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INTENT OF SPECIFICATIONS

It is the intent of these specifications to cover the furnishing and delivery to the purchaser a complete apparatus equipped as hereinafter specified. With a view of obtaining the best results and the most acceptable apparatus for service in the fire department, these specifications cover only the general requirements as to the type of construction and tests to which the apparatus must conform, together with certain details as to finish, equipment and appliances with which the successful bidder must conform. Minor details of construction and materials where not otherwise specified are left to the discretion of the contractor, who shall be solely responsible for the design and construction of all features. The apparatus shall conform to the requirements of the current (at the time of bid) National Fire Protection Association Pamphlet #1901 for Motor Fire Apparatus unless otherwise specified in these specifications.

Bids shall only be considered from companies which have an established reputation in the field of fire apparatus construction and have been in business for a minimum of ten (10) years.

Each bid shall be accompanied by a set of "Contractor's Specifications" consisting of a detailed description of the apparatus and equipment proposed and to which the apparatus furnished under contract must conform. Computer run-off sheets are not acceptable as descriptive literature.

The specifications shall indicate size, type, model and make of all component parts and equipment.

STATEMENT OF EXCEPTIONS TO NFPA 1901

If, at the time of delivery, the apparatus manufacturer is not in compliance, a statement of exceptions must be provided as follows:

- The specific standard affected.
- A statement describing why the manufacturer is not in compliance.
- A description of the remedy, and who the responsible party is.

The document must be signed by an officer of the company, and an authorized agent of the purchaser.

NO EXCEPTIONS

QUALITY AND WORKMANSHIP

The design of the apparatus must embody the latest approved automotive engineering practices.

The workmanship must be the highest quality in its respective field. Special consideration shall be given to the following points: Accessibility to various areas requiring periodic maintenance, ease of operation (including both pumping and driving) and symmetrical proportions.

Construction must be rugged and ample safety factors must be provided to carry loads as specified and to meet both on and off road requirements and speed as set forth under "Performance Test and Requirements."

PERFORMANCE TESTS AND REQUIREMENTS

A road test shall be documented with the apparatus fully loaded and a continuous run of ten (10) miles or more shall be made under all driving conditions, during which time the apparatus shall show no loss of power or overheating. The transmission drive shaft or shafts, and rear axles shall run quietly and free from abnormal vibration or noise throughout the operating range of the apparatus. The apparatus, when loaded, shall be approximately 66% on the rear axle. The successful bidder shall furnish a weight

certification showing weight on the front and rear axle, and the total weight of the completed apparatus at the time of delivery.

- a. The apparatus must be capable of accelerating to 30 MPH from a standing start within 25 seconds on a level concrete highway without exceeding the maximum governed engine RPM.
- b. The service brakes shall be capable of stopping the fully loaded vehicle within 35 feet from a speed of 25 MPH on a level concrete highway.
- c. The apparatus, fully loaded, shall be capable of obtaining a speed of 50 MPH on a level highway with the engine not exceeding 95% of its governed RPM (full load).
- d. The apparatus shall be tested and approved by a qualified testing agency in accordance with their standard practices for pumping engines.
- e. The contractor shall furnish copies of the Pump Manufacturer's Certification of Hydrostatic Test (if applicable), the Engine Manufacturer's current Certified Brake Horsepower Curve and the Manufacturer's Record of Construction Details.

FAILURE TO MEET TESTS

In the event the apparatus fails to meet the test requirements of these specifications on the first trial, a second trial may be made at the option of the bidder within thirty (30) days of the date of the first trials. Such trials shall be final and conclusive and failure to comply with these requirements shall be cause for rejection. Permission to keep and/or store the apparatus in any building owned or occupied by the purchaser shall not constitute acceptance of same.

EXCEPTIONS TO SPECIFICATIONS

The following specifications shall be strictly adhered to. Exceptions shall be considered if they are deemed equal to or superior to the specifications, provided they are fully explained on a separate page entitled "EXCEPTIONS TO SPECIFICATIONS." Exceptions shall be listed by page and paragraph.

Failure to denote exceptions in the above manner shall result in immediate rejection of the proposal. In addition a general statement taking "TOTAL EXCEPTION" to the specifications shall result in immediate rejection of bid.

GENERAL CONSTRUCTION

The apparatus shall be designed and the equipment mounted with due consideration to distribution of load between the front and rear axles so that all specified equipment, including filled water tank, a full complement of personnel and fire hose shall be carried without injury to the apparatus. Weight balance and distribution shall be in accordance with the recommendations of the International Association of Fire Chiefs and National Fire Association (or American Insurance Association). Certified Laboratories certificate shall be submitted by the manufacturer. Weight of apparatus shall meet all federal axle load laws.

DELIVERY REQUIREMENTS

The apparatus shall be completely equipped as per these specifications upon arrival and on completion of the required tests shall be ready for immediate service in the fire department of the purchaser. Any and

all alterations required at the scene of delivery to comply with these specifications must be done at the contractor's expense.

PURCHASER RIGHTS

The Purchaser reserves the right to accept or reject any bid. The purchaser also reserves the right to award in their best interest and reserves the right to waive any formalities.

U.S.A. MANUFACTURER

The entire apparatus shall be assembled within the borders of the Continental United States to insure more readily available parts (without added costs and delays caused by tariffs and customs) and service, as well as protecting the purchaser should legal action ever be required.

MANUFACTURER'S EXPERIENCE

Each manufacturer shall have been in business making similar apparatus for a minimum of seventy-five (75) years and must have had single ownership for more than fifty (50) years.

ELIMINATION OF DIVIDED RESPONSIBILITY

It is required that each bidder produce both the chassis and complete apparatus. To eliminate divided responsibility and service, the chassis and body must be manufactured by the same Company. Manufacturer shall state the number of years the Company has been producing their own chassis and body. Manufacturer shall state compliance with the paragraph. NO EXCEPTIONS.

FAMA COMPLIANCE

Manufacturer must be a current member of the Fire Apparatus Manufacturer's Association.

PROPOSAL DRAWING

A general layout drawing depicting the apparatus layout and appearance shall be provided with the bid. The drawing shall consist of left side, right side, frontal and rear elevation views. Apparatus equipped with a fire pump, shall have a general layout view of the pump operators panel scaled the same as the elevation views. The drawing shall be a depiction of the actual apparatus proposed and not of a generic similar product.

APPROVAL DRAWING

After the award of bid and pre-construction conference, a detailed layout drawing depicting the apparatus layout and appearance including any changes agreed upon shall be provided for customer review and signature. The drawing will become part of the contract documents. The drawing shall consist of left side, right side, frontal and rear elevation views. Apparatus equipped with a fire pump, shall have a general layout view of the pump operators panel scaled the same as the elevation views.

PRE-CONSTRUCTION CONFERENCE

After award of the contract, and prior to construction of the apparatus, a pre-construction conference shall be held at the facility of the manufacturer. A provision shall be provided in the bid price for all travel, food and lodging to accommodate three (3) Fire Department personnel.

INSPECTION TRIPS

An inspection trip at the manufacturers facility prior to delivery of the completed apparatus shall be provided. Accommodations for three (3) Fire Department personnel to include all transportation, food and lodging shall be included in the bid price.

CHASSIS

The chassis shall be manufactured in the factory of the bidder. The chassis shall be designed and manufactured for heavy duty service with adequate strength and capacity of all components for the intended load to be sustained and the type of service required. There shall be no divided responsibility in the production of the apparatus.

ALUMINUM CAB

The cab shall be a full tilt 6-person cab designed specifically for the fire service and manufactured by the chassis builder.

Cab shall be built entirely by the apparatus manufacturer within the same facilities (no exceptions). Rear of the cab shall be slanted forward at the top rear for mid-ship aerial use. The outside of the rear cab wall shall be aluminum diamond plate.

CAB DESIGN

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

The apparatus chassis shall be of an engine forward, fully enclosed tilt cab design. There shall be four (4) side entry doors.

The cab shall be of a fully open design with no divider wall or window separating the front and rear cab sections.

Construction of the cab shall consist of high strength 5052H32 aluminum welded to extruded aluminum framing of 6061-T6 material.

The cab roof shall utilize extruded, radiused outer corner rails with integral drip channel and box tubing type cross brace supports.

The cab sides shall be constructed from extruded door pillars and posts that provide a finished door opening, extruded and formed wheel well openings supports, formed aluminum wheel well liners and box tubing type support braces.

The cab floor and rear cab wall shall utilize box tubing type framing and support bracing.

The framework shall be of a welded construction that fully unitizes the structural frame of the cab.

The structural extrusion framework shall be overlaid with interlocked aluminum alloy sheet metal panels to form the exterior skin of the cab.

The structural extrusion framework shall support and distribute the forces and stresses imposed by the chassis and cab loads and shall not rely on the sheet metal skin for any structural integrity.

CAB SUB-FRAME

The cab shall be mounted to a steel box tube sub-frame, and shall be isolated from the chassis, through the use of no less than six (6) elastomeric bushings. The sub frame shall be painted to match the primary chassis color.

The sub-frame shall be mounted to the chassis through the use of lubricated Kaiser bushing for the front pivot point, and two (2) hydraulically activated cab latches, to secure the rear.

CAB TILT SYSTEM

An electrically powered hydraulic cab tilt system shall be provided, and shall lift the cab to an angle of 45 degrees, exposing the engine and accessories for service. The system shall be interlocked to only operate when the parking brake is set.

The lift system shall be comprised of two (2) hydraulic lift cylinders, an electrically driven hydraulic pump, and a control switch. A mechanical locking system will be provided to ensure the cab remains in the raised position in the event of a hydraulic failure.

