminate the need for rubber rung covers. The rungs shall be spaced on 14-inch centers and have integral skid-resistant surfaces as outlined in NFPA 1901 20.2.5 through 20.5.2.3. An oval-shaped rung shall be utilized to provide a larger step surface at low angles and more comfortable grip at elevated positions. The minimum design load shall be 500 pounds per rung distributed over a 3 ½ " (3.5")-wide area as outlined in NFPA 1901 20.2.5.4. **NO EXCEPTIONS.**

70.14 The minimum design load shall be 500 pounds distributed over a 3-1/2 " wide area per rung as outlined in NFPA 1901 20.2.5.4.

71.0 SECTION WIDTH HEIGHT

71.1 Base Section 45-1/4" 34-5/8"
Second Section 36-1/4" 30-3/8"
Fly Section 28-1/2" 26-9/16"

72.0 FIREFIGHTING PLATFORM

72.1 The platform shall be entirely constructed of aluminium and mounted to the end of the fly section.

72.2 The inside of the platform shall measure 37-1/4" long x 74-3/4" wide and contain 18.9 square feet of floor space. This exceeds the minimum NFPA 1901 20.7.6 requirement of 14 square feet. A continuous railing with 42" high side rails shall be supplied on all sides of the platform. There shall be no openings below the handrail larger than 24" in either direction.

72.3 The platform shall be constructed using a perimeter pipe system to carry water and serve as a structural component of the platform. The design of the platform shall minimize the distance between ladder center line and platform bottom heat shield. This requirement is to provide maximum visibility for the driver. A 4" high kick plate and grated floor assembly shall be supplied on the platform floor. The grated floor shall prevent water accumulation in the platform. These requirements are detailed in NFPA 1901 20.7.6.3 through 20.7.6.5.

72.4 A reflective aluminium heat shield shall be supplied on the front, bottom, sides, and rear of the platform as outlined in NFPA 1901 20.7.6.6.

72.5 A step shall be supplied over the pipe system around the front and sides of the platform for easy egress. This step shall be 8" deep and provide an additional 6.5 square feet of platform floor space.

72.6 The platform shall have three (3) gates for entry and exit, exceeding the two (2) required by NFPA 1901 20.7.6.2.2 through 20.7.6.2.3. Two (2) of the gates shall be mounted on the front corners of the platform. The front gates shall be 20-1/2" wide with inward swinging spring-loaded doors. Each front door shall have an interior mounted self latching handle. The front door handles shall have a push-to-open emergency release feature to allow the doors to be opened from the exterior by applying a force greater than 90 lbs. on the door.

72.7 This feature allows for quick entry into the platform without having to locate or actuate the handle.

72.8 The third platform access shall be at the rear of the platform to enter from the ladder. A Fire Research Aerial Saver shall be mounted in the opening with a loop

that extends under the bar. The bar shall slide up or in, but not out toward the base.

73.0 HARNESS ATTACHMENTS

73.1 There shall be four (4) attachment rings inside the platform for operators to attach fall protection harnesses (Life Belts). The rings shall be designed for personnel harnesses and are not intended to secure rescue ropes.

74.0 PLATFORM WATER CURTAIN

74.1 A water curtain system shall be installed under the platform to provide a 75 GPM cooling stream beneath the platform as outlined in NFPA 1901 20.7.6.7. The nozzle shall be controlled from the base and tip control stations.

75.0 PLATFORM LEVELING SYSTEM

75.1 An automatic platform leveling system shall be supplied as outlined in NFPA 1901 20.10.2. The system shall provide automatic leveling through a dual redundant hydraulic cylinder system. The system shall incorporate (4) hydraulic cylinders to level the platform. The lower cylinders shall be mounted between the aerial turntable and base section and the upper cylinders shall be mounted between the fly section and the platform. The system shall utilize oil exchange between the cylinders to provide smooth leveling at all operating positions. In addition to the automatic controls, the system shall include manual controls located at both the base and the platform to adjust platform pitch if needed. The system shall be supplied with load holding valves on the upper cylinders to prevent movement of the platform in the event of a ruptured hydraulic hose.

76.0 PLATFORM LIFTING EYES

76.1 A pair of lifting eyes shall be provided below the platform. The lifting eyes shall allow for a load of 375 pounds each (750 pounds total).

77.0 AERIAL FINISH

77.1 To reduce maintenance expense the aerial shall have a natural aluminium swirled finish. Visible inspection of all ladder weld joints shall be possible without having to remove paint or body filler to reveal the weld bead.

78.0 LADDER EXTENSION MECHANISM

78.1 Both power extension and retraction shall be furnished and meet the requirements of NFPA 1901 section 20.19, 20.20.3, and 20.5.3. Extension shall be by way of two (2) extending cylinders mounted on the side of the base section of the ladder.

78.2 Extension Cylinder Size:

Bore: 5"
Stroke: 77"

78.3 The cylinders shall operate through a block and tackle cable arrangement to extend and retract the ladder.

78.4 Maximum extension of the ladder is to be automatically limited by the stroke of the cylinders. The normal operating cable safety factor shall be 5:1 and the stall safety factor shall be 2:1 based on the breaking strength of the cables. The

minimum ratio of the diameter of wire rope used to the diameter of the sheave used shall be 1 to 12. The cables shall be treated with Pre-Lube 6 for increased service life.

78.5 Ladder Cable Size:

1st section (4 cables 2 extend, 2 retract): 3/4" 6 x 19 galvanized cable
2nd section (4 cables 2 extend, 2 retract): 1/2" 6 x 19 galvanized cable

79.0 LADDER SLIDE SYSTEM

79.1 The ladder assembly shall consist of three (3) separate weldments that shall extend and retract within each other. Polymer slide pads shall be utilized between each section to minimize friction. Four (4) interlocking load transfer stations shall be utilized at the end of each of the two (2) base ladder sections. The interlocking load transfer stations shall handle load transfer between ladder sections and encapsulate the slide pads.

79.2 The two (2) base ladder sections shall each be provided with six (6) slide cushions. The cushions are designed to limit movement between the ladder sections resulting in smoother operation and less wear on the ladder sections.

80.0 AERIAL EXTENSION INDICATOR

80.1 Reflective tape stripes shall be installed on the ladder top handrail of the base section to indicate extension in 5 foot increments. Numbers shall be supplied at 10 foot increments. A reflective dot on the base of the 2nd section shall provide a visual reference for the operator to estimate aerial elevation.

81.0 ELEVATING PLATFORM OPERATING POSITIONS

81.1 The elevating platform shall have two (2) control stations as outlined in NFPA 1901 20.9 with the lower controls capable of overriding the platform controls. The operators lower position shall be located on the left side of the aerial turntable. The console shall be angled with an etched panel for long service life. The lower control panel shall feature a roll-top type of cover to protect all controls from the elements. The upper control console shall be located in the front center of the platform and shall include all of the operational, aerial functions, and control switches (less the Intercom controls) as in the lower console. The centered console location shall allow easy access in and out of the left and right corner gates.

81.2 The consoles shall include lighting for night operations and controls shall all be labeled for easy identification of operation.

82.0 AERIAL LADDER CONTROL LEVERS

82.1 The control levers shall be arranged as outlined in NFPA 20.17.7. The first lever from the left shall be the extension control (forward for extend and back for retract). The second lever shall be for rotation (forward for clockwise and back for counter clockwise). The third handle shall control elevation (forward for down and back for up). A ring around the control console shall be provided to prevent unintentional movement as outlined in NFPA 20.17.6.2.

83.0 VARIABLE SPEED CONTROL SYSTEM

83.1 The aerial hydraulic system shall be equipped with a microprocessor based control system that shall deliver variable rotation and elevation speeds based on platform position. The system shall allow the aerial to proportionately operate quicker, either

through elevation or retraction, as the platform is brought in closer to the turntable centerline. This feature provides quicker ladder movement when not fully extended and/or elevated.

83.2 The variable speed system also offers the operator more consistent platform movement speed (distance per second) regardless of platform location, equating to more predictable aerial control. The aerial control system shall include electronic ramping to provide smooth acceleration and deceleration of aerial functions during sudden movements of the operator control levers. The control system shall also monitor the end of the stroke position of both the elevation and extension cylinders to bring the aerial to a smooth and controlled stop at the end of the cylinder stroke.

83.3 The control system shall be provided with a slow speed (Creep) switch. This switch, when activated, shall reduce aerial operating speeds, allowing for pin-point platform placement. When in the creep mode, the ramping feature of the controls system shall be disabled allowing for precise aerial placement.

83.4 The control system shall have self-diagnostic features and be pre-set at the factory.

83.5 The elevating platform shall utilize six (6) proportional control valves for aerial device movements.

83.6 The electrohydraulic valves shall permit the use of base and tip controllers and minimize hydraulic connections.

83.7 The hydraulic system valve body shall be located under the ladder base step to provide as much turntable workspace as possible.

83.8 The control system shall have manual overrides in the event of a system failure. The overrides shall be located in a compartment just below the turntable control console. The manual system shall be organized to match the base controllers and is function labeled.

84.0 BODY PROTECTION SYSTEM

84.1 The control system shall monitor rotation angle and elevation angle and shall automatically control the operational envelope of the aerial device to prevent contact with the aerial body or cab during low level operations. The system shall bring the aerial to a smooth and controlled stop whenever the aerial is approaching the body or cab. Indicator lights shall be included on both control consoles will show that the system has limited aerial movement. A momentary switch shall be provided at each control console to allow the operator to override the body protection system and move the aerial closer to the body if needed.

85.0 LOAD INDICATION SYSTEM

85.1 Two (2) lighted elevation/safe load indicator diagrams shall be provided on the aerial ladder to indicate safe load capacity at any angle of elevation. One (1) shall be located on the lower right side of the base section, and one (1) shall be located upper left side of the fly section. The safe load indicators shall be 15" x 15" in size and clearly communicate aerial capacity in any one of the following conditions: tip load, tip load with water flowing, and distributed load at full extension. The charts shall identify capacity using graphic characters to indicate each 250 lb. increment. The charts shall be illuminated and contain warnings for electrocution hazards from power lines and lightning.

86.0 OPERATION TIMES

- 86.1 The aerial shall complete the NFPA 1901 20.7.5 time test in no more than 100 seconds, exceeding the NFPA minimum requirement of 150 seconds. This test involves raising the aerial from the bedded position to full elevation and extension and rotating to 90 degrees. This test is to begin with the stabilizers deployed.

Time to extend ladder: 35-45 seconds
Time to retract ladder: 30-40 seconds
Time to raise ladder (fully retracted): 40-50 seconds
Time to raise ladder (fully extended): 65-75 seconds
Time to lower ladder (fully retracted): 35-45 seconds
Time to lower ladder (fully extended): 60-70 seconds
Time to rotate 180 degrees (fully retracted): 45-55 seconds
Time to rotate 180 degrees (fully extended): 95-105 seconds

87.0 ELEVATING PLATFORM RATED CAPACITY

- 87.1 The aerial device shall have a rated capacity of 1305 lbs. consistent with NFPA 1901 20.8.1 and 20.8.2. The rated capacity shall include 1000 lbs. in personnel allowance and 305 lbs. for equipment mounted at the tip of the aerial. The aerial device shall be rated in multiple configurations as outlined in 20.8.5.
-

- 87.2 The elevating platform shall be capable of delivering a 1250 GPM master stream from the platform while carrying a minimum of 500 lbs. as outlined in 20.8.3. A sign mounted at the base of the aerial shall communicate the following ratings in the unsupported fully extended configuration while maintaining a 2.5 to 1 safety margin as defined in NFPA 1901. The loads in each configuration are in addition to 305 lbs. of equipment mounted at the tip.
-

- 87.3 Condition #1- Tip load only, no water flowing

-6 to 80 degrees 4 people 1000 lbs.

Condition #2- Distributed loads no water flowing (These include two people in the platform from -6 to 44 degrees and four people in the platform from 45 to 80 degrees)

-6 to 20 degrees 5 people 1250 lbs.
21 to 30 degrees 6 people 1500 lbs.
31 to 45 degrees 10 people 2500 lbs.
46 to 80 degrees 12 people 3000 lbs.

Condition #3- Platform tip load while flowing 1250 gpm with pre-piped waterway

-6 to 80 degrees 2 people 500 lbs

88.0 HYDRAULIC SYSTEM

- 88.1 Hydraulic power for all operations shall be supplied by a chassis-mounted variable displacement pressure compensated pump for consistent and rapid response. The variable displacement piston pump shall be able to supply 30 GPM at a maximum pressure of 3000 PSI. The system shall operate between 1000 and 2500 PSI with flow controls to protect hydraulic components and incorporate a relief valve set at 2800 PSI to prevent over pressurization.
-

- 88.2 An interlock device shall be provided to prevent activation of the aerial ladder hydraulic pump until either the transmission is placed in neutral and the parking brake is set, or the transmission is placed in drive and the rear driveline is disengaged as outlined in NFPA 20.17.3.
-

- 88.3 The hydraulic system shall be of the latest design and incorporate features to minimize heat build up and provide smooth control of the aerial ladder. The system shall meet the performance requirement in NFPA 20.19.6 and 20.19.7, which requires adequate cooling under 2 ½ hours of operations. To control operating system temperature, a hydraulic oil cooler shall be supplied. The air to oil cooler shall be mounted on the turntable so as not to reduce the cooling capacity of the engine. A 12-volt fan shall move air across a tube and fin radiator system. The cooler shall be mounted on the turntable ahead of the operator's console.
-
- 88.4 All hydraulic components that are non-sealing whose failure could result in the movement of the aerial shall comply with NFPA 20.19.1 and have burst strength of 4 to 1. Dynamic sealing components whose failure could cause aerial movement shall have a margin of 2 to 1 on maximum operating pressure per NFPA 20.19.1.1. All hydraulic hoses, tubes, and connections shall have minimum burst strength of 3 to 1 per NFPA 20.19.2.
-
- 88.5 The hydraulic system shall consist of a 60 gallon reservoir mounted to the torque box and plumbed to the hydraulic pump. The tank shall be supplied with a removable top to access the tank strainer filter. There shall be plumbing for a supply and return line and a tank drain on the reservoir. The reservoir cap shall be marked per NFPA 20.19.5.2. Gated valves under the tank shall facilitate filter changes. Connections on the bottom of the tank shall utilize flange fittings for ease of service.
-
- 88.6 The hydraulic system shall use 5w-20 multi-weight, SAE 32 grade oil and incorporate the following filters to provide dependable service:
- Reservoir Breather: 10-micron
Magnetic Reservoir Strainer: 125-mesh
Pressure Filter (Torque Box): 3-micron
Return Filter: 10-micron
-
- 88.7 The aerial hydraulic system shall be designed in such a manner that a hydraulic pump failure or line rupture shall not allow the aerial or outriggers to lose position. Hydraulic holding valves shall be mounted directly on cylinders. To ensure reliable performance of holding valves, no hoses shall be permitted between a holding valve and cylinder.
-
- 88.8 The hydraulic system shall be designed with an auxiliary power unit meeting the guidelines of NFPA 1901 20.18.6. The auxiliary power shall be two (2) 12 volt pumps connected to the chassis electrical system. The pumps shall provide operation at reduced speeds to store the aerial device and stabilizers for road transportation. Self-centering switches shall be provided at the turntable and each stabilizer control station to activate the system. The system shall be designed to provide a minimum of five (5) minutes of hydraulic power to operate functions. Hydraulic power to the ladder shall be transferred from the torque box by a hydraulic swivel.
-
- 89.0 OUTRIGGERS**
- 89.1 The unit shall be equipped with two (2) sets of extendable criss-cross, underslung stabilizers.
-
- 89.2 The stabilizers shall have a maximum spread of 15' 6" centerline to centerline of the stabilizer pads when fully extended. **NO EXCEPTIONS**
-
- 89.3 One (1) set of stabilizers shall be mounted in the forward body area and a

second set close to the rear axle to minimize impact on departure angle. The stabilizers shall have an inner and outer tube that slide on a low-friction pad for deployment.

- 89.4 The stabilizers shall have a tip-over safety margin of 1-1/2 times the rated load imposed by the aerial in any position the aerial device can be placed as outlined in NFPA 1901 20.21.2. The apparatus stabilization shall be accomplished without the assistance of the chassis suspension or tires in contact with the ground.
-

- 89.5 The aerial shall be able to sustain a 1-1/3 to 1 rated load on a 5 degree slope downward in the position most likely to cause overturning as outlined in NFPA 1901 20.21.3. The maximum ground slope the apparatus can be set up on is 14 percent. On the 14 percent slope the apparatus can be leveled within a 6 percent operating range for the apparatus
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- 89.6 The cylinders shall be supplied with dual pilot-operated check valves on each stabilizer cylinder to hold the cylinder in the retracted (stowed) or extended (working) position should a charged line be severed at any point in the hydraulic system. The stabilizers shall level side-to-side, corner-to-corner, and front-to-rear on uneven terrain. Stabilizers shall contain safety lock valves. This assures there will be no "leak down" of stabilizer legs. Mechanical pins are not required. This feature contributes to efficient set-up and field operation.
-

- 89.7 Each stabilizer that can be extended from the body shall be supplied with a red warning light as outlined in NFPA 20.21.4.4. A stabilizer extended warning light shall be supplied in the cab to warn the driver of an extended stabilizer condition as outlined in NFPA 1901 13.11. A floodlight shall be supplied in each stabilizer location to illuminate the stabilizer and ground. The light shall automatically turn on with the deployment of the stabilizer.
-

- 89.8 The stabilizer ground contact area for each foot pad shall be 10" x 14" without auxiliary pads and 24" x 24" with auxiliary pads deployed. The ground pressure shall not exceed 75 PSI with auxiliary pads deployed when the apparatus is fully pads deployed. loaded and the aerial device is carrying its rated capacity in every position. This shall be accomplished with the stabilizer pads deployed, as outlined in NFPA 20.21.4.2.
-

90.0 OUTRIGGER CONTROLS

- 90.1 Eight (8) electric solenoid valves shall control the stabilizers. The control switches shall be located at the rear of the apparatus so the operator may observe the stabilizers during deployment. An audible alarm with a minimum 87 dbA shall also sound while the stabilizers are in motion as required by NFPA 20.21.4.1. Stabilizer deployment shall be completed in less than 45 seconds.
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- 90.2 There shall be an interlock that prevents the operation of the ladder until the stabilizers are down and properly set as outlined in NFPA 20.17.5. Four (4) micro-switches, one (1) on each jackleg, shall sense when all four (4) jack feet are in contact with the ground. This condition shall be indicated when all four (4) yellow jacks-down indicator lights are on and the green interlock light is on. When the apparatus has been leveled, a manual transfer switch shall be used to shift hydraulic power to ladder operations. The interlock system shall have a manual override with access through a door on the rear control panel.
-

- 90.3 To simplify leveling the apparatus, two (2) color-coded level indicators shall be supplied at the rear of the apparatus. One (1) indicator shall be for front to rear level and one (1) for side to side level.
-

91.0 TURNTABLE SUPPORT ASSEMBLY

- 91.1 The aerial ladder turntable assembly shall be mounted at the rear of the apparatus. The turntable support assembly shall be welded to the integral torque box for efficient transfer of aerial loads to the stabilizers and shall permit storage of ground ladders in the center rear of the apparatus. The complete turntable support assembly shall be multi-pass welded to the sides of the combination chassis frame torque box.
-

- 91.2 A bearing mounting plate shall be welded to the top of the verticals and sides of the horizontals. The bearing mounting plate shall be 54" x 54" and shall have a 1-1/2" (1.5") thickness. This bearing mounting plate shall be bulkheaded to a 3/4" (0.75") steel plate that is welded to the bottoms of the horizontal tubing. The use of multi-pass welding shall be utilized wherever possible.
-

92.0 UPPER TURNTABLE ASSEMBLY

- 92.1 The upper turntable assembly shall attach to the rotation bearing and the base of the ladder.
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- 92.2 The turntable platform shall be a one-piece flanged steel plate that is a minimum of 96" in diameter and 3/8" (0.38") thick. The working platform shall be covered with a non-skid material for operator safety.
-
- 92.3 Two (2) railings 42" high shall be provided along the outside of the turntable disc as outlined in NFPA 1901 20.18.1. There shall be a control pedestal on the left side of the turntable.
-
- 92.4 Two (2) padded Fire Research brand ManSaver safety bars shall be mounted to the turntable handrails. The bars shall lift up and inward (towards the ladder) permitting easy entrance to the ladder and control console.
-
- 92.5 The turntable assembly shall provide a mounting base for the ladder and elevating cylinders. The turntable assembly shall be bolted to the turntable bearing by twenty-two (22) 1" grade 8 plated bolts.
-

93.0 ELEVATION MECHANISM

- 93.1 The aerial shall utilize minimum dual 6" diameter elevating cylinders with 35" stroke and shall attach to the upper turntable assembly and the base section of the ladder by 2-1/4" (2.25") ID spherical bearings. The elevation system shall be designed following NFPA 1901 20.5.1. The elevation hydraulic cylinders shall incorporate cushions on the upper limit of travel. The hydraulic elevation cylinders shall also serve as a locking device to hold the aerial in the stored position for road travel.
-

94.0 ROTATION MECHANISM

- 94.1 The aerial shall be supplied with a hydraulically-powered rotation system as

outlined in NFPA 1901 20.5.2. The hydraulic rotation motor shall provide continuous rotation under all rated conditions and be supplied with a spring-applied brake to prevent unintentional rotation. The high torque rotation drive shall operate through a dual reduction planetary gearbox that drives a spur gear mated with the ring gear on the rotation bearing. The rotation gearbox shall be rated at 120,000 in. lbs.

95.0 HYDRAULIC, ELECTRIC AND WATER SWIVEL

95.1 A hydraulic swivel shall be installed to provide hydraulic fluid transfer to the aerial ladder cylinders, electrical power to the aerial ladder, and water delivery to the pre-plumbed waterway while permitting continuous 360-degree rotation. The swivel shall provide two (2) hydraulic circuits, twenty four (24) electrical circuits, and one (1) 4" passage for water flow. The swivel shall be environmentally-sealed to prevent contamination of the hydraulic fluid.

96.0 TURNTABLE CONTROL STATION

96.1 An aerial ladder operator's position shall be supplied as outlined in NFPA 1901 20.4. The operator's position shall be located on the left side of the aerial turntable. The apparatus shall be supplied with labels to warn of electrocution hazard. The control console shall provide a service access door on the front and side of the console to access hydraulic and electrical connections. The electrical panel shall be contained in junction box with labeled wires. The console shall be angled, labeled, and supplied with lights for night operation.

96.2 A diamond plate contoured hinged cover shall be supplied to protect the console from the elements. The cover shall latch in the stored position and swing away from the console so as not to interfere with sight of the aerial device.

96.3 The control levers shall be arranged as outlined in NFPA 20.17.7. The first lever from the left shall be the extension control (forward for extend and back for retract). The second lever shall be for rotation (forward for clockwise and back for counter clockwise). The third handle shall control elevation (forward for down and back for up). The aerial shall employ direct hydraulic controls for precise control and dependable service with minimal electrical functions. A ring around the control console shall be provided to prevent unintentional movement as outlined in NFPA 20.17.6.2.

96.4 A light on the control console shall indicate when the ladder rungs are aligned for climbing

97.0 AERIAL ALIGNMENT INDICATOR

97.1 A reflective arrow mounted to the body and the turntable shall indicate when the aerial is aligned for travel bed

98.0 LOAD INDICATION SYSTEM

98.1 A lighted elevation/safe load indicator diagram shall be located on the lower left side of the base section to indicate safe load capacity at any angle of elevation. The safe load indicator shall be 15" x 15" in size and clearly

communicate aerial capacity in any one of the following conditions: tiplod, tiplod with water flowing, and distributed load at full extension. The chart shall identify capacity using graphic characters to indicate each 250 lb. increment. The chart shall be equipped with lighting and warn of electrocution hazards from power lines and lightning.

99.0 AERIAL WATERWAY

99.1 A 1250 GPM pre-piped waterway shall be supplied as outlined in NFPA 1901 20.12. The waterway shall telescope to the end of the third section to the platform water system. A waterway of 4" internal diameter shall run through the turntable and a swivel joint to connect to the tubular aerial waterway. The tubular waterway shall run under the aerial ladder. The waterway tubes shall have the following sizes:

Base Section: 5" OD
2nd Section: 4-1/2" OD
Fly Section: 4" OD

99.2 The tubes shall be constructed of 6063-T6 hard coat anodized aluminium tube with 1/8" (0.125") walls and shall be telescopic with the aerial ladder through sealed slip joints. The slip joints shall be designed with grease zerk fittings to facilitate lubrication.

99.3 A 1-1/2" drain valve shall be installed and operated from the rear of the apparatus.

99.4 The water system shall be capable of flowing 1,250 GPM at 100 PSI nozzle pressure at full elevation and extension. The friction loss between the tip and below the swivel shall not exceed 100 PSI while flowing 1000 GPM as outlined in NFPA 1901 20.6.1 and 20.6.1.1.

99.5 An automatic relief valve preset at 250 PSI shall be installed in the aerial waterway to prevent over-pressurization of waterway system. The relief valve shall be mounted in the lower portion of the waterway where it enters the aerial torque box frame and dump under the apparatus.

99.6 The aerial ladder shall be equipped with an Akron style 3578 Stream Master electrically controlled monitor. The monitor shall be made from Akron's unique lightweight Pyrolite construction to minimize ladder tip loads. The monitor shall be equipped with an Akron style 5177 Akromatic electrically controlled automatic nozzle capable of discharging 250-1,000 gpm at 80 PSI nozzle pressure. This water flow capability shall be available at any extension, elevation, or position without any restrictions while flowing 1,000 gpm. A minimum stability factor of 1.5 to 1 shall be maintained in this configuration.