The hydraulic lift cylinders will be connected to a steel cab sub-frame, and not directly to the cab. **NO EXCEPTIONS**

CAB DIMENSIONS

The cab shall be designed to satisfy the following minimum width and length dimensions:

Cab Width (excluding mirrors)	98"
Cab Length (from C/L of front axle)	
To front of cab (excluding bumper)	68"

To rear of cab 56"
Total Cab Length (excluding bumper) 124"

INTERIOR

The cab interior shall have Zolatone gray/black rubberized, mar resistant, textured finish.

FENDER CROWNS

Polished stainless steel front axle fenderettes with full depth radiused wheel well liners shall be provided.

GRILLE

The front of the cab shall be equipped with a stainless steel grille with sufficient area to allow proper airflow into the cooling system and engine compartment.

CAB INSULATION

The exterior walls, doors, and ceiling of the cab shall be insulated from the heat and cold, and to further reduce noise levels inside the cab. The cab interior sound levels shall not exceed 90 decibels at 45 mph in all cab seat positions. **NO EXCEPTIONS**

ROOF DESIGN

The cab shall be of a flat roof design with side drip rails and shall satisfy the following **minimum** height dimensions:

Cab Dimensions Interior
Front 59"
Rear 55"

Cab Dimensions Exterior
Front 65"
Rear 65"

DIAMOND PLATE, CAB ROOF

The roof of the cab shall have a diamond plate overlay. The overlay shall be constructed of .125" aluminum serrated diamond plate and measure 30" x 60".

EXTERIOR GLASS

The cab windshield shall be of a two piece curved design utilizing tinted, laminated, automotive approved safety glass. The window shall be held in place by an extruded rubber molding. The cab shall be finished painted prior to the window installation.

Two (2) fixed position side windows shall be provided between the forward cab area and the crew cab area, one (1) each side and shall utilize tinted, tempered automotive approved safety glass. The widows shall be approximately 20.5" high x 16.50" wide to provide maximum visibility. The side windows shall be held in place by an extruded rubber molding.

The cab door and canopy windows shall utilize tinted, automotive approved safety glass.

Two (2) sliding rear windows approximately 15" x 17" shall be installed on the rear wall of the cab.

SUN VISORS

The sun visors shall be made of dark smoke colored transparent polycarbonate. There shall be a visor located at both the driver and officer positions, recessed in a molded form for a flush finish.

CAB STEPS

The lower cab steps shall be no more than 22" from the ground. An intermediate step shall be provided, mid way between the lower cab step, and the cab floor.

The intermediate step shall be slightly inset to provide for safer ingress and egress. All steps shall be covered with material that meets or exceeds the NFPA requirements for stepping surfaces.

STEP LIGHTS

A white LED strip light shall illuminate each interior cab step. These lights shall illuminate whenever the battery switch is on and the cab door is opened.

CAB STRUCTURAL INTEGRITY

The cab of the apparatus shall be designed and so attached to the vehicle as to eliminate, to the greatest possible extent, the risk of injury to the occupants in the event of an accident.

The apparatus cab shall be tested to specific load and impact tests with regard to the protection of occupants of a commercial vehicle.

A test shall be conducted to evaluate the frontal impact strength of the apparatus cab to conform to the test J2420 and the "United Nations Regulation 29, Annex 3, paragraph 4, (Test A). A second test shall be conducted to evaluate the roof strength of the apparatus cab to conform to the Society Of Automotive Engineers (SAE) SAE J2422/SAE J2420 and "United Nations Regulation 29, Annex 3, paragraph 5, (Test B) and SAE J2420. The evaluation shall consist of the requirements imposed by ECE Regulation 29, Paragraph 5.

The test shall be conducted by a certified independent third party testing institution.

A letter stating successful completion of the above test on the brand of cab being supplied shall be included in the bid. There shall be "**no exception**" to this requirement.

SEAT BELT TESTING

The seat belt anchorage system shall be tested to meet FMVSS 207 Section 4.2a and FMVSS 210 section 4.2. Testing shall be conducted by an independent third party product evaluation company.

A copy of the certification letter shall be supplied with the bid documents.

MANUAL CAB LIFT

There shall be a manually operated hydraulic pump for tilting the cab in case the main pump should fail. Access to the pump shall be located under the left corner of the front bumper.

CAB DOORS

The cab doorframes shall be constructed from aluminum extrusions fitted with an aluminum sheet metal skin and shall be equipped with dual weather seals. The cab doors shall be equipped with heavy-duty door latching hardware, which complies with FMVSS 206. The mechanics of the door operation shall utilize rod linkage for positive operation. A rubber coated nylon web doorstop shall be provided.

The doors shall be lap type with a full-length stainless steel 3/8" diameter hinge and shall be fully adjustable.

All openings in the cab shall be grommeted or equipped with rubber boots to seal the cab from extraneous noise and moisture.

The cab doors shall be designed to satisfy the following minimum opening and step area dimensions:

Door Opening:	
Front	36.5" x 73"
Rear	36.5" x 73"

POWER WINDOWS

All four cab entry doors shall have power windows. Each door shall be individually operated and the driver's position shall have master control over all windows. The front windows shall roll down completely.

WORK SURFACE

There shall be a flat work surface in front of the officer's seat.

DELUXE CONSOLE

There shall be a deluxe console mounted on the engine hood between the driver and officer. The console shall be covered in black vinyl material to match the engine hood. The console shall come complete with two drink holders, and recessed wells for storage of gloves or other miscellaneous items.

The outboard sections shall contain duct work to direct air flow from the heater/AC towards the driver and officer.

INTERIOR DOOR PANELS

The interior of the cab entry doors shall have a 304 brushed stainless steel scuff plate, contoured to the door, from the door sill down.

The lower portion of the doors shall also have a 304 brushed stainless steel scuff plate and shall include a total of 245 square inches of reflective material on each door, exceeding the NFPA requirement of 96 square inches. The layout shall be opposing ruby red "chevron" stripes on each side. The red striping shall be laid over white 3M reflective materials. The reflective decal shall be plainly visible to oncoming traffic when the doors are in the open position.

CAB ACCESSORY FUSE PANEL

A fuse panel shall be located underneath the rear facing seat on the officer's side. The fuse panel shall

consist of six (6) battery hot and six (6) ignition switch circuits. Each circuit shall be capable of 10-ampere 12-volt power and total output of 50-amps. The fuse panel shall be capable of powering accessories such as hand held spotlights, radio chargers, hand lantern chargers and other miscellaneous 12-volt electrical components.

AIR HORNS

Two (2) Grover 2040 Stuttertone rectangular, chrome plated, air horns shall be recess mounted, one (1) each side behind the perforated grille of the bumper. The air horns shall be controlled by a toggle switch wired through the horn button. A foot switch for the air horns shall also be provided on the officer's side.

ALTERNATOR

A 320 ampere Prestolite/Leece Neville Model 4962PA, alternator with serpentine belt shall be provided. The alternator shall generate 260 amperes at idle.

A low voltage alarm, audible and visual, shall be provided.

FRONT AXLE

The front axle shall be a Dana™ EFA-24-T5 Tube Axle with a capacity of 24,000 pounds. The axle shall be hub piloted, 10 stud, furnished with oil seals and come complete with assist cylinder, hoses, and mounting brackets.

REAR AXLE

The rear axle shall be a Meritor™ RT-50-180 Tandem drive axle with a capacity of 52,000 lbs. The axles shall be hub piloted, 10 studs, furnished with oil seals.

TOP SPEED

Top speed shall be 60 MPH.

BATTERIES

The battery system shall be a single system consisting of four negative ground, 12 volt Interstate Group 31 MHD batteries, cranking performance of 950 CCA each with total of 3800 amps, 185 minute reserve capacity with 25 ampere draw at 80 degrees Fahrenheit. Each battery shall have 114 plates. Warranty shall be accepted nationwide.

The batteries shall be installed in a vented 304 stainless steel battery box with a removable aluminum cover to protect the batteries from road dirt and moisture. The batteries are to be placed on dri-deck and secured with a fiberglass hold down. The batteries shall be wired directly to starter motor and alternator.

The battery cables shall be 3/0 gauge. Battery cable terminals shall be soldering dipped, color-coded and labeled on heat shrink tubing with a color-coded rubber boot protecting the terminals from corrosion.

There shall be a 350-ampere fuse protecting the pump primer and a 250-ampere fuse protecting the electric cab tilt pump and other options as required.

BATTERY CHARGING

A Kussmaul Auto Charge 1200 battery system charger shall be provided. The Auto Charge 1200 is a fully automatic battery charger with a very high output for vehicles with a single battery system. A single bar graph display is provided to indicate the state of charge of the battery system. The rated output shall be 40 amps for the vehicle battery system.

A Kussmaul Model 091-55-20-120 super electric auto-eject with weatherproof cover and power interrupt shall be provided.

BATTERY JUMPER TERMINAL

There shall be one set (two studs) of battery jumper terminals located by the battery box under the cab. The terminals shall have plastic color-coded covers. Each terminal shall be tagged to indicate positive/negative.

BRAKES (Front)

The front brakes shall be Meritor S-cam style. They shall be 16.5" x 6" with heavy-duty return springs, and a double anchor pin design. They shall also have quick-change shoes for fast easy brake relining.

BRAKES (Rear)

The rear brakes shall be Meritor S-cam style. They shall be 16.5" x 7" with heavy-duty return springs, and a double anchor pin design. They shall also have quick-change shoes for fast easy brake relining.

AIR BRAKE SYSTEM

The vehicle shall be equipped with air-operated brakes. The system shall meet or exceed the design and performance requirements of current FMVSS-121 and test requirements of current NFPA 1901 standards.