99.7 The monitor shall have fully enclosed motors and gears with built in manual override capability and quick-attach handles.

99.8 A battery, which continuously charges from the vehicle power system shall provide power for monitor movement.

99.9 Control switches for horizontal movement, vertical movement and pattern selection shall be located at the control panel.

100.0 MONITOR TIP CONTROLS

100.1 In addition to the controls at the operator console, electric monitor directional and stream controls shall be installed in close proximity to the monitor on the ladder. _____

101.1 MONITOR

101.1 The aerial platform shall come equipped with an Akron 3578 electrically controlled monitor with an Akromatic 5177 straight stream to fog nozzle. _____

101.2 The platform waterway monitor shall have a horizontal sweep of 180 degrees (90 degrees either side of center) and a vertical sweep of 90 degrees (45 degrees above and below horizontal). The monitor relay box shall include solid state components and be coated to resist corrosion. The monitor shall have fully enclosed motors and gears with built in manual override capability and quick attach handles. The monitor shall be able to operate in the horizontal and vertical axis simultaneously. _____

101.3 Control switches for horizontal movement, vertical movement and pattern selection shall be located at the base of the platform at the turntable console. _____

101.4 The electric monitor and nozzle shall be capable of discharging 250-1250 gpm at 80 psi nozzle pressure. _____

101.5 The monitor shall be installed on the center front of the platform. _____

102.0 PLATFORM MONITOR VALVE

102.1 A 4" inline butterfly valve shall be installed in the platform piping directly below the monitor. The valve shall be controlled from inside the platform by a handwheel. The valve shall be of the slow closing type to prevent sudden pressure spikes. _____

103.0 MONITOR FINISH

103.1 The aerial monitor(s) shall be painted job color. _____

104.0 AERIAL INFORMATION SYSTEM

104.1 The aerial device shall be equipped with an electronic system that displays critical information to the aerial operator for added safety. The system shall consist of a turntable mounted display, platform mounted display, electronic control module, sensors and an interface harness. _____

104.2 Information shall be conveyed to the operator through five (5) mission-specific screens, each tailored for a specific fireground activity. The screens display shall include available tip load, distributed load, master stream and aerial systems data. _____

104.3 The available tip load screen shall feature simple "Stick-Figure" type symbols that represent the allowable quantity of people at the tip. The screen layout shall be uncluttered allowing the symbols to be easily read at a glance. Systems that rely on hydraulic pressure to determine load shall not be acceptable. In addition to available tip load, the system shall display the following information:

- Ladder extension (%)
- Ladder inclination
- Distributed load
- Waterway flow

- Waterway pressure
 - Tip temperature
 - Base temperature
 - Hydraulic oil pressure
 - Hydraulic oil temperature
 - Rung alignment
 - Cradle alignment
 - Breathing air status (if equipped with breathing air)
-

104.4 The system shall include alarms to indicate when breathing air is below 20% volume, tip temperature is greater than 300°F and hydraulic oil temperature is above 190°F.

104.5 In addition to the audible warnings, the system shall include visual warning indicators for low breathing air, high tip temperature and high hydraulic oil temperature.

104.6 Display shall have:

- 5.6" Quarter VGA Transflective LCD screen with glass lens
 - LED backlighting
 - Environmentally hardened housing
 - Five (5) function buttons with three (3) color LED backlighting
 - Five (5) navigation buttons
-

104.7 Electronic Control Module shall be:

- Environmentally sealed aluminium housing
 - 40 MHz processor
 - 448kB flash ROM
 - 282kB SRAM
 - 8kB EEPROM
-

104.8 The Sensors shall be located at:

- Ladder extension
 - Ladder inclination
 - Waterway pressure
 - Waterway flow
 - Water presence
 - Tip temperature
 - Base temperature
 - Hydraulic oil pressure
 - Hydraulic oil temperature
 - Cradle alignment
 - Rung alignment
 - Breathing air pressure (If equipped with breathing air)
-

104.9 Wiring shall be individually and permanently function and color-coded every three (3) inches on the insulation.

104.10 The insulation shall meet SAE standard J1128 in its latest edition for GXL or SXL temperature rating. All exposed wiring shall be run in a loom with a minimum 289 degree Fahrenheit rating. All wiring looms shall be properly supported and attached along the entire run.

104.11 The components shall be thoroughly tested and have a proven reliability in severe environments to ensure long life on the fireground. The system shall be capable of operating in a temperature range of -40°F through 185°F.

104.12 The display and processor shall remain operational through the following tests:

- Humidity Tolerance - Component shall operate properly during and after an eight hour cycle in a humidity chamber at 115% of nominal system voltage and 90% relative humidity from its maximum operating temperature to -40°F and back to maximum temperature.
 - Salt Spray - Component to function correctly at 115% of nominal system voltage while being subjected to a 5% salt spray for 48 hours at 100° F.
 - Vibration - 8g random from 24-2000Hz
 - Moisture Leakage - Components must be sealed to +/-5 psi against water and water vapour.
 - Destructive over voltage - Component must not fail in an unacceptable condition when subjected to 180 volts DC for eight hours at maximum operating temperature.
-

104.13 The system shall detect faults through routine self-diagnostics. These checks shall be carried out on power-up, power down and during operation. A fault validation technique shall be used to ensure that a fault has been present for a period of time before being declared detected. Each possible fault or event shall be identified and displayed by a unique diagnostic code, which shall be accessible through the service menu on the system display.

105.0 FLOWMINDER

105.1 The aerial shall be equipped with one (1) Class 1 brand Flowminder for the aerial waterway to digitally display the actual volume of water being discharged in gallons per minute and the total volume of water that has flowed through the waterway. The readout shall be mounted at the turntable control station.

105.2 The Flowminder shall consist of:

i) Weatherproof digital flow display with super-bright digits at least 1/2" (0.5") high. The display shall read actual flow and shall switch to total flow when the totalizer button is depressed and held.

ii) Flow transmitter mounted in the aerial waterway pipe above the swivel. The transmitter shall consist of a weather-resistant black-anodized housing with brass wetted parts with a double paddle wheel.

iii) Connecting cables to connect the digital display to the flow transmitter and apparatus power.

iv) Machined mounting hardware to hold the transmitter in position in the discharge line.

105.2.1 The Flowmeter shall be checked and calibrated prior to delivery of the apparatus.

106.0 PUMP COMPARTMENT

106.1 The pump operator's control panel and pump compartment shall be located at the front of the body. The operator's controls and gauges shall be located on the left side (street side) of the apparatus. The compartment shall be designed following NFPA 1901 15.6.

- 106.2 The left and right side pump panels shall be completely removable for easy access to the pump compartment. Each panel shall be split approximately two-thirds of the way from the bottom by an anodized extrusion, which shall allow removal of the left side upper panel for easy access to gauges. _____
- 106.3 An aluminium diamond plate pump compartment access door shall be provided above the right side pump panel. The access door shall be horizontally-hinged and shall be securely attached with a full-length stainless steel piano hinge and stainless steel D-ring style handle. The access door shall be as wide and high as possible. _____
- 106.4 A 4" circular single bulb pump compartment light mounted in a shock-resistant housing shall be supplied to inspect plumbing components. The light shall switch on with the pump panel lights. _____
- 106.5 A side running board formed from 1/8" aluminum diamond plate shall be provided and shall extend the full length of the pump module on each side of the apparatus. The running board shall be bolted to the pump compartment. _____

107.0 PUMP OPERATORS PANEL

- 107.1 The pump compartment side panels shall be constructed of brushed, non-glare 14 gauge stainless steel. Providing removable escutcheon panels around the side discharges shall enhance service access to main pump body discharge valves _____
- 107.2 Pump panel light assemblies shall be provided for each side panel. The pump panel lights shall provide 5 foot-candles light intensity to the pump panel as outlined in NFPA 1901 16.9.2. Light shields shall be anodized aluminum extrusion bolted to the side pump panels. _____
- 107.3 The following instruments shall be supplied as a group on the operator's panel as outlined in NFPA 1901 16.12.1 and located as far as practical from hose connections.

Pump master intake
Pump master discharge
Tachometer
Engine coolant temperature indicator
Engine oil pressure
Voltmeter
Pressure controls
Engine throttle
Pump primer
Water tank to pump control
Water tank fill valve
Water tank level _____

- 107.4 Test connections for pump gauges shall be supplied on the operator's panel as outlined in NFPA 1901 16.12.5. Two (2) 1/4" standard pipe thread connections shall be supplied with plugs and identified as intake and discharge ports. _____
- 107.5 Gauges supplied on the pump operator's panel shall be compliant with NFPA 1901 16.12.2.1.5. There shall be a 1" differential in viewing area between analog master gauges and individual analog outlet gauges. All gauges shall meet ASME B40.1 and be resistant to vibration, pressure pulsation dampened, corrosion-resistant, shock-resistant and condensation-resistant. _____

107.6 Any discharge outlet 1 ½" or larger shall have an output indicator and be labeled to identify its control function as outlined in NFPA 1901 16.12.3. The valve control levers shall be chrome push-pull locking "T" handles located at the pump operator's panel unless the discharge is located on the operator's panel. If the valve is located on the operator's panel, a swing-style valve control shall be used. The control levers shall be located directly adjacent to one another and shall be mounted in line so they are in the same position when shut off. Each valve control lever shall be connected directly to its respective valve by a 7/8" non-corrosive rod to form a direct linkage control system. The specified discharge gauges shall be located directly above the discharge control levers when possible. Each control shall be clearly marked by metal nameplates recessed into the control lever handle.

107.7 To improve identification of discharges and intakes, color-coded tags, in accordance with current NFPA 1901 A.16.9.1 standards, shall be provided.

108.0 COMPARTMENTS

108.1 Due to request of a Demonstrator unit, all compartment size and dimension will be accepted as manufacturers design.

108.2 All doors (roll up/barn) shall be at the discretion of the manufacturer.

109.0 WATER TANK

109.1 The booster tank shall be T-shaped in configuration and shall have a useable capacity of 300 gallons (U.S.). The tank sides, top, and bottom shall be constructed of 1/2" (0.50") black UV-stabilized copolymer polypropylene.

109.2 The tank shall have a combination vent and manual fill tower. The tower shall be located in the left front corner of the tank. The tank overflow shall be 4" diameter and shall dump behind the rear wheels to permit maximum traction. The tower shall have a hinged cover and a 1/4" (0.25") thick polypropylene screen.

109.3 There shall be two (2) standard tank openings; one (1) for the tank-to-pump suction line with an anti-swirl plate, and one (1) for the tank fill line.

109.4 Baffles, both longitudinal and latitudinal, shall be interlocking and thermo welded to minimize water surge during travel, enhancing road handling stability. Openings in the baffles shall be positioned to allow water flow to NFPA standards during filling or pumping operations.

109.5 The tank shall be supported in an aluminum cradle resting on the frame on fiber-reinforced rubber strips to prevent wear and galvanic corrosion caused when two dissimilar metals come in contact. The tank shall be completely removable without disturbing or dismounting the apparatus body structure.

109.0 PUMP HEAT PAN

109.1 The pump heat pan shall be constructed of 1/8" smooth aluminum plate and reinforced with 3/4" x 2-3/4" aluminum extrusions. The heat pan shall be installed under the apparatus pump and securely attached to the underside of the apparatus body. The heat pan shall be easily removable for fair weather operation.

110.0 CROSSLAY COVER

110.1 A cover constructed of red (or black) 18 oz. PVC vinyl coated polyester shall be installed on the apparatus crosslay. The base fabric shall be 1000 x 1300 Denier Polyester with a fabric count of 20 x 20 square inch.

110.2 The cover shall be held in place across the top of the body by chrome snaps. The sides of the cover shall have integral flaps that extend down to cover the sides of the crosslay. The side flaps shall be secured in place to comply with the latest edition of NFPA 1901.

111.0 HOSEBED COVER – ALUMINUM 2 PIECE

111.1 An aluminum cover shall be provided to protect fire hose stored in the hose bed.

111.2 The hose bed cover shall be constructed of 1/8" aluminum tread brite and shall be two piece in design. Cover shall be hinged with full-length stainless steel knuckle hinges. For ease of use a pneumatic cylinder (gas shock) shall be used on each cover. Each cover shall also have a recessed handle.

111.3 Each cover shall have a single water and corrosion resistant switch that will activate the 2" red flashing door ajar light in the cab to alert the driver that a cover is open.

112.0 REAR HOSEBED COVER

112.1 A cover constructed of red (or black) 18 oz. PVC vinyl coated polyester shall be installed at the rear apparatus hosebed. The base fabric shall be 1000 x 1300 Denier Polyester with a fabric count of 20 x 20 square inch.