Each wheel shall have a separate brake chamber. A dual treadle valve shall split the braking power between the front and rear systems.

All main brake lines shall be color-coded nylon type protected in high temperature rated split plastic loom. The brake hoses from frame to axle shall have spring guards on both ends to prevent wear and crimping as they move with the suspension. All fittings for brake system plumbing shall be brass.

A Meritor Wabco System Saver 1200 air dryer shall be provided.

The air system shall be provided with a rapid build-up feature, designed to meet current NFPA 1901 requirements. The system shall be designed so the vehicle can be moved within 60 seconds of startup. The quick build up system shall provide sufficient air pressure so that the apparatus has no brake drag and is able to stop under the intended operating conditions following the 60-second buildup time. The vehicle shall not be required to have a separate on-board electrical air compressor or shoreline hookup to meet this requirement.

Six (6) supply tanks shall be provided. One air reservoir shall serve as a wet tank and a minimum of one tank shall be supplied for each the front and rear axles. A Schrader fill valve shall be mounted in the front of the driver's step well.

A spring actuated air release emergency/parking brake shall be provided on the rear axle. One (1) parking brake control shall be provided and located on the engine hood next to the transmission shifter

within easy reach of the driver. The parking brake shall automatically apply at 35 ± 10 PSI reservoir pressure. A Meritor WABCO IR-2 Inversion Relay Valve, supplied by both the Primary and Secondary air systems, shall be used to activate the parking brake and to provide parking brake modulation in the event of a primary air system failure.

Accessories plumbed from the air system shall go through a pressure protection valve and to a manifold so that if accessories fail they shall not interfere with the air brake system.

AIR INLET

An air system inlet/fill connection shall be provided. The inlet shall be connected to the air brake to allow constant air feed. The location of the inlet shall be determined during the pre-construction conference.

AIR BRAKING ABS SYSTEM

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 from water and weather and be vibration resistant.

The system shall constantly monitor wheel behavior during braking. Sensors on each wheel transmit wheel speed data to an electronic processor, which shall sense approaching wheel lock and instantly modulate brake pressure up to 5 times per second to prevent wheel lock-up. Each wheel shall be individually controlled. To improve field performance, the system shall be equipped with a dual circuit design. The system circuits shall be configured in a diagonal pattern. Should a malfunction occur, that circuit shall revert to normal braking action. A warning light at the driver's instrument panel shall indicate malfunction to the operator.

The system shall consist of a sensor clip, sensor, electronic control unit and solenoid control valve. The sensor clip shall hold the sensor in close proximity to the tooth wheel. An inductive sensor consisting of a permanent magnet with a round pole pin and coil shall produce an alternating current with a frequency proportional to wheel speed. The unit shall be sealed, corrosion-resistant and protected from electro-magnetic interference. The electronic control unit shall monitor the speed of each wheel sensor and a microcomputer shall evaluate wheel slip in milliseconds.

BUMPER

There shall be a 12" high double rib polished stainless steel wrap-around bumper provided at the front of the apparatus. Laser cut perforated grilles shall be incorporated into the bumper and located at the outboard section of the bumper for the air horns and at the center for the siren speaker. The bumper shall be mounted to a reinforcement plate constructed of 1/4" x 10" x 70" carbon steel. A gravel shield shall be provided, constructed of .188" aluminum diamond plate. The bumper extension shall be approximately 6".

COOLING SYSTEM

The cooling system shall be designed to keep the engine properly cooled under all conditions of road and pumping operations. The cooling system shall be designed and tested to meet or exceed the engine and transmission manufacturer's requirements, and EPA regulations.

The complete cooling system shall be mounted in a manner to isolate the system from vibration and stress. The individual cores shall be mounted in a manner to allow expansion and contraction at various

rates without inducing stress to the adjoining core(s).

The cooling system shall be comprised of a charge air cooler to radiator serial flow package that provides the maximum cooling capacity for the specified engine as well as serviceability. The main components shall include a surge tank, a charge air cooler, bolted to the top of the radiator to maximize cooling, recirculation shields, a shroud, a fan, and required tubing. All components shall consist of an individually sealed system.

RADIATOR

The radiator shall be a cross-flow design constructed completely of aluminum with welded side tanks. The radiator shall be bolted to the bottom of the charge air cooler to allow a single depth core, thus allowing a more efficient and serviceable cooling system.

The radiator shall be equipped with a drain cock to drain the coolant for serviceability. The drain cock shall be located at the lowest point of the aluminum cooling system to maximize draining of the system.

CHARGE AIR COOLER

The charge air cooler shall be of a cross-flow design and constructed completely of aluminum with extruded tanks. The charge air cooler shall be bolted to the top of the radiator to allow a single depth core.

COOLANT

The cooling system shall be filled with a 50/50 mix. The coolant makeup shall contain ethylene glycol and de-ionized water to prevent the coolant from freezing to a temperature of -34 degrees F.

HOSES & CLAMPS

Silicone hoses shall be provided for all engine coolant lines.

All radiator hose clamps shall be spring loaded stainless steel constant torque hose clamps for all main hose connections to prevent leaks. Recirculation shields shall be installed where required to prevent heated air from reentering the cooling package and affecting performance.

FAN

The engine cooling system shall incorporate a heavy-duty composite 11- blade Z-series fan. It shall provide the highest cooling efficiently while producing the lowest amount of noise. This robust yet light-weight fan results in less wear and stress on motors and bearings.

A shroud and recirculation shield system shall be used to ensure air that has passed through the radiator is not drawn through again.

The fan tip to radiator core clearance shall be kept at a minimal distance to increase the efficiency of the fan and reduce fan blast noise.

FAN CLUTCH

A fan clutch shall be provided that shall allow the cooling fan to operate only when needed. The fan shall remain continuously activated when the truck is placed in pump gear.

SURGE TANK

The cooling system shall be equipped with an aluminum surge tank mounted to the officer's side of the cooling system core. The surge tank shall house a low coolant probe and sight glass to monitor the coolant level. Low coolant shall be alarmed with the check engine light. The surge tank shall be equipped with a dual seal cap that meets the engine manufacturer's pressure requirements, and system design requirements.

The tank shall allow for expansion and to remove entrained air from the system. There shall also be an extended fill neck to prevent system overflow and encroachment of expansion air space. Baffling shall be installed in the tank to prevent agitated coolant from being drawn into the engine cooling system.

DRIVELINE

The driveline shall consist of Spicer 1710 series, or equal, dual grease fitting universal joints with "Half-Round" end yokes. The drive shaft shall be built with a heavy-duty steel tube 4.095" outside diameter x .180 wall thickness. The shafts shall be dynamically balanced prior to installation into the chassis. A splined slip joint shall be provided in each shaft assembly. Universal joints shall be extended life. There shall be two (2) Zerk fittings in each universal joint assembly so the joint can be greased without turning the shaft.

ENGINE ENCLOSURE

An integral, formed aluminum and composite engine enclosure shall be provided. The engine enclosure shall be contoured and blended in an aesthetically pleasing manner with the interior dash and flooring of the cab. The enclosure shall be kept as low as possible, to maximize space and increase crew comfort.

The enclosure shall be constructed from 5052 H2 aluminum plate and GRP composite materials, providing high strength, low weight, and superior heat and sound deadening qualities. The exterior shall be covered in heavy duty, molded black vinyl, further reducing noise and heat in the cab.

The underside of the engine enclosure shall be covered with a sound deadening, heat reflective insulation system, and shall further minimize noise (DB levels), and eliminate engine heat from the front and rear of the cab. The insulation material shall be bonded with adhesive and mechanically fastened to the underside of the cab. All seams shall be sealed to prevent water absorption. **NO EXCEPTIONS**

A work light shall be installed in the engine enclosure with an individual switch located on the base of the light.

ENGINE

The apparatus shall be powered by an export model Detroit Diesel Series 60 DDEC V, 515 H.P. @ 1800 R.P.M., 1650 ft. lb. torque @ 1200 R.P.M., 14.0 liter displacement. The engine shall be configured to burn high sulphur fuel.

ENGINE WARRANTY

The engine shall have a five year or 100,000 mile warranty and approval by Detroit Diesel for installation in the chassis.

AIR COMPRESSOR

The air compressor shall be a 16 CFM engine driven Bendix model BA-941.

STARTER

The starter shall be a 12-volt Delco Remy model 42MT controlled by a switch on the left lower cab dash.

FUEL FILTERS

The engine fuel filters shall be mounted in a manner that is easily accessible for service or replacement. A primary and secondary filter shall be provided and shall be approved for use by the engine manufacturer.

EXHAUST SYSTEM

The engine exhaust system shall be horizontal design constructed from heavy-duty truck components. All exhaust tubing shall be aluminized. A 30" length of stainless steel flex tube shall be used to isolate the exhaust system from the engine. The outlet shall be directed to the forward side of the rear wheels, exiting the right side, with a chrome straight tip. The muffler shall be an aluminized type, mounted under the right side frame rail, and meeting the engine manufacturer's specifications and current noise level tests. An orange fiberglass heat-absorbing sleeve shall be used on the exhaust pipe in the engine compartment area to reduce the heat, to protect the alternator, and also to protect hands when checking or adding oil in the engine compartment.

AIR CLEANER/INTAKE

The engine air intake and filter shall be designed in accordance with the engine manufacturer's recommendations. It shall be 99.9% effective in removing airborne contaminants when tested per the industry standard SAE J726 procedure and offer a dirt holding capacity of at least 3.0 gm/cfm of fine dust (tested per SAE J726) offering superior engine protection.

The air filter shall be located at the front of the apparatus and shall be at least 66" above the ground, to allow fording deep water in an emergency situation.

An ember separator shall be provided in the engine air intake meeting the requirements of NFPA 1901.

An Air Restriction warning light shall be provided and located on the cab dash.

ENGINE BRAKE

The engine shall be equipped with a Jacobs compression engine brake. An "On/Off" switch and a control for "Low/High" shall be provided on the instrument panel within easy reach of the driver.

The engine brake shall interface with the Wabco ABS brake controller to prevent engine brake operations during adverse braking conditions.

A pump shift interlock circuit shall be provided to prevent the engine brake from activating during pumping operations.

The brake light shall activate when the engine brake is engaged.

FRAME

The frame shall be steel channel with a full-length steel channel inner liner. The mainframe shall be 10-1/8" x 3-1/2" x 3/8", and the inner liner frame shall be 9-3/8" x 3-1/8" x 3/8". Section modulus shall be 58.86 in.³, 100,000-psi yield. RBM shall be 6,474,800 in lb. There shall be six (6) crossmembers, minimum 3/8" thick, all formed channels and shall have formed gusseted ends at the frame rail attachment. Huck bolt fasteners shall be used on all permanently attached brackets to eliminate the need for time-consuming bolt re-torquing. The frames shall be painted glossy black prior to installing wiring harnesses or components.

The frame shall have a lifetime warranty, per manufacturer's written statement.

FUEL TANK

The chassis shall be equipped with a 65-gallon rear mounted, behind the rear axle, rectangular fuel tank that shall be constructed of steel. The fuel tank shall be certified to meet FMVSS 393.67 tests. It shall also maintain engine manufacturer's recommended expansion room of 5%.

There shall be two (2) tank baffles.

Dual pick-up and return ports shall be provided for diesel generators if required.

The fuel tank shall be equipped with a 2 1/4" filler neck assembly with a 3/4" vent located on the left hand side of the tank. A fuel fill cap attached with a lanyard shall be provided. The bottom of the fuel tank shall contain a 1/2" drain plug.

The fuel lines shall be nylon braid reinforced fuel hose with brass fittings. The lines shall be carefully routed along the inside of the frame rails. All fuel lines are covered in high temperature rated split plastic loom. Single suction and return fuel lines shall be provided.

CAB HANDRAILS

There shall be a 24" long, handrail provided and installed, at each cab entrance. The handrails shall be constructed of type 304 stainless steel 1.25 inch diameter tubing with bright finish and knurled gripping surface. Mounting flanges shall be constructed from 7 gauge, .180 thick, stainless sheet. Each grab rail shall have 90 degree returns to flanges. The ends of grab rail shall pass through the flanges and be welded to form one structural unit. The handrails shall be mounted using 1.25" SS Hex bolts, with a barrier rubber gasket at each flange.

Sufficient space shall allow for a gloved hand to firmly grip the rail.

There shall be two (2) rubber coated grab handles provided and mounted on the interior of the cab, one each side, on the windshield post for ingress assistance. The handrail on the driver's side shall be approximately 11" long and the handrail on the officer's side shall be approximately 18" long.

CAB DOOR HANDRAILS

Two (2) 1.25" diameter knurled stainless steel handrails shall be provided on the inside of the rear crew doors just above the windowsill.

HEAVY DUTY HEATER/DEFROSTER/AIR CONDITIONER

There shall be a minimum 60,000 cool BTU and 80,000-heat BTU single unit, heater/air conditioner mounted over the engine cover. The unit shall be mounted in center of the cab on the engine hood/enclosure. Unit shall have a shutoff valve at the right side of the frame, next to the engine. Airflow of the heater/air conditioner shall be a minimum 1200 CFM. To achieve maximum cooling, a TM-31 Compressor (19.1 cu. in.) will be used. There shall be ductwork to the floor of the cab, facing forward to provide heat for the front of cab floor area.

The defroster/heater shall be a minimum of 39,000 BTU and shall be a separate unit mounted over the windshield. There shall be eight (8) louvers/defusers to direct to windshield and door glass. Airflow of the defroster/heater shall be a minimum 350 CFM. The unit shall be painted Zolatone greystone to match the cab ceiling.

The condenser shall be roof mounted and have 60,000 BTU rating. The unit shall include two fan motors. Airflow of the condenser shall be a minimum 2250 CFM. (This roof-mounted condenser shall work at full rated capacity at an idle with no engine heat problems.)

HEATER/DEFROSTER/AIR CONDITIONING CONTROLS

The heater/defroster/air conditioning shall be located in the overhead console in the center of the apparatus cab within reach of the driver and officer. The controls shall be illuminated for easy locating in dark conditions. The controls shall be located in such a way that the driver will not be forced to turn away from the road to make climate control adjustments. Control of all heater/defroster/air conditioning functions for the entire apparatus cab shall be achieved through these controls.

LOAD MANAGER

Load manager shall have the ability to sequence loads on and off. It shall also be able to shed 8 loads when the vehicle is stationary, starting at 12.7 volts lowest priority load to be shed, then respectively at 12.6, 12.4, 12.2, 12.0, 11.8, 11.4 and 11.0 volts DC. Any load that has been shed shall be off for a minimum of five minutes, and then if voltage has rebounded above shed voltage, the shed load shall automatically come on. There shall also be an indicator panel along side the rocker switches, which indicate power is on, battery warning and fast idle. Battery warning indicator shall flash at a rate proportional to the voltage discharge rate.

AUTOMATIC HIGH IDLE ACTIVATION

The load management system shall be capable of activating the apparatus high idle system when the system voltage drops below 12.3 volts DC. The system shall raise engine speed for a minimum of five minutes until voltage exceeds 13.0 volt DC. The load management system shall activate the high idle feature before any devices are automatically shed OFF. The high idle function request from the load management device shall function only if the appropriate interlocks are present; that is, control of the high idle system is monitored and shall be superseded by the state of the interlock control module. The automatic high idle system shall be deactivated whenever the brake pedal is pressed, and shall remain inactive for two minutes thereafter to allow an operator to override the high idle function and return the engine to idle before PTO engagement.

INSTRUMENT PANEL

The main dash shroud, which covers the area directly in front of the driver from the doorpost to the engine hood, shall be custom molded and covered with a non-glare black vinyl. The dash shall be a

one-piece hinged panel that tilts outward for easy access to service the internal components. The gauge panel shall be constructed of durable aesthetically pleasing light gray polymer material, placed over a heavy duty steel backing plate, for added strength and durability.

The gauges shall be Beede Instruments, NexSys Link gauges with built-in self-diagnostics and red warning lights to alert the driver of any problems. All gauges and controls shall be backlit for night vision and identified for function. All main gauges and warning lights shall be visible to the driver through the steering wheel.

MASTER BATTERY & IGNITION SWITCH

The vehicle shall be equipped with a keyless ignition, with a two (2)-position Master Battery rocker switch, "Ignition Off/On" and a two (2)-position Engine Start rocker switch, "Off/Start".

DIESEL PARTICULATE FILTER CONTROLS

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

INSTRUMENTATION & CONTROLS

Instrumentation on dash panel:

- Tachometer/hourmeter with built in high exhaust system regeneration temperature, and instrument malfunction indicators
- Speedometer/odometer with built in turn signal, high beam and re-settable trip odometer
- Voltmeter
- Diesel fuel gauge
- Engine oil pressure
- Transmission temperature
- Engine temperature
- Primary air pressure
- Secondary air pressure

Indicators and warning lights visible to driver:

- Battery on
- Parking brake engaged
- Low air with buzzer
- Turn signals
- Hi-beam
- Transmission temperature
- Do not shift transmission
- Check transmission
- Stop engine with buzzer
- Check engine
- Regeneration
- High exhaust temperature
- Air filter restriction light

- Back pressure
- Cab door open (flashing)
- Compartment door open (flashing)
- Antilock brake warning
- Low voltage
- Upper aerial power on (when applicable)

Other indicator and warning lights

- Differential locked
- PTO (s) engaged
- Auto-slip response
- Retarder engaged
- Retarder temperature
- Jacks out
- Jacks down

Controls located on main dash panel:

- Master power disconnect with ignition switch
- Engine start switch
- Headlight switch
- Windshield wiper/washer switch
- Differential lock switch (if applicable)
- Dimmer switch for backlighting

Controls included in steering column:

- Horn button
- Turn signal switch
- Hi-beam low-beam switch
- 4-way flasher switch
- Tilt-telescopic steering wheel controls

Controls, gauges and indicator lights located to the right of driver's position:

- Transmission shifter
- Pump shift control with OK TO PUMP and PUMP ENGAGED lights
- Heater/defroster controls
- Eighteen (18) illuminated rocker switches
- Parking brake control

Driving compartment warning labels shall include:

- HEIGHT OF VEHICLE
- OCCUPANTS MUST BE SEATED AND BELTED WHEN APPARATUS IS IN MOTION
- DO NOT USE AUXILIARY BRAKING SYSTEMS ON WET OR SLIPPERY ROADS
- EXIT WARNINGS

Additional labels included:

- COMPUTER CODE SWITCH
- ABS CODE SWITCH
- FLUID DATA TAG
- CHASSIS DATA TAG

ENGINE WARNING SYSTEM

An engine warning system shall be provided to monitor engine conditions such as low oil pressure, high engine temperature and low coolant level. Warning indication shall include a STOP ENGINE (red) light with audible buzzer activation and a CHECK ENGINE (amber) light

Note: (Some engine configurations may also include a fluid warning light.)

There shall be a master information light bar with 24 lights located across the center of the dash panel that covers up to 24 functions. These are defined under Indicators and Warning Lights above.