112.2 The top of the cover shall be mechanically attached to the rear hosebed cover extrusion. The lower portion of the cover shall be secured in place with heavy duty nylon straps to comply with the latest edition of NFPA 1901.

113.0 HOSEBED DIVIDER

113.1 There shall be one (1) hosebed divider provided the full fore-aft length of the hosebed. The hosebed divider shall be constructed of 1/4" (0.25") smooth aluminum plate with an extruded aluminum base welded to the bottom. The rear end of the divider shall have a 3" radius corner to protect personnel. The divider shall be natural finish aluminum for long- lasting appearance and shall be sanded and deburred to prevent damage to the hose. The divider shall be adjustable from side to side in the hosebed to accommodate varying hose loads.

114.0 LARGE FOLDING STEPS

114.1 A heavy duty folding step that meets NFPA requirements shall be supplied. Each step shall be located above and below intermediate pump panel step.

114.2 Assist handrail(s) shall be provided at each position where steps for climbing are located. Handrail(s) shall consist of 1-1/4" OD 6063T5 anodized aluminum tube mounted between chrome stanchions. Handrail(s) shall be machine extruded with an integral ribbed surface to assure a good grip for personnel safety.

115.0 INTERMEDIATE PUMP PANEL STEP

115.1 An intermediate pump panel step shall be provided on the side of the body at the pump panel area, between the upper and lower panels. The step shall be

a minimum of 8" deep x the width of the pump panel and shall be tapered on the forward end. Step construction shall be formed of minimum 1/8" aluminum diamond plate.

115.2 Assist handrail(s) shall be provided at the step area. Handrail(s) shall consist of 1-1/4" OD 6063T5 anodized aluminium tube mounted between chrome stanchions. Handrail(s) shall be machine extruded with an integral ribbed surface to assure a good grip for personnel safety.

115.3 A recessed 4" circular single bulb light shall be mounted above the step. The light shall be wired to the work light switch on the cab dash. The light shall be in a resilient shock absorbent mount for improved bulb life. The wiring connections shall be made with a weather resistant plug in style connector.

116.0 STEP SURFACES

116.1 All body exterior step surfaces shall be provided with an aggressive skid-resistant surface in accordance with current NFPA requirements.

116.2 Aluminium diamond plate steps shall include a multi-directional, aggressive gripping surface incorporated into the diamond plate. The surface shall extend vertically from the diamond plate sheet a minimum of 1/8" (0.125"). Gripping surfaces shall be circular in design, a minimum of 1" diameter and on centers not to exceed 4".

117.0 SLID-OUT PLATFORM

117.1 The slide-out platform shall be 21" deep and shall be constructed of 1/8" aluminium tread brite. The platform shall be mounted under the apparatus body below the pump panel. The platform shall utilize a maintenance free slide system incorporating stainless steel shoulder bolts that slide in slotted heavy wall aluminium angles. Notches shall be provided at each end of the slots to hold the platform in both the extended and retracted positions.

117.2 A chrome grab handle shall be provided on the front face of the platform for ease of operation.

117.3 The rear slide-out platform shall be 18" deep and shall be constructed of 1/8" aluminium tread brite. The platform shall be recessed into the rear of the apparatus body below the hosebed. The platform shall utilize a maintenance free slide system incorporating formed aluminium plate(s) and nylatron slide pads. A gas shock shall be provided to hold the platform in both the extended and retracted positions.

117.4 An assist handrail shall consist of one (1) 1-1/4" OD 6063T5 anodized aluminium tube mounted between chrome stanchions. The handrail shall be machine extruded with an integral ribbed surface to assure a good grip for personnel safety.

118.0 PUMP COMPARTMENT HEATERS

118.1 Pump compartment heater – shall be water cooled heater(s), suitable to prevent freezing of the pump and plumbing. The heater(s) shall be located to be protected from damage and water spray. The heater(s) shall be thermostatically controlled and shall be equipped with an on/off switch, located for convenient operation on the pump operator's panel.

119.0 AUXILIARY GROUND PADS

119.1 Auxiliary ground pads shall be 24" x 24" x 1/2" thick aluminium plates. They shall have a grab handle and shall be mounted in a lift-up, slide-out bracket that is mounted under the apparatus next to each stabilizer.

120.0 SCBA BOTTLE STORAGE

120.1 Eight (8) 8" diameter air bottle holders shall be provided. The bottle holders shall be located at the wheel well area of the rear axle as specified by the customer. The storage tube shall be constructed of high strength "ABS" to provide protection for the bottles.

120.2 The bottles shall be held in place by an aluminium-hinged door casting with a positive catch latch. Each bottle holder door shall include an inner door seal for increased protection against the elements.

121.0 PUMP SYSTEM

121.1 The pump shall be a midship-mounted Hale QMAX single stage centrifugal pump. The pump shall be mounted on the chassis frame rails and shall be split-drive driven.

121.2 The entire pump body and related parts shall be of fine grain alloy cast iron, with a minimum tensile strength of 30,000 PSI (207 MPa). All metal moving parts in contact with water shall be of high quality bronze or stainless steel. Pump body shall be horizontally split in two sections, for easy removal of impeller assembly including wear rings and bearings from beneath the pump without disturbing pump mounting or piping.

121.3 The pump impeller shall be hard, fine grain bronze of the mixed flow design and shall be individually ground and hand balanced. Impeller clearance rings shall be bronze, easily renewable without replacing impeller or pump volute body, and of wrap-around double labyrinth design for maximum efficiency.

121.4 The pump shaft shall be heat-treated, corrosion-resistant stainless steel and shall be rigidly supported by three (3) bearings for minimum deflection. The sleeve bearing is to be lubricated by a force fed, automatic oil lubricated design, pressure-balanced to exclude foreign material. The remaining bearings shall be heavy-duty, deep groove ball bearings in the gearbox and shall be splash-lubricated. Pump shaft must be sealed with double-lip oil seal to keep road dirt and water out of the gearbox.

121.5 Two (2) 6.0" diameter suction ports with 6" NST male threads and removable screens shall be provided, one each side. The ports shall be mounted one (1) on each side of the midship pump and shall extend through the side pump panels. Inlets shall come equipped with long handle chrome caps.

122.0 PUMP PACKING

122.1 The pump shaft shall have only one (1) packing gland located on the inlet side of the pump. It shall be of split design for ease of repacking. The packing gland shall be of a design to exert uniform pressure on packing and to prevent cocking and uneven packing load when tightened. The packing rings shall be permanently lubricated, graphite composition, and have sacrificial zinc foil separators to protect the pump shaft from galvanic corrosion.

123.0 PRESSURE RELIEF VALVE

123.1 The pump shall be equipped with an automatic pressure control device. A single bronze variable-pressure-setting relief valve shall be provided and be

of ample capacity to prevent an undue pressure rise as outlined in N.F.P.A 1901. The relief valve shall be normally closed and shall open against pump pressure. A relief valve control wheel with a control light to signal when open shall be mounted on the pump operator's panel.

124.0 DISCHARGE MANIFOLD

124.1 The pump system shall utilize a stainless steel discharge manifold system that allows a direct flow of water to discharge valves. The manifold and fabricated piping systems shall be constructed of a minimum of Schedule 10 stainless steel to reduce corrosion.

125.0 PRIMING SYSTEM

125.1 The electrically-driven priming pump shall be a positive displacement vane type. One (1) priming control, located at the pump operator's position, shall open the priming valve and start the priming motor. The primer shall be oil-less type. The priming valve shall be electronically interlocked to the "Park Brake" circuit to allow priming of the pump before the pump is placed in gear.

126.0 PUMP SHIFT

126.1 The pump shift shall be pneumatically-controlled using a power shifting cylinder.

126.2 The power shift control valve shall be mounted in the cab and be labeled "PUMP SHIFT". The apparatus transmission shift control shall be furnished with a positive lever, preventing accidental shifting of the chassis transmission.

126.3 A green indicator light shall be located in the cab and be labeled "PUMP ENGAGED". The light shall not activate until the pump shift has completed its full travel into pump engagement position.

126.4 A second green indicator light shall be located in the cab and be labeled "OK TO PUMP". This light shall be energized when both the pump shift has been completed and the chassis automatic transmission has obtained converter lockup (4th gear lockup).

126.5 One (1) pump panel-mounted "GREEN" indicator light shall be positioned by the throttle control on the pump operator's panel. The light shall be energized when the pump shift has been completed, chassis automatic transmission has obtained converter lockup (4th gear lockup), and the chassis parking brake is set.

127.0 PUMP SYSTEM

127.1 One (1) 4-1/2" master suction and one (1) 4-1/2" master discharge gauge shall be pump panel-mounted. These compound gauges shall be liquid filled.

127.2 Two (2) test plugs shall be pump panel-mounted for third party testing of vacuum and pressures of the pump.

127.3 A master drain valve shall be installed and operated from the pump operator's panel. The master pump drain assembly shall consist of a Class 1 bronze master drain with a rubber disc seal and turning handle.

127.4 The manual Master Drain Valve shall have six (6) individually-sealed ports that allow quick and simultaneous draining of multiple intake and discharge lines. It shall be constructed of corrosion-resistant material and be capable of

operating at a pressure of up to 600 PSI.

127.5 The master drain shall provide independent ports for low point drainage of the fire pump and auxiliary devices.

128.0 GEARBOX COOLER

128.1 A gearbox cooler shall be provided to maintain safe operating temperatures during prolonged pumping operations.

129.0 AUXILIARY ENGINE COOLER

129.1 An engine cooler used to lower engine water temperature during prolonged pumping operations and controlled at the pump operator's panel shall be provided.

129.2 The engine cooler shall be installed in the engine coolant system in such a manner as to allow cool pump water to circulate around engine water, thus forming a true heat exchanger action. Cooler inlet and outlet shall be continuous, preventing intermixing of engine coolant and pump water.

130.0 PUMP CERTIFICATION

130.1 The pump, when dry, shall be capable of taking suction and discharging water in accordance with current NFPA 1901. The pump shall be tested at the manufacturer's facility by an independent, third-party testing service. The conditions of the pump test shall be as outlined in current NFPA 1901.

130.2 The tests shall include, at a minimum, the pump test, the pumping engine overload test, the pressure control system test, the priming device tests, the vacuum test, and the water tank to pump flow test as outlined in current NFPA 1901.

130.3 A piping hydrostatic test shall be performed as outlined in current NFPA 1901.

130.4 The pump shall deliver the percentage of rated capacities at pressures indicated below:

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

130.5 A test plate, installed at the pump panel, shall provide the rated discharges and pressures together with the speed of the engine as determined by the certification test, and the no-load governed speed of the engine.

130.6 A Certificate of Inspection certifying performance of the pump and all related components shall be provided at time of delivery. Additional certification documents shall include, but not limited to, Certificate of Hydrostatic Test, Electrical System Performance Test, Manufacturer's Record of Pumper Construction, and Certificate of Pump Performance from the pump manufacturer.

131.0 SUCTION SIDE RELIEF VALVE

131.1 The pump shall be equipped with an Akron style 59 cast brass, variable-pressure-setting relief valve on the pump suction side. It shall be designed

to operate at a maximum inlet pressure of 250 psi. The relief valve shall be normally closed and shall be set to begin opening at 125 psi in order to limit intake pressures in the pumping system. When the relief valve opens, the overflow water shall be directed through a plumbed outlet to discharge below the apparatus body in an area visible to the pump operator. The overflow outlet shall terminate with a male 2-1/2" NST threaded fitting to allow the overflow water to be directed away from the vehicle with a short hose (supplied by the fire department) during freezing weather or under other conditions where an accumulation of water around the apparatus might be hazardous.

133.0 MECHANICAL SPEED COUNTER

133.1 The test connection shall be installed on the pump operator's panel to manually verify the vehicle engine speed displayed on the electronic tachometer.

134.0 ELECTRONIC FIRE COMMANDER

134.1 The apparatus shall be equipped with a Detroit Diesel Electronic Fire Commander.

134.2 It shall be connected directly to the DDEC V Electronic Control Module (ECM) mounted on the engine. The Electronic Fire Commander shall operate as a throttle and operate the pressure sensor governor eliminating the need for a relief valve on the discharge side of the pump.

134.3 The Electronic Fire Commander shall display engine information and critical warnings, such as engine temperature, oil pressure, engine RPM, and voltage in a single weatherproof, highly visible digital display

134.4 A special preset feature shall permit a predetermined pressure or RPM to be set. The preset pressure or RPM shall be displayed at the message display of the Electronic Fire Commander and shall be easily adjustable by the operator.

134.5 The display module shall be mounted at the pump operator's panel.

135.0 WATER TANK LEVEL GAUGE

135.1 One (1) Innovative Controls brand water tank level gauge shall be located at the pump operator's panel to provide a high-visibility display of the water tank water level. Fourteen (14) high-intensity light emitting diodes (LED's) on the display module shall form an inverted "V" pattern allowing the full, 3/4, 1/2, 1/4, and refill levels to be easily distinguished at a glance.

135.2 The display module shall be protected from vibration and contamination with the components being encased in an encapsulated plastic housing. The long life and extreme durability of LED indicators eliminates light bulb replacement and maintenance. Color-coded cover plates shall complete the assembly of the display module to the pump panel. System calibration shall be accomplished via five (5) small adjustment screws, one for each level, located on the face of the display module. Each display level shall be set independently for maximum reliability.

135.3 The display shall provide a steady indication of fluid level despite sloshing

inside of the tank when the vehicle is in motion.

136.0 PUMP COOLER

136.1 The pump shall have a 3/8" line installed from the pump discharge to the booster tank to allow a small amount of water to circulate through the pump casing in order to cool the pump during sustained periods of pump operation when water is not being discharged. The pump cooler line shall be controlled from the pump operator's panel by a 3/8" snubber valve.

137.0 PUMP TO TANK FILL

137.1 One (1) manually operated 1-1/2" Akron valve shall be installed between the pump discharge, and the booster tank in order to fill the tank. The valve control shall be located at the pump operator's panel, and shall visually indicate the position of the valve at all times.

137.2 The valve shall be an Akron 8800HD series with a 316 stainless steel ball and dual polymer seats for ease of operation and increased abrasion resistance. The valve shall have a self locking ball feature using an automatic friction lock design to balance the stainless steel ball when in a throttle position and water is flowing through it.

137.3 The valve shall be of the unique Akron Swing-out design to allow the valve body to be removed for servicing without disassembling the plumbing.

137.4 All fabricated piping shall be a minimum of Schedule 10 stainless steel for superior corrosion resistance, and decreased friction loss.

138.0 DOUBLE CROSSLAY HOSEBED

138.1 Two (2) crosslay hosebeds shall be provided at the front area of the body. Each of the two crosslay sections shall have a capacity for 200' of 1-3/4" double-jacket fire hose preconnected to the pump discharge. The crosslay decking shall be constructed entirely of maintenance-free 3/4" x 2-3/4" (0.75" x 2.75") hollow aluminium extrusions.

138.2 Each crosslay section shall include one (1) 2" brass swivel with a 1-1/2" NST male hose connection to permit the use of the hose from either side of the apparatus.

138.3 Stainless steel rollers with nylon guides set in aluminium extrusions shall be installed horizontally and vertically on each end of the crosslay to allow easy deployment of the hose and help protect the body paint.

138.4 The crosslay piping shall consist of two (2) 2" heavy-duty hoses from the pump discharge manifold to the 2" swivels. Each crosslay discharge shall include a manually operated 2" Akron style valve. The valve control shall be located at the pump operator's panel, and shall visually indicate the position of the valve at all times.

138.5 The valve shall be an Akron 8800HD series with a 316 stainless steel ball and dual polymer seats for ease of operation and increased abrasion resistance. The valve shall have a self locking ball feature using an automatic friction lock design to balance the stainless steel ball when in a throttle position and water is flowing through it.

138.6 The valve shall be of the unique Akron Swing-out design to allow the valve body to be removed for servicing without disassembling the plumbing.

138.7 All fabricated piping shall be constructed of a minimum of Schedule 10 stainless steel piping for superior corrosion resistance and decreased friction loss.

138.8 Each crosslay discharge shall include a Class 1 2.5" diameter liquid-filled (-30-0-600 psi) pressure gauge mounted at the pump panel adjacent to the manual valve control. The discharge shall be supplied with a 3/4" bleeder valve assembly to drain water from the gauge pressure line to prevent freezing of the line. The bleeder valve shall be controlled with a quarter-turn handle on the pump panel.

139.0 2.5" CROSSLAY HOSEBED

139.1 One (1) single crosslay shall be provided at the front area of the body. The crosslay shall have a capacity of 150' of 2-1/2" double-jacket fire hose. The crosslay decking shall be constructed entirely of maintenance-free 3/4" x 2-3/4" (0.75" x 2.75") hollow aluminium extrusions.

139.2 The crosslay shall have one (1) 2-1/2" mechanical swivel hose connection to permit the use of the hose from either side of the apparatus.

139.3 Stainless steel rollers with nylon guides set in aluminium extrusions shall be installed horizontally and vertically on each end of the crosslay, to allow easy deployment of the hose and to help protect the body paint.

139.4 The crosslay hosebed shall consist of a 2.5" heavy duty hose coming from the pump discharge manifold to the 2.5" swivel. The hose shall be connected to a manually operated 2.5" Akron valve. The valve shall be an Akron 8800HD series with a 316 stainless steel ball and dual polymer seats for ease of operation and increased abrasion resistance.

139.5 The valve shall have a self locking ball feature using an automatic friction lock design to balance the stainless steel ball when in a throttle position and water is flowing through it.

139.6 The valve shall be of the unique Akron Swing-out design to allow the valve body to be removed for servicing without disassembling the plumbing.

139.7 The discharge shall include a Class 1 2.5" diameter liquid-filled (-30-0-600 psi) pressure gauge mounted at the pump panel adjacent to the discharge control. This logical gauge and valve alignment is to ensure proper control execution and ease of field operation. The discharge shall be supplied with a 3/4" bleeder valve assembly. The bleeder valve shall be installed to drain water from the gauge pressure line to prevent freezing of the line. The drain shall be controlled with a quarter-turn valve on the pump panel.

139.8 The valve control shall be located at the pump operator's panel and shall visually indicate the position of the valve at all times.

139.9 All fabricated piping shall be a minimum of Schedule 10 stainless steel for superior corrosion resistance, and decreased friction loss.

140.0 LEFT SIDE 2-1/2" DISCHARGE

140.1 One (1) 2-1/2" discharge outlet with a manually operated Akron valve shall be provided at the left side pump panel.

140.2 The valve shall be an Akron 8800HD series with a 316 stainless steel ball

and dual polymer seats for ease of operation and increased abrasion resistance. The valve shall have a self locking ball feature using an automatic friction lock design to balance the stainless steel ball when in a throttle position and water is flowing through it.

140.3 The valve shall be of the unique Akron Swing-out design to allow the valve body to be removed for servicing without disassembling the plumbing.

140.4 The discharge shall include a Class 1 2.5" diameter liquid-filled (-30-0-600 psi) pressure gauge mounted at the pump panel adjacent to the discharge control. This logical gauge and valve alignment is to ensure proper control execution and ease of field operation. The discharge shall be supplied with a 3/4" bleeder valve assembly. The bleeder valve shall be installed to drain water from the gauge pressure line to prevent freezing of the line. The drain shall be controlled with a quarter-turn valve on the pump panel.

140.5 The valve control shall be located at the pump operator panel and shall visually indicate the position of the valve at all times.

140.6 All fabricated piping shall be a minimum of Schedule 10 stainless steel for superior corrosion resistance and decreased friction loss.

141.0 RIGHT SIDE 2-1/2" DISCHARGE

141.1 One (1) 2-1/2" discharge outlet with a manually operated Akron valve shall be provided at the right side pump panel.

141.2 The valve shall be an Akron 8800HD series with a 316 stainless steel ball and dual polymer seats for ease of operation and increased abrasion resistance. The valve shall have a self locking ball feature using an automatic friction lock design to balance the stainless steel ball when in a throttle position and water is flowing through it.

141.3 The valve shall be of the unique Akron Swing-out design to allow the valve body to be removed for servicing without disassembling the plumbing.

141.4 The discharge shall include a Class 1 2.5" diameter liquid-filled (-30-0-600 psi) pressure gauge mounted at the pump panel adjacent to the discharge control. This logical gauge and valve alignment is to ensure proper control execution and ease of field operation. The discharge shall be supplied with a 3/4" bleeder valve assembly. The bleeder valve shall be installed to drain water from the gauge pressure line to prevent freezing of the line. The drain shall be controlled with a quarter-turn valve on the pump panel.

141.5 The valve control shall be located at the pump operator panel and shall visually indicate the position of the valve at all times.

141.6 All fabricated piping shall be a minimum of Schedule 10 stainless steel for superior corrosion resistance and decreased friction loss.

142.0 2-1/2" DISCHARGE ELBOWS

142.1 2.5" discharge valves shall extend out from the apparatus at a 30 degree angle with chrome plated 2-1/2" WST threads. The 30 degree droop shall be an integral part of the discharge valve.

143.0 2-1/2" THREADS

143.1 All 2.5" threads shall be Winnipeg Fire and Paramedic threads.

144.0 AERIAL WATERWAY 4" DISCHARGE

144.1 One (1) 4" diameter discharge outlet with an electrically operated Akron valve shall be connected from the pump to the aerial waterway. _____

144.2 The valve shall be an Akron 8840E HD series with a bronze flat ball design for ease of operation and increased abrasion resistance. The valve shall have a self locking ball feature using an automatic friction lock design to balance the brass ball when in a throttle position and water is flowing through it. _____

144.3 The valve shall be of the unique Akron Swing-out design to allow the valve body to be removed for servicing without disassembling the plumbing. _____

144.4 The 8840E series valve shall have the following features:
i) 12 volt DC motor
i) A toggle switch and indicator lamp assembly mounted on the pump operator's panel
ii) Red, yellow and green valve position indicator lights
iii) Valve open and close "Auto Travel"
iv) Manual override valve actuation _____

144.5 The discharge shall include a Class 1 2.5" diameter liquid-filled (-30-0-600 psi) pressure gauge mounted at the pump panel adjacent to the discharge control. This logical gauge and valve alignment is to ensure proper control execution and ease of field operation. The discharge shall be supplied with a 3/4" bleeder valve assembly. The bleeder valve shall be installed to drain water from the gauge pressure line to prevent freezing of the line. The drain shall be controlled with a quarter-turn valve on the pump panel. _____

144.6 The valve controls and indicators shall be located at the pump operator panel. _____

144.7 All fabricated piping shall be a minimum of Schedule 10 stainless steel for superior corrosion resistance and decreased friction loss. _____

145.0 RIGHT SIDE 4" DISCHARGE

145.1 One (1) 4" diameter discharge outlet with an electrically operated Akron valve shall be provided at the right side pump panel. _____

145.2 The valve shall be an Akron 8840E HD series with a bronze flat ball design for ease of operation and increased abrasion resistance. The valve shall have a self locking ball feature using an automatic friction lock design to balance the brass ball when in a throttle position and water is flowing through it. _____

145.3 The valve shall be of the unique Akron Swing-out design to allow the valve body to be removed for servicing without disassembling the plumbing. _____

145.4 The 8840E series valve shall have the following features:
i) 12 volt DC motor
ii) A toggle switch and indicator lamp assembly mounted on the pump operator's panel
iii) Red, yellow and green valve position indicator lights
iv) Valve open and close "Auto Travel"
v) Manual override valve actuation _____

145.5 The discharge shall include a Class 1 2.5" diameter liquid-filled (-30-0-600 psi) pressure gauge mounted at the pump panel adjacent to the discharge control. _____

This logical gauge and valve alignment is to ensure proper control execution and ease of field operation. The discharge shall be supplied with a 3/4" bleeder valve assembly. The bleeder valve shall be installed to drain water from the gauge pressure line to prevent freezing of the line. The drain shall be controlled with a quarter-turn valve on the pump panel.

145.6 The valve controls and indicators shall be located at the pump operator panel.

145.7 All fabricated piping shall be a minimum of Schedule 10 stainless steel for superior corrosion resistance and decreased friction loss.

145.8 This discharge shall be provided with a 5" Storz fitting.

146.0 TANK TO PUMP 3" SUCTION

146.1 One (1) manually operated 3" Akron valve shall be installed between the pump suction and the booster tank in order to pump water from the tank. The valve control shall be located at the pump operator's panel, and shall visually indicate the position of the valve at all times.

146.2 The valve shall be an Akron 8800HD series with a 316 stainless steel ball and dual polymer seats for ease of operation and increased abrasion resistance. The valve shall have a self locking ball feature using an automatic friction lock design to balance the stainless steel ball when in a throttle position and water is flowing through it.

146.3 The valve shall be of the unique Akron Swing-out design to allow the valve body to be removed for servicing without disassembling the plumbing.

146.4 All fabricated piping shall be a minimum of Schedule 10 stainless steel for superior corrosion resistance, and decreased friction loss.

147.0 LEFT SIDE 2-1/2" SUCTION

147.1 One (1) 2 1/2" suction inlet with a manually operated 2 1/2" Akron valve shall be provided on the left side of the apparatus at the pump panel.

147.2 The valve shall be an Akron 8800HD series with a 316 stainless steel ball and dual polymer seats for ease of operation and increased abrasion resistance. The valve shall have a self locking ball feature using an automatic friction lock design to balance the stainless steel ball when in a throttle position and water is flowing through it.

147.3 The valve shall be of the unique Akron Swing-out design to allow the valve body to be removed for servicing without disassembling the plumbing.