WIRING

All wiring shall have XL high temperature crosslink insulation and shall be 10 gauge, 12 gauge, 14 gauge and 18 gauge depending on load. All wiring shall be color-coded, and the function and number stamped at 3" intervals on each wire. All wiring shall be covered with high temperature rated split loom for easy access to wires when trouble shooting. All electrical connectors and main connectors throughout the chassis shall be treated to prevent corrosion.

DOOR AJAR INDICATION

Four (4) red LED lights are provided in the forward cab overhead console area, visible to both driver and officer. Upon releasing the apparatus parking brake one or more of these lights shall automatically illuminate (flash) if any cab door is open, compartment door is open, any ladder or equipment rack is not in stowed position, stabilizer system deployed or any other device has not been properly stowed that may cause damage if the apparatus is moved.

MASTER ELECTRICAL PANEL

The chassis main breaker panel shall be wired through the master disconnect solenoid and controlled with a three-position ignition rocker switch. Circuit breakers and flashers shall be located at officer's right side lower interior firewall with removable cover and schematic provided with notebook holder on outside cover.

A deluxe breaker panel with up to 22 ground switched relays with circuit breaker protection shall be provided.

An integrated electrical sub-panel shall be provided and interfaced to the body and chassis through an engineered wire harness system.

Twelve (12) 20-ampere and one (1) 70-ampere relay for cab lightbar and assemblies shall be provided. If the option for a mechanical siren has been selected two (2) additional relays shall be provided.

Additional four relay boards with circuit breaker protection for additional loads. Maximum two boards (8 relays) per breaker panel. All relay boards set up to trip with input from switch of positive-negative or load manager by moving connector on board (no tools needed to do this).

All relay boards shall be equipped with a power-on indicator light (red), input indicator light (green) and power output indicator light (red).

Up to 23 additional automatic reset circuit breakers for non-switched loads that are remotely switched (ie: heater fans, hood lights, etc.).

All relays and circuit breakers on the relay boards shall be pull-out/push-in replaceable.

All circuit breakers on the relay boards shall be 20 ampere automatic reset which can be doubled or tripled for 40 or 60-ampere capacity.

The system shall utilize Deutch DRC weather resistant connectors at the breaker panel, toe board and main dash connections.

All internal wire end terminals, including locking connectors, shall be mechanically affixed to the wire ends by matching terminal crimping presses to assure the highest quality terminations.

All internal splices shall be ultrasonically welded connections and all internal wiring shall be high temperature GXL type wire that is protected by wiring duct wherever possible.

All switches shall be ground controlled; no power going through any rocker switch.

Any switch controlling a relay in the breaker panel shall be capable of being set to function only when the parking brake is set. All relays shall be tagged with the function that the relay is controlling.

PUMP SHIFT MODULE

A pump shift module with indicating lights shall be located within easy reach of the driver. A gear lockup shall be provided to hold the transmission in direct drive for pump operation.

HIGH IDLE

The engine shall have a "high idle" switch on the dash that shall maintain an engine RPM of 1,000. The switch shall be installed at the cab instrument panel for activation/deactivation. The "high idle" mode shall become operational only when the parking brake is on and the truck transmission is in neutral.

AUXILIARY POWER POINT

One (1) 12-volt 15-ampere auxiliary lighter socket type plug-in, shall be provided in the cab near the officer.

VEHICLE DATA RECORDER

An Akron / Weldon vehicle data recorder as required by the 2009 edition of NFPA 1901 shall be installed. Vehicle data shall be sampled at the rate of 1 second per 48 hours, and 1 minute per 100 engine hours.

Software shall be provided to allow the fire department to collect the data as needed.

INTERIOR

The cab interior shall be finished in gray Durawear on the full front and rear headliners and rear firewall.

LIGHTING CAB EXTERIOR

Exterior lighting and reflectors shall meet or exceed Federal Motor Vehicle Safety Standards and National Fire Protection Association requirements in effect at this time.

HALOGEN HEADLIGHTS

There shall be dual sealed beam halogen rectangular headlights in custom housings on each side of the front of the cab.

HAND HELD SPOTLIGHT

One Optronics Blue Eye Model KB-4003, 400,000-candle power hand-held spotlight shall be provided, installed at officer's side of cab.

LIGHTING CAB INTERIOR

Interior lighting shall be provided inside the cab for passenger safety. Two (2) ceiling mounted combination red/clear LED dome lights with a push button on/off switch in the light lens. One light shall be located over each the officer and driver's position. The lights shall also activate from the open door switch located in each cab doorjamb.

LIGHTING CREW CAB INTERIOR

Interior lighting shall be provided inside the crew cab for passenger safety. Two (2) ceiling mounted combination red/clear LED dome lights with a push button on/off switch in the light lens shall be provided. The lights shall also activate from the open door switch located in each cab doorjamb.

MIRRORS

Two (2) Lang Mekra 300 Series chrome plated Aero style main and convex mirrors shall be installed on each side of the vehicle. The main mirror shall be 4-way remote adjustable with heat, 7" x 16" 2nd surface chromed flat glass. The convex shall be, 6" x 8" 2nd surface chromed 400 mm radius glass. Each mirror housing assembly shall be constructed of lightweight textured chrome ABS with on truck glass and housing back cover replacement. In the event the mirror breaks the glass shall be replaceable in (3) minutes or less. The glass shall include a safety adhesive backing to keep broken glass in place. The mirror assembly shall be supported by a "C" loop bracket constructed of polished stainless steel tube utilizing two point mounting reducing vibration of mirror glass during normal vehicle operation. The lower section of the holder shall include a spring loaded single detent position 20 degrees forward with easy return to operating position without refocusing.

HELMET STORAGE

A universal style helmet bracket shall be provided for each riding position.

A placard will be provided for each riding position warning that injury may occur if helmets are worn while seated.

SEAT BELT WARNING SYSTEM

An Akron / Weldon seat belt warning system shall be provided, and shall monitor each seating position. Each seat shall be supplied with a sensor that, in conjunction with the display module located on the dash, shall determine when the seat belt was fastened and if the seat is occupied. An icon shall represent that the seat is properly occupied. An audible and visual alarm shall be activated if the seat is occupied and/or the belt is not fastened in the proper sequence.

DRIVER'S SEAT

The driver's seat shall be a Bostrom Sierra FX air ride high back, adjustable fore/aft, upholstered with gray tweed Durawear. A 3-point seat belt shall be provided.

OFFICERS SEAT

The officer's seat shall be a Bostrom Sierra FX ABTS high back seat. The seat shall have the following features:

- Integrated 3-point seat belts
- "Auto-Pivot & Return" head rest
- Built in lumbar support
- 100% Durawear™ gray tweed seat material
- Adjustable fore/aft

UNDER SEAT STORAGE

There shall be a storage compartment under the officer's seat approximately 15" wide x 10.5" tall x 15.5" deep.

CREW SEATS

The crew cab area shall have four (4) Bostrom Firefighter™ seats. The seating arrangement shall be: two (2) rear facing Bostrom Tanker 450 ABTS SCBA seats and two (2) forward facing Bostrom 400CT ABTS SCBA flip up seats. The seats shall have the following features:

- Integrated 3-point seat belts
- "Auto-Pivot & Return" head rest
- Built in lumbar support
- 100% Durawear™ gray tweed seat material

SCBA BOTTLE BRACKET

The officer and crew seats shall come equipped with an H.O. Bostrom SecureAll™ SCBA Locking System capable securing all U.S. and international SCBA brands and sizes while in transit or for storage on fire trucks.

Locking shall be achieved by pushing the SCBA unit (bottle) against the pivot arm to engage the automatic lock system. A top clamp shall surround the top of the SCBA tank for a secure fit in all directions. The bracket shall be equipped with a center guide fork to keep the tank in-place for a safe and comfortable fit in seat cavity.

All adjustment points shall utilize one tool and be easily adjustable.

The bracket system shall be free of straps and clamps that may interfere with auxiliary equipment on SCBA units.

The release handle shall be integrated into the seat cushion for quick and easy release and shall eliminate the need for straps or pull cords to interfere with other SCBA equipment.

The bracket system shall meet NFPA 1901 standards and requirements of EN 1846-2.

CREW SEAT COMPARTMENT

A compartment shall be provided under the forward facing crew seats on the back wall of the cab. The compartment shall be full through, with an access door on each side, accessible from the side of the crew cab doors.

STEERING

Ross heavy duty Model TAS-85 power steering shall be provided. The steering gear shall be bolted to the frame at the cross-member for steering linkage rigidity. Four (4) turns from lock to lock with an 18" diameter slip resistant rubber covered steering wheel. Steering column shall have six-position tilt and 2" telescopic adjustment. The cramp angle shall be 45 degrees with 315mm tires or 43 degrees with 425mm tires providing very tight turning ability.

SUSPENSION (FRONT)

The front suspension shall be a variable rate taper-leaf design, 54" long and 4" wide. Long life, maintenance free, urethane bushed spring shackles shall be utilized. All spring and suspension mounting shall be attached directly to frame with high strength Huck bolts and self-locking round collars. Spring shackles and pins that require grease shall not be acceptable. **NO EXCEPTIONS.**

ENHANCED FRONT SUSPENSION SYSTEM

The front suspension shall have the handling, stability, and ride quality enhanced by the use of a Ride Tech auxiliary spring system and Koni high performance shock absorbers.

This system shall utilize three stage, urethane auxiliary springs, and high performance gas filled shock absorbers to control the deflection of the leaf springs, and dampen vibration normally transmitted to the chassis. This maintenance free system will be custom tuned to the apparatus gross weight rating for maximum performance, while maintaining a soft compliant ride. **NO EXCEPTIONS.**

A (3) three year 36,0000 mile warranty will be provided by the manufacturer.