147.4 The outlet of the valve shall be connected to the suction side of the pump with the valve body located behind the pump panel. The valve shall come equipped with a brass inlet strainer, 2 1/2" NST female chrome inlet swivel and shall be equipped with a chrome-plated, rocker-lug plug with a retainer device.

147.5 The valve controls and indicators shall be located at the pump operator panel.

147.5.1 All fabricated piping shall be a minimum of Schedule 10 stainless steel for superior corrosion resistance and decreased friction loss.

148.0 LIGHT BAR

148.1 A Federal Signal model 535NFPA6P1 6 pod Viewpoint LED light system

shall be mounted on the forward part of the cab roof. The system shall include two (2) individual three (3) pod units

- 148.2 Each pod unit shall have three (3) SOL-6 red LED reflectors, two (2) SOL-6 red LED reflectors and two (2) SOL-6 red LED reflectors. The lens configuration shall be R/R/R/R/R/R. (Pods 2 & 5 may be wired through the load management system).
-

149.0 SIREN SPEAKER

- 149.1 One (1) Federal model MS100 Dynamax 100 watt speaker shall be flush mounted as far forward and as low as possible on the front of the unit. The speaker shall meet NFPA requirements for sound output producing a minimum 120 dB of sound at 10 feet. A polished Model MSFMT-EF "Electric F" grille shall be provided on the outside of the speaker to prevent road debris from entering the speaker.
-

- 149.2 Speaker dimensions shall be: 5.8 in. high x 5.8 in. wide x 2.6 in. deep. Weight = 5.5 lbs.
-

150.0 BODY WIRING

- 150.1 All body electrical equipment installed by the apparatus manufacturer shall conform to current automotive electrical system standards, the latest Federal DOT standards, and the requirements of the applicable NFPA Apparatus Standard. Twisted-pair shielded wire shall be provided within the electrical system for noise reduction.
-

- 150.2 The wiring harness shall conform to SAE J-1128 with GXL temperature properties. All exposed wiring shall be run in a loom with a minimum 289 degree Fahrenheit rating. All wiring looms shall be properly supported and attached to body members along the entire run. All wiring shall be mounted so as to provide protection from water and heat. All connections shall be crimp-type with heat shrink tubing with insulated shanks to resist moisture and foreign debris such as grease and road grime. Weather-resistant connectors shall be provided throughout to ensure the integrity of the electrical system. All wiring looms shall be properly supported and attached along the entire run. At any point where wire or looms must pass through metal holes, rubber grommets shall be installed in the holes to protect the wire from abrasion.
-

- 150.3 Wiring shall be individually and permanently function-labeled and color-coded every three (3) inches on the insulation to allow for easy identification.
-

- 150.4 The main low voltage chassis to body interface point and distribution panel shall be provided at the front of the body in a location providing easy service access. The distribution panel shall be labeled and shall contain body electrical relays and wire connection bar. The distribution panel shall be located so as not to reduce useable compartment space.
-

- 150.5 All electrical equipment switches shall be mounted on a switch panel mounted in the cab convenient to the operator. Emergency warning light switches shall be of the rocker type. For easy nighttime operation, an integral indicator light shall be provided to indicate when the circuit is energized. All switches shall be appropriately identified as to their function.
-

151.0 MAIN CONTROL SYSTEM

- 151.1 The apparatus shall have an in-vehicle electrical networking system, also

known as multiplexing, to provide real-time or current-state diagnostic capability and reduce troubleshooting or down time when compared to a standard point to-point wiring system. Due to the unique features and capabilities of a multiplexed electrical system, no exception will be allowed to this specification.

151.2 The system shall have the capability of delivering multiple signals via a CAN bus, utilizing specifications set forth by SAE J1939.

151.3 For superior system integrity, the networked system shall meet the following minimum requirements:

i) Universal System Manager (USM) containing the main processor and load manager.

ii) Integrated load management functions such as load shedding

iii) Self-contained LED diagnostic indicators:

- PWR for input power status (red)
- BUS for output power status (yellow)
- COM for communication status (green)

iv) Power Distribution Module - input/output modules

- Switch input capability
 - Solid-state circuitry
 - Responsible for lighting device activation
 - Diagnostic display for warning message indication
 - Vocation Module to allow for failsafe pumping operations in the event of a
 - fault occurrence within the multiplex system.
-

151.4 The electrical system shall be pre-wired for computer modem accessibility to allow service personnel to easily plug in a modem and phone line to allow remote diagnostics, troubleshooting, or program additions.

151.5 There shall be a diagnostic display provided in the cab. The diagnostic display shall allow for fault and condition messages to be displayed. This will provide the operator with detailed messages, such as which compartment door is ajar. The display shall allow for complete diagnostic capability without the use of additional hardware or software.

152.0 **NON-WARNING LIGHTING**

152.1 Clearance lights and reflectors shall be installed in conformance to the latest Federal DOT standards. Clearance lights and reflectors shall include two (2) red clearance lights, four (4) red rectangular reflectors, two (2) amber rectangular reflectors, and three (3) red marker lights centered at the rear step, recessed in the rubrail for protection.

152.2 There shall be a rectangular-shaped marker light with an amber-colored lens installed on either side of the apparatus body at the front of the body and just forward of the rear axle. The marker light shall be wired to the turn indicator. Marker lights at the front of the body shall be mounted in the rubrails of the body for protection.

152.3 There shall be a rectangular-shaped marker light with a red-colored lens installed at the trailing edge on either side of the apparatus body. The marker lights shall be recessed in the rubrails for protection.

152.4 There shall be a license plate light installed at the rear of the vehicle. _____

152.5 Three (3) Weldon #2030 lights shall be mounted under a light shield directly above each pump panel if equipped with a pump. The work light switch in the cab shall activate the lights when the park brake is set. _____

153.0 COMPARTMENT LIGHTING

153.1 There shall be a minimum of one (1) 4" circular single light bulb mounted in each body compartment. Compartment lights shall be wired to a master on/off rocker switch on the cab instrument panel. Each light shall be in a resilient shock shock-absorbent mount for improved bulb life. _____

153.2 The wiring connection for the compartment lights shall be made with a weather-resistant plug in style connector. A single water- and corrosion-resistant switch with a polycarbonate actuator and sealed contacts shall control each compartment light. The switch shall allow the light to illuminate if the compartment door is open. _____

153.3 The compartment light switch shall also be wired to activate a 2" red flashing light located in the cab to alert the driver that a body door is open. The door ajar warning light shall be interlocked through the parking brake to prevent the light from flashing when the vehicle is being serviced or the master/ignition switch is in the on position. _____

153.4 There shall be a compartment light with a switch installed to illuminate the pump area for service. _____

154.0 STEP LIGHTS

154.1 There shall be a minimum of four (4) recessed 4" lights with clear lenses provided to illuminate the rear step area. Step lights shall be activated with the work lights switch in cab after the park brake is set. _____

154.2 The apparatus shall have sufficient lights to properly illuminate the work areas, steps, walkways, and ground areas around the apparatus in accordance with current NFPA requirements. Areas under the driver and crew area exits shall be activated automatically when the exit doors are opened. Ground area lights shall be switched from the cab dash with the work light switch. _____

155.0 BACK-UP ALARM

155.1 There shall be an electronic back-up alarm supplied at the rear of the apparatus. The 97 dB(A) alarm shall be wired into the chassis back-up lights to signal when the vehicle is in reverse. _____

155.0 ELECTRICAL SYSTEM LOAD MANAGER

155.1 The vehicle's electrical system shall be equipped with an integrated load management device. The load manager shall be a one-touch device designed so that it shall be protected against reverse voltage and electrostatic damage. _____

155.2 Integrated load management functions shall be as follows:

- i) Eight (8) electrical load priorities, # 0 through # 7
- ii) The sequence of load shedding from # 7 shall start with # 7 and proceed

in order to # 1 and with # 0 never shedding. Sequencing of loads shall be at 1/20.5 second intervals.

155.3 Electrical load shedding shall be tied through the parking brake. Electrical loads shall shed only during stationary operations. Only devices not required for stationary operation, in accordance with current NFPA requirements, will be available for load shedding. Electrical loads shed during stationary operation will be reactivated when the park break is released.

155.4 Automatic fast idle activation shall occur before load shedding. The fast idle shall automatically activate whenever the parking brake is set and the system voltage drops below 12.8 volts for at least one 1 minute. The fast idle is to remain on for a minimum of 10 minutes and until a minimum of 13.0 volts is achieved. The fast idle function is to be automatically canceled if the park brake is released, there is loss of neutral safety, pump is shifted into gear, or the service brake is depressed.

155.5 The load manager system shall include the following features:

- i) Main battery monitoring
 - ii) Visual and audible low voltage alarm control
 - iii) Digital display for diagnostics and status information
 - iv) Test button to cycle all loads and the ability to verify load shedding sequences without draining the battery
 - v) Override switch shall be provided, with label, to override operation of the management system, per NFPA requirements.
-

155.6 The apparatus low voltage electrical system shall be tested in accordance with current NFPA requirements. A third-party testing service shall perform testing and certification.

156.0 MULTIPLEX MODEM KIT

156.1 A kit shall be supplied to include modem, adapter for laptop computer interface and adapter harness. The diagnostic hookup shall be located under the officer's side dash.

157.0 MULTIPLEX DATA LOGGER

157.1 The data logger shall record historical faults within the multiplex system and be accessible through the diagnostic software as well as the information center.

158.0 ELECTRONIC SIREN

158.1 One (1) Federal Signal PA300 siren model 690010 solid state electronic siren with attached noise-canceling microphone shall be installed. The unit shall be capable of driving high-power speakers up to 200 watts to achieve a sound output level that meets Class "A" requirements. Operating modes shall include hi-lo, yelp, wail, P.A., air horn, and radio re-broadcast. It shall include a Tap II feature.

159.0 REAR UPPER LEVEL WARNING LIGHTS

159.1 One (1) red and one (1) amber Federal Signal Sentry model SY12FS rotating light with a polycarbonate base, a single 55-watt halogen lamp, and a twist-on lexan dome shall be mounted at the upper rear of the vehicle to comply with NFPA 1901. Each light shall produce 175 flashes per minute. The warning light on the left side of the apparatus shall have a red dome, and the warning

light on the right side shall have an amber dome.

160.0 FEDERAL QL64XF RED LED (PR)

160.1 Two (2) Federal Quadraflare QL64XF LED (Light Emitting Diode) light heads with red lens shall be provided. The rectangular lights shall be wired with weatherproof connectors and shall be surface mounted where specified.

- Low on side of cab ahead of rear doors (each side)
-

161.0 LED LIGHT PACKAGE

161.1 Eight (8) Whelen 600 series, two (2) 500 Series LED (Light Emitting Diode) light heads with red lenses shall be provided.

161.2 The lights shall be wired with weatherproof connectors and shall be mounted as close to the corner points of the apparatus as is practical as follows:

- Two Quadraflare QL64XF LED light heads on the front of the apparatus facing forward
- Two Quadraflare QL64XF LED light heads on the rear of the apparatus facing rearward
- Two Quadraflare QL64XF LED light heads each side of the apparatus, one each side at the forward most point (as is practical), and one each side centered to provide midship warning (or as is practical).
- Two Federal 3300 series LED light heads, one each side as far rearward as practical

161.3 All warning devices shall be surface mounted in compliance with NFPA standards.

162.0 SCENE LIGHTS

162.1 Two (2) Federal GHSCENE lights with clear lenses shall be provided. Each light shall include (2) 20 watt halogen fixtures within the light housing. Both lights, within the each housing, shall be adjustable horizontally and vertically to provide desired coverage. All electrical connectors are to be enclosed in the housing providing protection against the elements.

162.2 The light shall be 12VDC, 40 watts, and provide 1050 candelas.

162.3 Located each side of cab between front door and side window.

162.4 Two (2) Unity model AGS4413 6" chrome-plated 12-volt, 35-watt floodlights shall be installed at the rear of the apparatus. Each light shall be manually operated by an on/off switch at the light.

163.0 HOSE BED LIGHTS

163.1 One (1) Federal Signal GHSCENE flush-mounted scene light with a clear lens shall be installed at the front area of the hosebed to provide hosebed lighting per current NFPA 1901. The light shall include (2) 20-watt halogen light fixtures within the light housing. The hosebed light shall be switched with worklight switch in the cab. An on-off switch shall also be provided at the light.

163.2 The two light fixtures shall be adjustable horizontally and vertically to provide the desired coverage. All electrical connectors are to be enclosed in the housing providing protection against the elements.