SUSPENSION (REAR) 52,000 TANDEM AIR RIDE

The rear suspension shall be a Raydan Manufacturing, Air Link™ model 952-52-199 air ride suspension. This suspension shall incorporate a quad air spring system. The air suspension bags shall have internal rubber stops giving the ability to operate without air if the need arises. Heavy-duty shock absorbers shall be provided, inboard mounted, to dampen load forces, reduce tire hops, and improve stopping. Torque rods shall be incorporated to restrict lateral movement of the differentials and to reduce bushing and tire wear. Dual height control valves shall be provided to maintain even, balanced loads.

Suspension shall have a ground rating of 52,000 pounds.

TIRE PRESSURE MONITOR

A Real Wheels LED tire pressure sensor shall be provided for each wheel. The pressure sensor shall indicate if a particular tire is not properly inflated. A total of ten (10) indicators shall be provided.

FRONT TIRES

Front tires shall be Goodyear 445/65R22.5, load range L, G286A SS highway tread, single tubeless type with a GAWR of 26,300 pounds. Wheels shall be disc type, hub piloted, 22.5 x 12.25 10 stud 11.25 bolt circle. Chrome plated lug nut caps shall be provided.

FRONT HUB COVERS

Polished stainless steel hub covers shall be provided for the front axle.

REAR HUB COVERS

Polished stainless steel hub covers shall be provided for the rear axle.

REAR TIRES

Rear tires shall be Goodyear 12R22.5, load range H, G149 highway tread, dual tubeless type with a GAWR of 52,000 pounds. Wheels shall be disc type, hub piloted, 22.5 x 8.25 10 stud with 11.25" bolt circle. Chrome plated lug nut caps shall be provided.

MUD FLAPS

Hard rubber mud flaps shall be provided for front and rear tires.

WHEELS

Aluminum wheels shall be provided for the front and for the inside and outside of the rear wheels. The aluminum wheels shall match the tire and axle capacities of the apparatus.

TOW EYES (Front)

There shall be two front tow eyes with 3" diameter holes attached directly to the chassis frame.

TOW EYES (Rear)

There shall be two tow eyes attached directly to the chassis frame rail and shall be chromate acid etched for superior corrosion resistance and painted to match the chassis.

TRANSMISSION

The chassis shall be equipped with a Generation IV Allison EVS4000 six (6) speed automatic transmission. It shall be programmed five (5) speed, sixth gear locked out, for fire apparatus vocation, in concert with the specified engine.

An electronic oil level indicator shall be provided as well as a diagnostic reader port connection. The fifth gear shall be an overdrive ratio, permitting the vehicle to reach its top speed at the engine's governed speed. The dipstick is dipped in a rubber coating for ease in checking oil level when hot.

The chassis to transmission wiring harness shall utilize Metri-Pack 280 connectors with triple lip silicone seals and clip-type positive seal connections to protect electrical connections from contamination without the use of coatings.

Ratings:	Max Input (HP)	600
	Max Input (Torque)	1850 (lb ft)
	Max Turbine (Torque)	2600 (lb ft)

Mechanical Ratios:	1 st -	3.51:1
	2 nd -	1.91:1
	3 rd -	1.43:1
	4 th -	1.00:1
	5 th -	0.74:1
	Reverse -	-5.00

TRANSMISSION FLUID

The transmission shall come filled with Castrol TranSynd™ Synthetic Transmission Fluid or approved equal meeting the Allison TES-295 specification. **NO EXCEPTION.**

TRANSMISSION SHIFTER

An Allison "Touch Pad" shift selector shall be mounted to the right of the driver on the engine cover accessible to the driver. The shift position indicator shall be indirectly lit for nighttime operation.

POWER TAKE OFF

A hot shift PTO drive shall be provided for the foam system.

FRONT TURN SIGNALS

There shall be two Whelen 400 Series LED rectangular amber turn signal lights mounted one each side in the front of the headlight housing and one mounted on each side of the warning light housing.

WINDSHIELD WIPERS

Two (2) black anodized finish two speed synchronized electric windshield wiper system. Dual motors with positive parking. System includes large dual arm wipers with built in washer system. One (1) master control works the wiper, washer and intermittent wipe features. Washer bottle is a remote fill with a 4 quart capacity. Washer fill is located just inside of officer cab door.

MISCELLANEOUS CHASSIS EQUIPMENT

Fluid capacity plate affixed below driver's seat.

Chassis filter part number plate affixed below driver's seat.

Maximum rated tire speed plaque near driver.

Tire pressure label near each wheel location.

Cab occupancy capacity label affixed next to transmission shifter.

Do not wear helmet while riding plaque for each seating position.

NFPA compliant seat belt and standing warning plates provided.

INDUSTRIAL PUMP CERTIFICATION

The pump, when dry, shall be capable of taking suction and discharging water in compliance with NFPA #1901 chapter 14. The pump shall be tested by National Testing and shall deliver the percentages of rated capacities at pressures indicated below:

100% of rated capacity @ 100 PSI net pump pressure.

70% of rated capacity @ 150 PSI net pump pressure.

50% of rated capacity @ 200 PSI net pump pressure.

ESP PRIMING PUMP

The pump to be capable of taking suction and discharging water with a lift of 10 ft. in not more than 30 seconds with pump dry, through 20 ft. of suction hose of appropriate size. Primer system shall be capable of developing a vacuum of 22" at an altitude of up to 1000 ft.

A high capacity positive displacement priming system will be furnished, consisting of: a Hale ESP rotary vane priming pump with 12-volt electric motor drive, PVG pump control panel mounted priming valve assembly with chrome T-handle push-pull control, and appropriate vacuum hoses and 12-volt electrical wiring. The priming valve assembly to be located so as to allow self-draining.

Hale model ESP priming system to be self lubricating.

SECOND HALE ESP PUMP PRIMER PUMP AND MOTOR

A second (two each total) Hale ESP "oil-less" self lubricating rotary vane priming pump with 12-volt electric motor drive, and a second PVG manual/electric priming valve assembly with control shall be furnished and installed within the same pump enclosure. Both specified motor driven priming pump systems shall be plumbed to the fire pump volute. The second priming pump and priming valve shall allow for total redundancy of the fire pump's priming system, as well as expedite the priming process. Both priming systems shall be operated by a single operator's panel control.

FIRE PUMP SYSTEM

HALE SINGLE-STAGE FIRE PUMP - MIDSHIP

A 3000 gallon per minute, Hale model 8FGR, single-stage "end suction" high-capacity centrifugal fire

truck pump shall be furnished, mounted "mid-ship" of the vehicle immediately ahead of the compartments and water tank. The pump shall be driven by a drive line from the truck transmission. The engine shall provide sufficient horsepower and RPM to enable pump to meet and exceed its rated performance. Pump transmission to be gear box style with "cut-spur" chrome nickel steel gears. Pump shall deliver the percentage of rated capacity at discharge pressures indicated below:

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

The pump body and related parts shall be of fine grain alloy cast iron, with a minimum tensile strength of 30,000 PSI (2069 bar). All metal moving parts in contact with water shall be of high quality bronze or stainless steel. Pump utilizing castings made of lower tensile strength cast iron not acceptable. Pump body shall be vertically split, on a single plane for easy removal of entire impeller assembly including clearance rings. Pump shaft to be rigidly supported by two bearings for minimum deflection. The bearings shall be heavy-duty, deep groove ball bearings in the gearbox and they shall be splash lubricated.

PUMP TESTING

The entire pump shall be assembled and tested at the pump manufacturer's factory. Pump shall be tested by Hale, hydrodynamically at above pressure and capacities, and hydrostatically at a pressure of 600 psig. Certification by Hale shall be provided in delivery manual.

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

DATA & LUBE PLATES

The pump shall be provided with a metal plate giving the rated flow at "capacity" and "pressure" test pressures, together with the RPM of the engine at those pressures and deliveries, and mounted in clear view of the pump operator's panel. Test plate shall also indicate pump serial number, engine governed speed, and pump mode of operation for all four individual pump rating tests.

A permanently mounted metal lube plate shall be furnished, located inside driver's compartment, specifying the quantity and type of the following fluids (where applicable) as used in this pumper apparatus:

MANUALS

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

PUMP FEATURES

Additional pump features shall include: a hard, fine grade bronze impeller of the mixed flow design, accurately machined, hand-ground and individually balanced. The vanes of the impeller intake eye shall be hand ground and polished to a sharp edge, and be of sufficient size and design to provide ample reserve capacity utilizing minimum horsepower. Impeller clearance rings shall be bronze, easily renewable without replacing impeller or pump volute body. The pump impeller shaft shall be electric furnace heat-treated, corrosion resistant stainless steel. Pump shaft must be sealed with double-lip oil seal to keep road dirt and water out of gearbox.

All pump components including: pump shift, pump transmission, priming system, and drain valve, to be manufactured by Hale.

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

PUMP TRANSMISSION AND DRIVELINE

Heavy duty 16,000 pound-foot torque rated gearbox pump drive to be furnished for high torque engine applications. The drive unit shall be designed of ample capacity for lubrication reserve and to maintain the proper operating temperature. The gearbox drive shafts shall be of heat-treated chrome nickel steel and at least 2-3/4 inches in diameter, on both the input and output drive shafts. They shall withstand the full torque of the engine. All gears, both drive and pump, shall be of highest quality electric furnace chrome nickel steel. Bores shall be ground to size and teeth integrated and hardened, to give an extremely accurate gear for long life, smooth, quiet running, and higher load carrying capability. An accurately cut spur design shall be provided to eliminate all possible end thrust. The pump ratio shall be selected by the apparatus manufacturer to give maximum performance with the engine and transmission selected.