164.0 CROSSLAY LIGHTS

164.1 Two (2) Weldon model 2030 lights with Cast Products model LH23501 housings shall be provided at the driver's and officer's side rear of the crosslay. The lights shall be mounted approximately 16" away from the exterior on top of the body. The lights provide NFPA required crosslay lighting. _____

164.2 The light shall be operated by the work light switch in the cab. _____

165.0 DECK LIGHT WIRED TO BACK-UP

165.1 The rear deck lights shall be activated when the chassis is placed in reverse to provide additional lighting, in addition to the back-up lights, when backing the vehicle. _____

166.0 TAIL LIGHTS

166.1 Two (2) Federal QL64XF Quadraflare series L.E.D. (Light Emitting Diode) lights with one (1) halogen backup light shall be installed in a Cast 3 housing in a horizontal position each side at rear, and wired with weatherproof connectors. _____

166.2 Light functions shall be as follows:

- L.E.D. red running light with red brake light in upper position.
 - L.E.D. amber turn signal in middle position.
 - Halogen 27 watt clear backup light in lower position.
- _____

166.3 A one-piece polished aluminium trim casting shall be mounted around the three (3) individual lights in a vertical position. _____

167.0 12V POWER POINT

167.1 A plug-in type receptacle for hand held spotlights, cell phones, chargers, etc... shall be installed as specified. _____

168.0 CAB DOME LIGHTS

168.1 A dome light assembly consisting of a 3-position assembly mounted rocker switch, (31) candlepower incandescent 4" stainless steel white dome light and a (31) candlepower incandescent 4" stainless steel red dome light and plastic housing shall be installed as specified. _____

168.2 The white lights activates with appropriate cab door and light assembly mounted rocker switch, the red light activates with assembly mounted rocker switch only. _____

169.0 HAND HELD SPOT LIGHT

169.1 A specialty #2150 hand held spotlight, with holder, shall be provided. _____

170.0 HYDRAULIC GENERATOR

170.1 Smart Power, model #ER110, modular style generator 10,000 watt hydraulic generator shall be provided and installed as per the customer specified, ventilated, location. _____

- 170.2 The unit shall come equipped with: modular generator unit (which includes the hydraulic motor and filter, generator, hydraulic reservoir and cooler), axial piston hydraulic pump and a gauge panel. _____
- 170.3 The gauge panel shall display voltage, hourmeter, frequency, and amperage. _____
- 170.4 The hydraulic motor, generator, blower, cooler, and necessary hydraulic components shall be mounted in a rugged steel case. _____
- 170.5 The modular generator unit shall be 33.5" long x 15.75" wide x 13.75" high and weigh approximately 130 pounds. _____
- 170.6 The hydraulic pump shall be driven by a chassis transmission mounted power take off (PTO). _____
- 170.7 A PTO engage switch shall be mounted on the cab instrument panel to engage the PTO and start the generator. _____
- 170.8 *Ratings and Capacity*
- i) 10,000 watts instantaneous / 10,000 watts continuous
 - ii) 120/240 volts
 - iii) Single phase / 4 wire
 - iv) 60 Hz
 - v) 83 amps @ 120 volts / 42 amps @ 240 volts
 - vi) Engine engagement speed below 1000 RPM
 - vii) RPM operation range of 850 to 3240 RPM
- _____
- 170.9 The generator shall be tested in accordance with current N.F.P.A. 1901 standards. _____
- 171.0 TWIST LOCK RECEPTICLE**
- 171.1 A 20 amp, 110 volt (NEMA #L5-20) twist lock receptacle with a weatherproof cover plate shall be installed as specified by the department. _____
- 172.0 TELESCOPIC QUARTZ LIGHTS**
- 172.1 Two (2) Kwik-Raze model 36 Magnafire quartz light heads with 750-watt, 120-volt halogen bulb rated at 19,200 Lumens mounted on a Kwik-Raze model 500 bottom raising aluminium telescopic pole with up indicator switch. _____
- 172.2 The light assembly shall be externally mounted, One (1) each side at rear of cab. _____
- 172.3 The pole shall allow for 360-degree rotation of the light. A locking knob shall hold the pole at the desired height. _____
- 173.0 BREAKER PANEL**
- 173.1 A ten (10) place breaker box with up to ten (10) appropriately sized ground-fault interrupter circuit breakers shall be supplied. The breaker box will include a master breaker sized according to the generator output. The breaker box will be located in the specified compartment, not to exceed 12' run of wire. _____
- 173.2 Dimensions: 17.92" high x 14.25" wide x 3.75" deep. _____

174.0 ELECTRIC CORD REEL

174.1 A permanently mounted Hannay model ECR 1616-17-18 electric rewind electric cord reel with 200' of black 10 gauge 3 conductor type SOWA cord rated 20 amps @ 110 volts shall be installed as specified. The cord shall be terminated at the end. A rewind button shall be mounted as specified.

175.0 CORD REEL ROLLERS

175.1 Stainless steel rollers shall be installed for the electric rewind cord reel to facilitate smooth removal of the electrical cord.

176.0 CORD CONNECTOR

176.1 A Daniel Woodhead 20 amp, 110 volt (NEMA #L5-20) twistlock female cord connector model #27W47 shall be installed as specified.

177.0 PLATFORM PRECONNECT

177.1 One (1) 2-1/2" discharge (**WCT**) with an Akron 2-1/2" Pyrolite™ valve shall be located externally on the front center or rear of the platform as specified. This outlet shall come equipped with a 30 degree chrome elbow and a 2-1/2" **WCT** x 1-1/2" **NPSH** chrome reducing cap and chain. This shall allow the use of 2-1/2" or 1-1/2" hose from this outlet.

178.0 HOSE BOX

178.1 A hinged covered hose box shall be mounted at the platform. The box shall have sufficient capacity to hold 50' of 1-1/2" double jacket coupled fire hose and pistol type automatic nozzle.

179.0 REAR 4" AERIAL WATERWAY INLET

179.1 One (1) 4" inlet shall be provided at the rear of the apparatus and shall be connected to the vertical pedestal waterway piping to supply water to the aerial waterway from an outside source. All fabricated piping shall be constructed of a minimum of Schedule 10 stainless steel piping to help prevent corrosion. A 4" NST chrome-plated male adapter with a long-handle chrome-plated 4" NST cap shall be installed on the inlet.

180.0 WATERWAY PRESSURE GAUGE

180.1 One (1) weatherproof 3-1/2" compound vacuum pressure gauge with a range of 30-0-600 shall be installed adjacent to the waterway inlet. The function of the gauge is to advise the aerial operator of the pressure within the waterway. The gauge shall be filled with a liquid solution.

181.0 LADDER SECTION LIGHTS

181.1 A lighting system to illuminate the climbing area inside each ladder section shall be provided. The lights shall be located above ladder rung level and directed toward the centerline of the ladder to reduce glare. A minimum of three 12 volt lights per section, with polished guards shall be wired and attached so as not to be an obstruction during climbing. The lights shall be controlled with the ladder lights switch at the operators control console.

182.0 TIP SPOTLIGHT

182.1 There shall be a 12V Collins spotlight with a switch mounted on the tip of the aerial device.

183.0 PLATFORM LIGHTING

183.1 Four (4) Federal Signal QL64XF Quadraflare LED (Light Emitting Diodes) light heads with RED diodes shall be provided. The rectangular flashing lights shall be surface mounted low across the aerial platform and be wired to the upper level warning light package.

183.2 A Kwik-Raze model 36 Magnafire quartz light head with 750-watt 120-volt halogen bulb rated at 19,200 Lumens mounted on a Kwik-Raze model 1400 permanent mount.

The light shall be mounted on the lower rear outside of the aerial platform facing down.

A weather resistant switch shall be provided on the platform control panel to control the light when the aerial power circuit is activated.

184.0 AERIAL TIP RECEPTICAL

184.1 A 110-volt Twist Lock 15 or 20 amp receptacle outlet shall be installed at the tip of the aerial device and wired into an apparatus breaker box with a 30-amp breaker. The breaker shall be fitted with a GFI protection feature. The receptacle box shall be fitted with a weather resistant cover.

185.0 LADDER BASE LIGHTING

185.1 Two (2) Unity model AG-S-H floodlights shall be mounted at the bottom of the ladder base section, one on each side. They shall be controlled from the turntable-operating pedestal.

186.0 TWO-WAY INTERCOM

186.1 A two way Atkinson Dynamics (Federal Signal) intercom system shall be installed to provide communications between the turntable control station and the aerial tip. The system shall consist of a 12 volt transistorized amplifier and two (2) waterproof speaker / microphones.

186.2 In addition to the combination speaker / microphone, the turntable shall include a volume control and a push to talk button. The speaker / microphone at the tip shall be hands free operation.

187.0 REAR LADDER STORAGE

187.1 A ladder storage tunnel shall be provided beneath the aerial device frame work. The ladder tunnel shall have a minimum storage capacity for the 115 feet of ground ladders as per NFPA 1901, with access to the ladders via an opening at the rear.

187.2 This tunnel shall be lined with .090" aluminium. The ladders will be held captive top and bottom by aluminium tracks and slide on friction reducing material. All ladders shall be removable individually without having to remove any other ladder. A quick release, device shall keep the ladders secured in the storage area.

188.0 LADDER TUNNEL DOORS

188.1 A pair of 1/8" (.125) aluminium diamond plate doors with D-ring style handles shall be installed for access to the rear ladder tunnel. Each door shall open a full 90 degrees to allow easy removal of ground ladders. _____

189.0 PIKE POLE STORAGE

189.1 Pike poles storage shall be provided at the rear of the body for six (6) pike poles. The storage area shall be labeled for two (2) 6' poles, two (2) 8' poles, and two (2) 12' poles. The pike poles shall be secured by either "J" slotted locking tubes and/or diamond plate door(s). _____

190.0 PIKE POLE MOUNT

190.1 There shall be an aluminum tube mounted directly on the ladder for storage of a 8' pike pole. _____

191.0 AERIAL PLATFORM BREATHING AIR SYSTEM

191.1 The aerial device shall be supplied with a breathing air system as outlined in NFPA 1901 20.7.7 and section 25.5. The air system shall hold a total of 888 cubic feet of air carried in two DOT 444 cubic foot cylinder rated at 4500 psi. The air tank shall be painted yellow and marked with a label that read "High Pressure 4500 psi Breathing Air". The tank shall be mounted in accordance with NFPA 1901 25.5.7 and include a guard to protect the valve on the cylinder end. _____

191.2 All components of the piping system shall have a 3 to 1 safety margin. There shall be a high pressure regulator supplied at the base of the aerial to reduce the air pressure to no more than 125 psi up the aerial. All valves fittings and hoses shall be constructed of corrosion resistant material. A pressure relief valve set at 1 1/2 times working pressure shall be supplied to relieve the air lines in the event of a pressure regulator failure. Two (2) 1/4" NPT outlets shall be provided in the platform for dealer/customer installed quick connect fittings. An airmask box shall be provided to store breathing air masks at the tip as outlined in NFPA 1901 20.7.7.4. _____

191.3 A low air breathing alarm shall be provided as outlined in NFPA 1901 section 20.7.7.5. The low air warning system shall provide an audible and visual warning when the air volume is at or below 20 percent. _____

192.0 ROOF LADDER BRACKET

192.1 A roof ladder -mounting bracket shall be installed on the outside of the ladder base section. The bracket shall be designed to allow for quick removal of the ladder. _____

193.0 THIRD PARTY FLOW TEST

193.1 A flow test shall be conducted to determine that the water system is capable of flowing 1,000 gpm at 100 psi nozzle pressure with the aerial device at full extension and elevation. When the aerial apparatus is equipped with a fire pump, the test shall be conducted using the onboard pump. Intake pressure for the onboard pump shall not exceed 20 psi. _____

193.2 In addition to the flow test, a hydrostatic test shall be done on the waterway system. The permanent water system, piping, and monitor shall be hydrostatically tested at the maximum operating pressure required to flow 1,000 gpm at 100 psi nozzle pressure at maximum elevation and extension. _____

193.3 These results shall be certified by an independent, third-party testing organization, per NFPA 16.13.1 through 16.13.1.3. _____

194.0 LADDERS

194.1 One (1) Alco-Lite FL-10 10' aluminum folding attic ladder shall be provided. Both ends shall be equipped with molded rubber feet and the ladder shall have handles for easy carrying. The ladder shall meet or exceed the requirements of the current edition of NFPA 1931. _____

194.2 An Alco-Lite PRL-14 14' roof ladder shall be provided. Folding steel roof hooks shall be attached to one end of the ladder with steel spikes on the other. _____

194.3 One (1) Alco-Lite PRL-16 16' aluminum roof ladder shall be provided. A pair of folding 3/4" (0.75") steel roof hooks shall be attached to one end of the ladder, and a pair of steel spiked feet on the other end. The ladder shall meet or exceed the requirements of the current edition of NFPA 1931. _____

194.4 One (1) Alco-Lite PEL-24 24' aluminum two-section extension ladder shall be provided. The ladder shall meet or exceed the requirements of the current edition of NFPA 1931. _____

194.5 An Alco-Lite PEL-28 28' two-section extension ladder shall be provided. _____

194.6 An Alco-Lite PEL-35 35' two-section extension ladder shall be provided. _____

195.0 PIKE POLES

195.1 One (1) Ziamatic Plasticore model PCM 6 6' hollow fiberglass pike pole, 1-3/4" (1.75") outside diameter, with painted steel pike shall be supplied. _____

195.2 One (1) Ziamatic Plasticore model PCM 8 8' hollow fiberglass pike pole, 1-3/4" (1.75") outside diameter, with painted steel pike shall be supplied. _____

195.3 One (1) Ziamatic Plasticore model PCM 12 12' hollow fiberglass pike pole, 1-3/4" (1.75") outside diameter, with painted steel pike shall be supplied. _____

196.0 STOKES FERNO WASHINGTON MODEL 71

196.1 A Ferno Washington Model # 71 orange stokes shall be supplied. The stokes basket shall include four orange nylon tie-down straps approximately four feet in length. The straps shall have a loop on one end with male/female seatbelt type buckles at the other end. _____

197.0 CAB PAINT

197.1 The cab and chassis shall be painted with the highest quality finish for low maintenance, long life, and attractive appearance. The finish shall consist of a corrosion-resistant primer, urethane high build primer, and high performance durable color coat. The vehicle finish shall be protected with a minimum of 2 mils film thickness of UV resistant clear coat.

- L6572EG Red
 - L0006EG White
-

198.1 INTERIOR CAB PAINT FINISH

198.1 The interior of the cab shall be painted with Zolatone Gray Stone #20-64. _____

199.0 BODY PAINT FINISH

199.1 The apparatus body shall be painted with the highest quality finish for low maintenance, long life, and attractive appearance. The finish shall consist of a corrosion-resistant primer, urethane high build primer, and high performance durable color coat. The vehicle finish shall be protected with a minimum of 2 mils film thickness of UV resistant clear coat.

- L6572EG Red
-

200.0 DOUBLE "Z" STRIPE

200.1 A double scotchlite tape "Z" stripe shall run the length of each side of the apparatus. The stripes shall be 2" and 4" in height. _____

201.0 AERIAL SIGN PLATE

201.1 Two (2) 16" x 144" x 1/8" (0.125") thick smooth aluminium plates shall be provided. The plates shall have 1" lips top and bottom for rigidity. Each sign plate shall be bolted on either side of the base section, approximately at the midpoint. The plates shall be provided to display the department's name or other information. The plates shall be painted white or as specified by the customer. _____

202.0 REFLECTIVE TAPE ON JACKS

202.1 The four outriggers that protrude beyond the side of the body shall be striped with white reflective tape. The tape shall be visible from the front or rear of the unit. _____

203.0 AERIAL CERTIFICATION

203.1 The manufacturer shall include a statement from a licensed and registered independent, third-party professional engineer employed by an independent, third-party engineering firm attesting that the aerial ladder on the unit bid is designed and will be provided with a minimum 2.5 to 1 structural safety factor based on the yield strength of the material. This safety factor shall include 2.5 times the dead weight of the aerial, plus 2.5 times the rated load capacity, plus 2 times the water load stress. The safety factor shall be applicable to all components used in the construction of the aerial ladder, including all substructure and stabilizer components. _____

203.2 The manufacturer shall also include a statement from a licensed and registered independent, third-party professional engineer employed by an independent, third-party engineering firm attesting that the aerial and stabilizer system on the unit bid is designed and will be provided with a minimum of 1.5 to 1 stability factor or tip-over safety factor. This stability factor shall include 1.5 times the rated live load capacity. The stability factor shall apply when the vehicle is on a level surface, as well as when it is on a 5-degree downward side slope with the aerial in the direction most likely to cause overturning. _____

- 203.3 All quality control testing shall be performed by an ASNT-certified level II Non-Destructive Test Technician. The aerial ladder shall be tested in compliance with the current editions of NFPA 1901 and NFPA 1914. All sub-assemblies are to be inspected before assembly and body mounting. _____
- 203.4 Each aerial section shall be tested prior to the assembly of the complete aerial device. Each section shall be subjected to a visual weld inspection to assure the integrity of the weldment. Die penetrant shall be used as required to qualify suspected weld defect indications. All turntable mounting bolts, cylinder anchor pins, outrigger anchor pins, aerial hinge pins, and other critical mounting components are subjected to ultrasonic testing to detect any flaws. _____
- 203.5 A magnetic particle test shall be conducted on the torque box, aerial support structure, outriggers, outrigger support structure and all other structural ferrous aerial components. This test shall be performed to assure the integrity of the weldment. _____
- 203.6 After the aerial is assembled and installed on the vehicle, an operational inspection shall be made and the aerial shall be tested to comply with the applicable standards in the current editions of NFPA 1901 and NFPA 1914. _____
- 203.7 In addition to the above tests, the aerial shall successfully complete the following operational tests:
- 1) The completed apparatus shall be placed on a firm, level surface with the aerial stabilizers extended and down. The aerial shall lift a test weight equal to the rated tip load capacity, as specified herein, with the aerial at full extension, 0 degrees elevation, and rotated 90 degrees to either side of the truck chassis. The test weight shall be lifted from 0 degrees to 15-20 degrees. The test weight shall be suspended from a position equal to the position of the outermost rung of the fly section or the center of the platform when so equipped. The aerial shall lift the test weight smoothly and evenly with no twisting or jerking. This test shall be performed at the normal hydraulic system relief valve setting. No temporary adjustments to the relief valve shall be allowed.
 - 2) The completed apparatus shall be placed on a firm, level surface with the aerial ladder stabilizers extended and down. A test weight equal to 1.5 times the aerial's rated tip load capacity, shall be suspended from a position equal to the position of the outermost rung of the fly section (or center of the platform when so equipped), with the aerial in the straight-ahead position. The aerial shall then be rotated a full 360 degrees around the vehicle with the aerial at full extension and at 0 degrees elevation (or high enough to clear vehicle-mounted equipment). The aerial and vehicle shall show no signs of instability. This test shall be performed with no water in the tank, or hose, ladders, or removable equipment that would act as a counterbalance in order to simulate a worst-case condition.
 - 3) The completed apparatus shall be placed on a firm surface having a minimum 5 degrees side slope with the aerial stabilizers extended and down. A test weight equal to 1.5 times the aerial's rated tip load capacity, shall be suspended from a position equal to the position of the outermost rung of the fly section (or center of the platform when so equipped), with the aerial in the straight-ahead position. The aerial shall then be rotated 90 degrees to the downhill side with the aerial at full extension, 0 degrees elevation (or high enough to clear vehicle-mounted equipment). The aerial and vehicle shall show no signs of instability, and all of the stabilizers shall remain firmly on the ground. This test shall be performed with no water in the tank, or hose, ladders, or removable equipment that would act as a counterbalance in order to simulate a worst-case condition
 - 4) The completed apparatus shall be placed on a firm, level surface with the aerial stabilizers extended and down. A test weight equal to 2.0 times the aerial's rated tip load capacity, shall be suspended from a position equal to the position of the outermost rung of the fly section (or center of the platform when so equipped), with the aerial in the straight-ahead position at full extension and at 8 degrees elevation (or high enough to clear vehicle-mounted equipment). After ten (10)

minutes, the weight shall be removed, and the aerial shall be inspected for any abnormal twist or deflection.

5) The completed apparatus shall be placed on a firm, level surface with the aerial stabilizers extended and down. The aerial will be positioned at full extension at 0 degrees elevation at some position out of the travel rest and off the side or rear of the truck. For units without a pre-piped waterway to the tip, a test weight of 220# shall be applied horizontally and perpendicular to the tip of the aerial at the location of the outermost rung. The rotation brake shall not release nor shall the aerial's deflection exceed the manufacturer's accepted tolerances. For aerials with pre-piped waterways, a test weight of 350# will be applied at the location of water nozzle.

204.0 MANUALS & DIAGNOSTIC SOFTWARE:

204.1 The Contractor shall supply the following manuals (in English) upon delivery of the vehicles:

204.1.1 Operator's manual – one (1) per vehicle. _____

204.1.2 Parts and Service manuals- one (1) set. _____

204.2 Data Collections Sheets- Data collections sheets to be completely fill out. See clause D.6 (PMDCS) _____

205.0 WARRANTY:

205.1 The apparatus manufacturer shall provide a **full 1-year standard warranty**. All components manufactured by the apparatus manufacturer shall be covered against defects in materials or workmanship for a 1-year period. All components covered by separate suppliers such as engines, transmissions, tires, and batteries shall maintain the warranty as provided by the component supplier. A copy of the warranty document shall be provided with the proposal. _____

205.2 The apparatus manufacturer shall provide a **full lifetime frame warranty**. This warranty shall cover all apparatus manufacturer designed frame, frame members, and crossmembers against defects in materials or workmanship for the lifetime of the covered apparatus. A copy of the warranty document shall be provided with the proposal. Frame warranties that do not cover crossmembers for the life of the vehicle shall not be acceptable. _____

205.3 The apparatus manufacturer shall provide a **comprehensive 10-year/100,000-mile structural warranty**. This warranty shall cover all structural components of the cab and/or body manufactured by the apparatus manufacturer against defects in materials or workmanship for 10 years or 100,000 miles, whichever occurs first. Excluded from this warranty are all hardware, mechanical items, electrical items, or paint finishes. A copy of the warranty document shall be provided with the proposal. _____

205.4 The apparatus manufacturer shall provide a **full 10-year stainless steel plumbing components warranty**. This warranty shall cover defects in materials or workmanship of apparatus manufacturer designed foam/water plumbing system stainless steel components for 10 years. A copy of the warranty document shall be provided with the proposal. _____

205.5 The apparatus manufacturer shall provide a **10-year limited paint and corrosion perforation warranty**. This warranty shall cover paint peeling, cracking, blistering, and corrosion provided the vehicle is used in a normal and reasonable manner. Paint shall be prorated for 10 years and corrosion perforation shall be covered

100% for 10 years. The warranty period shall begin upon delivery of the apparatus to the original user-purchaser. A copy of the warranty document shall be provided with the proposal.

205.6 The aerial manufacturer shall provide a **20 year structural integrity warranty on the aerial device**. This warranty shall cover structural components and shall be extended for a period of 20 years after the date on which the vehicle is delivered to the original purchaser. A copy of the warranty document shall be provided with the proposal. Please refer to warranty document for complete details and exclusions.

205.7 In the event of a failure on the part of the Contractor to repair or replace any article during the warranty period within five (5) business days from the date of notification, the City may have the work performed by others and offset the cost against any money due, or that may become due to the Contractor, or if there is money due, the Contractor agrees to pay the City such cost.

205.8 The responsibility for the design of the complete equipment, its performance and reliability shall rest upon the Contractor.

205.9 The term "*repeated failures*" as determined by the Contract Administrator, as used herein is defined to mean that the same component, subassembly, or assembly develops repeated defects, breakdowns and/or malfunctions rendering the apparatus inoperative, or requiring repeated shop correction, service and/or replacement during the warranty period applicable for said component, subassembly, or assembly. Minor items or ordinary service adjustments are not included, or considered under the scope of "repeated failures", as well as other factors, such as operational damage due to accidents, misuse or lack of proper maintenance, service and lubrication attention by not following the manufacturer's preventative maintenance schedule.

205.10 Where the vehicle develops "repeated failures" in service, the Contractor shall make any necessary engineering changes, repairs, alterations or modifications in order to guarantee reliability of performance, at no cost to the City, including all incidental costs, with a reapplied, full warranty as described in 205.1 to 205.6.

206.0 TRAINING:

The Contractor shall be required to provide training (at the Contractor's expense) for the City of Winnipeg maintenance and operating personnel.

The training shall be divided into two separate sessions, one for maintenance personnel and one for operating personnel. The training shall be conducted in separate or combined sessions for each group of personnel.

The duration of the sessions shall be as long as required for adequate familiarization and orientation of the equipment to the satisfaction of the Contract Administrator.

The training shall be conducted within two (2) calendar weeks from the date of delivery and shall be coordinated through the Contract Administrator.

The training shall be conducted in Winnipeg at a time and location designated by the Contract Administrator.

Pricing should be based on two (2) business days for maintenance personnel and two (2) business days for operating personnel.

Note: The first payment of the contract on the equipment will not be issued until successful completion of training has been conducted to the satisfaction of the Contract Administrator.

206.1 Training Aides

206.1.1 Training aids to be included. _____

206.2 On the type of equipment being offered, state if VHS video tape or CD Rom training aides are available. _____

206.3 State if other training aides are available and state type _____

207.0 DELIVERY:

207.1 The equipment shall be serviced, ready for operation and delivered F.O.B. with the freight prepaid to the City of Winnipeg, Fleet Management Agency, 185 Tecumseh Street, Winnipeg, Manitoba within **eight (8) calendar weeks** from the date of official notification of award of Contract. The Contractor shall contact the Contract Administrator prior to delivery of the equipment. _____

207.1.1 The Contractor shall fax all vehicle serial numbers, hours/mileage to the Contract Administrator one (1) calendar week prior to delivery. _____

207.1.2 A pre-delivery inspection shall be performed by the Contractor on all equipment. _____