Input and output pump drive multiple bolt companion flanges are to be furnished, torque capacity compatible with the vehicle's driveline.

PUMP SEAL

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

HALE PNEUMATIC PUMP SHIFT

Pump transmission "gear box" to be equipped with a Hale "VPS" pneumatic power shift. The shifting mechanism to be heat treated hard anodized aluminum power cylinder, with stainless steel shaft. A shift console shall be provided, for installation in the driver's compartment. Shift console to have two (2) green warning lights to indicate when pump has completed the shift from "ROAD" to "PUMP" position.

One (1) additional "Throttle Ready" light to be located on operator's control panel adjacent to engine throttle or governor control. All lights to have appropriate identification/instruction plates.

ENGINE COOLER/HEAT EXCHANGER CONTROL VALVE

Operation of the custom chassis supplied "integral-radiator" heat exchanger shall be controlled from the pump control panel, and labeled to identify its operation. Discharge feed and suction return piping between the fire pump and heat exchanger shall be high pressure lines with threaded stainless steel or copper fittings. The piping shall be installed to drain back (down) to the fire pump, without low points, when pump master drain is "open", so as to prevent freezing. Pressure line (from pump discharge) to be gated, with valve control on pump control panel.

HALE MULTIPLE PORT MANIFOLD DRAIN

Hale manifold drain valve, with bronze body will be furnished installed inside pump compartment. Drain valve to be mounted in lowest portion of pump compartment, piped with copper tubing, to low points of pump suction and discharge cavities to allow simultaneous draining through a single drain valve.

Drain valve to be model 107370 (12-Port) "screw type" with universal joint and driver side exterior pump

panel control.

INTAKE RELIEF VALVE, 2-1/2" STAINLESS STEEL

A Class 1 model 107819 stainless steel pump suction intake relief valve shall be furnished, installed inside pump compartment, flange bolted or threaded to suction cavity of the fire pump. Valve is to be of the pre-set (to 125 psi) adjustable bypass design, so as to dump below the vehicle excessive inlet water pressure. Relief valve is to be accessible for future adjustment of bypass pressure.

PRESSURE GOVERNOR

Apparatus shall be equipped with a Class1 Pressure Governor that is connected to the Electronic Control Module (ECM) mounted on the engine. The Governor will operate as a pressure sensor (regulating) governor (PSG) utilizing the engine's data for optimal resolution and response.

Programmable presets for RPM and Pressure settings shall be easily configurable using the menu structure.

Engine RPM, system voltage, engine oil pressure and engine temperature with audible alarm output for all shall be provided.

ANODE, INLET - 2 EACH

Two (2) sacrificial zinc anodes shall be provided in the water pump inlet manifold, to protect the pump from corrosion.

PUMP SUCTION INLETS

Following specified pump manifold inlets shall be of proper inside diameter for rated pump capacity, equipped with strainers of appropriate size for the pump impeller vanes and high flow capacity.

All intakes shall be provided with suitable closures capable of withstanding 500 psi, threaded caps shall be NST, rocker lug 3" and smaller, long handled larger than 3", non-threaded shall be Storz or Cam-Lok as specified.

SUCTION INLET VALVE STANDARDS (WHERE OPTIONALLY SPECIFIED)

Following optionally specified 3" or larger gated intakes (except the tank-to-pump intake) shall include a remote controlled valve mechanism that shall not permit changing the position of the flow regulating element of the valve from full close to full open, or vice versa, in less than 3 seconds. Where air type actuators are employed, they shall include dual (2-each) adjustable needle valve restrictors, bench set/tested, so as to facilitate the slow movement. Where manual gear or electric gear style actuators are employed, the crank or motor shall regulate movement speed.

INLET BLEEDER VALVES

Where specified, each gated intake shall be equipped with a bleeder valve located inside pump compartment, upstream gate valve, with remote bleeder control in close proximity to the intake. The specified gated suction bleeders shall consist of: 3/4" cast bronze quarter-turn drain/bleeder valves, panel mounted with exterior chrome plated control handle. Controls to be positioned in a single row immediately above runningboard riser, driver and/or passenger sides, identified with color coded permanently engraved identification label.

AUTOMATIC THERMAL RELIEF VALVE

One (1), Hale model TRV120, thermal relief valve to be furnished, installed on fire pump discharge manifold. Thermal relief valve to automatically relieve discharge water from fire pump when temperature exceeds 120 degree F. setting of valve. Discharge shall be "to ground", thermal relief valve discharge to be non-gated to prevent freezing.

VALVES - ELKHART UNIBODY SERIES

All ball valves shall be Elkhart Brass in-line valves. The Elkhart valves shall be the Unibody series heavy-duty brass construction, with: stainless steel ball, self-adjusting dual-seats, and designed to allow for interchangeable actuators.

The must be capable of swinging out of the waterway for maintenance. The valves shall be manufactured and assembled in the United States.

"ROUND TUBULAR" HIGH-FLOW SUCTION MANIFOLD PIPING

A stainless steel "high-flow" round tubular suction manifold shall be furnished, bolted to and easily removable from, the fire pump's 8-inch flanged volute suction inlet. Tubular suction manifold shall have a flow capacity exceeding the capacity of the fire pump system, when pumping at draft at an altitude of up to 2000 feet above sea level.

NOTE: Due to the likelihood of deformation and poor flow characteristics, manifolds fabricated of square or rectangular tubing's, regardless of material or metal thickness, are not acceptable.

Tubular suction manifold shall be fabricated of type 304 stainless steel, equipped with an 8-bolt stainless steel flange (at pump inlet), minimal "long-sweep" weld elbows (allowing for smooth non-turbulent water flow), and Victaulic roll-grooved joints where appropriate (to allow convenient disassembly). All welds shall be "tig" with full depth penetration and smooth uniform outer circumference. Interior of water ways, at elbows shall be provided with guide vanes designed and positioned to prevent whirlpool of the water.

All auxiliary exterior side wall taps and/or risers shall be "coped" to conform to the radius of larger size waterway, so as to provide unsurpassed flow characteristics. Under no conditions shall there be weld slag, misalignment or tubing sections, or projections into the main tributary of the manifold. Split waterways must incorporate "rams-horn" pathway, tee-intersecting waterways are not acceptable.

The suction manifold itself shall contain multiple Victaulic and flanged ports or risers, to facilitate the installation of any optionally specified auxiliary suction(s), tank-to-pump suction line(s), and intake relief valve.

All suction manifolds and fittings, suction valves, tubing's, and hoseline assemblies shall be pressure tested after installation.

PASSENGER SIDE SUCTION(S)

6" GATED SUCTION(S), 6" NST CAPPED, REMOTE ELECTRIC CONTROLLED

Three (3) each, passenger's side gated 6" pump suction intake(s) area to be provided, each with: 6" NST long handled chrome plated brass cap, 6" removable zinc strainer, 6" NST male inlet adapter, 6" extension nipple (extending through pump panel), 6" ASA threaded flange, bronze bleeder valve located inboard pump panel with remote control handle, 6" butterfly style Hale MIV-E master intake valve with built-in plunger style intake relief valve, "slow operating" electric gear type actuator, hand wheel style manual override valve control adjacent to inlet, operator's panel toggle switch control switch with indicator lights, and appropriate interior pump compartment 6" flanged pump intake fitting. Gate valve with actuator and intake relief valve to be located inboard of the pump panel, inlet shall have minimum extension outboard the pump panel to allow for preconnected inlet adapter.
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3" GATED SUCTION, 2-1/2" NST PLUGGED, INLET CONTROL

One (1) each, passenger's side gated 3" pump suction intake(s) are to be provided, each with: 2-1/2" NST male chrome plated rocker lug plug type cap with chain, 2-1/2" NST chrome plated rocker lug swivel female with internal strainer, bronze bleeder valve with outboard control knob, 3" full flow Elkhart Uni-Body 1/4-turn ball style bronze suction valve (located inboard pump panel) with through-the-panel control arm, "OPEN" and "CLOSED" nameplates, and minimum 3" i.d. stainless steel pipe and long-sweep elbows between valve and pump intake fitting.

3" GATED SUCTION, 2-1/2" NST PLUGGED, INLET CONTROL

One (1) each, driver's side gated 3" pump suction intake(s) are to be provided, each with: 2-1/2" NST male chrome plated rocker lug plug type cap with chain, 2-1/2" NST chrome plated rocker lug swivel female with internal strainer, bronze bleeder valve with outboard control knob, 3" full flow Elkhart Uni-Body 1/4-turn ball style bronze suction valve (located inboard pump panel) with through-the-panel control arm, "OPEN" and "CLOSED" nameplates, and minimum 3" i.d. stainless steel pipe and long-sweep elbows between valve and pump intake fitting.

TFT RC JUMBO BALL INTAKE VALVE

There shall be three (3) TFT RC Jumbo Ball Intake Valves AX1SX-NX-RC provided with the apparatus. The inlet side shall be 6" NST female and the outlet side shall be 6" Storz.. The valve controllers shall be mounted on the pump operator's panel.

REAR INLET

One 5" gated electric inlet valve shall be provided on the right rear of the apparatus. The inlet shall be controlled from the pump panel. The inlet shall be supplied with chrome plated long handle cap and removable strainer.

PUMP DISCHARGE OUTLETS

Each of the following specified 3" or larger discharge valves shall have an operating mechanism which shall not permit changing the position of the flow regulating element of the valve from full close to full open, or vice versa, in less than 3 seconds.

DISCHARGE OUTLET BLEEDERS

Each of the following specified gated discharges shall be equipped with a "discharge outlet bleeder". The specified discharge outlet bleeders shall consist of: 3/4" high pressure flexible hose assemblies extending between discharge valve and bleeder valve, 3/4" cast bronze 1/4-turn drain/bleeder valve mounted interior pump compartment, exterior pump panel chrome plated bleeder valve control handle, and color coded (to match corresponding discharge outlet) permanently engraved identification label. Bleeders for side discharges to be located in a single row immediately above runningboard riser.

HOSE THREADS

Where specified, all screw-on/off threads shall be NST (National Standard Threads), all "sexless" couplings shall be Storz.

"ROUND TUBULAR" HIGH-FLOW STAINLESS STEEL DISCHARGE MANIFOLD

A stainless steel "**round tubular**" discharge manifold shall be furnished, bolted to and easily removable from, the fire pump's 6" diameter discharge outlet flange.

NOTE: Due to the likelihood of high pressure deformation (regardless of wall thickness), manifolds fabricated of square or rectangular tubing's, are not acceptable.

The tubular manifold's main waterway shall be commensurate in diameter to feed the quantity and size of optionally specified discharge line "branches" So as to provide unsurpassed flow characteristics, all auxiliary branch reducers shall be concentric bell reducers, and all couplings and risers shall be "coped" to conform to the radius of the larger size upstream waterway. All capped ends shall be spherical for high pressure applications. Flat-mount weld spuds and non-coped risers welded to rectangular fabrications are not acceptable.

All stainless steel welding shall be TIG, to assure proper penetration and conformity with original tubing and weld fitting outside diameters. Under no conditions shall there be weld slag, misalignment or tubing sections, or projections into any tributaries of the manifold. All elbows shall be smooth sweep weld fittings.

See following specifications describing the number/size/locations of outlet gate valves to be furnished.

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

All discharge manifolds and fittings, suction manifolds and fittings, discharge and suction valves, tubing's, and hoseline assemblies shall be pressure tested before and after installation.

PUMP SUCTION MANIFOLD ANODE PLUGS, HALE

Two (2) replaceable HALE threaded anode plugs shall be installed in the fire pump discharge manifold to help protect the pump and piping from electrolysis.

PASSENGER SIDE DISCHARGE(S)

PASSENGER SIDE 3" FOAM CAPABLE DISCHARGE(S)

One (1) each, passenger's side 3" gate foam capable discharge(s) are to be furnished, each one provided

with: 2-1/2" NST chrome plated brass rocker lug cap with chain, 2-1/2" NST male x 2-1/2" NST rocker lug swivel female 30 degree chrome plated brass elbow extension, 2-1/2" NST male chrome plated brass outlet adapter, 3/4" bleeder valve with exterior remote control, 3" i.d. stainless steel pipe or wire reinforced hose assembly with 3" stainless end fittings, 3" Elkhart Uni-Body series ball style 1/4-turn full flow bronze bodied discharge valve with EIF 12-volt electric actuator with wiring harness (located inside pump enclosure), and Elkhart model UBEC-1 Valve Controller with Valve 10-Position Indicator Lights.

PASSENGER SIDE 3" FOAM LINE CONTROLLERS AND ACCESSORIES

One (1) each, FoamPro 1-inch diameter Line Controller Assemblies shall be provided, one (1) for each of the above specified foam capable 2-1/2" passenger side gated discharge lines.

Each Line Controller Assembly shall include one (1) ultra bright LED digital Line Control Display, one (1) Line Control Driver, one (1) Line Foam Flowmeter, one (1) Line Control Valve, one (1) Foam Inject Check Valve, and one (1) Calibrate Inject Valve with high pressure foam concentrate bypass return line to the foam concentrate reservoir.

In addition to the above accessories, each Line Controller Assembly shall be provided with a: Data Bus Cable, Foam Flowmeter Cable, Water Flowmeter Cable, and Power Cables to Line Control Valve and Flowmeters. The 1-inch diameter Foam Line Controller Assemblies shall have an operational range of foam concentrate flow ranging from 1.8 GPM (6.8L/min) to 60 GPM (227.1 L/min). Example: with 3% foam concentrate ratio: at a minimal foam concentrate flow of 1.8GPM, the Line Controller will service a water flow of 60GPM.

The Line Controller electronic display module shall allow the pump operator to perform the following control and operation functions for each discharge:

1. Choose between plain water or foam solution
2. Provide push-button control of foam proportioning rates
3. Display current flow-per-minute of water
4. Display total volume of water discharged during and after foam operations are completed
5. Display total amount of foam concentrate consumed
6. Display injection percentage
7. Simulate flow rates for manual operation
8. Perform setup and diagnostic functions for the computer control microprocessor
9. Allow three injection percentage defaults to be stored

PASSENGER SIDE FOAM CAPABLE LARGE DIAMETER DISCHARGE(S)

Three (3) each, passenger's side 6" gated discharge to be furnished, each one provided with: Storz locking cap with cable retainer, 6" (purchaser designated) Storz x 6" NST rocker lug swivel female 30 degree elbow outlet adapter, 6" NST male chrome plated brass outlet adapter, 3/4" bleeder valve with exterior remote control, 6" i.d. stainless steel pipe nipple, 6" Elkhart butterfly style 1/4-turn discharge valve with 12-volt electric actuator and wiring harness (located inside pump enclosure), Elkhart model UBEC-1 Valve Controller with Valve 10-Position Indicator Lights located on pump operator's control panel.

PASSENGER SIDE 6" FOAM LINE CONTROLLERS AND ACCESSORIES

Three (3) each, FoamPro 1.50-inch diameter Line Controller Assemblies shall be provided, one (1) for each of the above specified foam capable 6" passenger side gated discharge lines.

Each Line Controller Assembly shall include one (1) ultra bright LED digital Line Control Display, one

(1) Line Control Driver, one (1) Line Foam Flowmeter, one (1) Line Control Valve, one (1) Foam Inject Check Valve, and one (1) Calibrate Inject Valve with high pressure foam concentrate bypass return line to the foam concentrate reservoir.

In addition to the above accessories, each Line Controller Assembly shall be provided with a: Data Bus Cable, Foam Flowmeter Cable, Water Flowmeter Cable, and Power Cables to Line Control Valve and Flowmeters. The 1-1/2 inch diameter Foam Line Controller Assemblies shall have an operational range of foam concentrate flow ranging from 16 GPM (60.5L/min) to 150 GPM (567.6 L/min). Example: with 3% foam concentrate ratio: at a minimal foam concentrate flow of 16GPM, the Line Controller will service a water flow of 533GPM.

The Line Controller electronic display module shall allow the pump operator to perform the following control and operation functions for each discharge:

1. Choose between plain water or foam solution
2. Provide push-button control of foam proportioning rates
3. Display current flow-per-minute of water
4. Display total volume of water discharged during and after foam operations are completed
5. Display total amount of foam concentrate consumed
6. Display injection percentage
7. Simulate flow rates for manual operation
8. Perform setup and diagnostic functions for the computer control microprocessor
9. Allow three injection percentage defaults to be stored

DRIVER'S SIDE DISCHARGE(S)

DRIVER SIDE 3" FOAM CAPABLE DISCHARGE(S)

One (1) each, driver's side 3" gate foam capable discharge(s) are to be furnished, each one provided with: 2-1/2" NST chrome plated brass rocker lug cap with chain, 2-1/2" NST male x 2-1/2" NST rocker lug swivel female 30 degree chrome plated brass elbow extension, 2-1/2" NST male chrome plated brass outlet adapter, 3/4" bleeder valve with exterior remote control, 3" i.d. stainless steel pipe or wire reinforced hose assembly with 3" stainless end fittings, 3" Elkhart Uni-Body series ball style 1/4-turn full flow bronze bodied discharge valve with E1F 12-volt electric actuator with wiring harness (located inside pump enclosure), and Elkhart model UBEC-1 Valve Controller with Valve 10-Position Indicator Lights.

DRIVER SIDE 3" FOAM LINE CONTROLLERS AND ACCESSORIES

One (1) each, FoamPro 1-inch diameter Line Controller Assemblies shall be provided, one (1) for each of the above specified foam capable 2-1/2" driver side gated discharge lines.

Each Line Controller Assembly shall include one (1) ultra bright LED digital Line Control Display, one (1) Line Control Driver, one (1) Line Foam Flowmeter, one (1) Line Control Valve, one (1) Foam Inject Check Valve, and one (1) Calibrate Inject Valve with high pressure foam concentrate bypass return line to the foam concentrate reservoir.

In addition to the above accessories, each Line Controller Assembly shall be provided with a: Data Bus Cable, Foam Flowmeter Cable, Water Flowmeter Cable, and Power Cables to Line Control Valve and Flowmeters. The 1-inch diameter Foam Line Controller Assemblies shall have an operational range of foam concentrate flow ranging from 1.8 GPM (6.8L/min) to 60 GPM (227.1 L/min). Example: with 3% foam concentrate ratio: at a minimal foam concentrate flow of 1.8GPM, the Line Controller will service a water flow of 60GPM.

The Line Controller electronic display module shall allow the pump operator to perform the following control and operation functions for each discharge:

1. Choose between plain water or foam solution
2. Provide push-button control of foam proportioning rates
3. Display current flow-per-minute of water
4. Display total volume of water discharged during and after foam operations are completed
5. Display total amount of foam concentrate consumed
6. Display injection percentage
7. Simulate flow rates for manual operation
8. Perform setup and diagnostic functions for the computer control microprocessor
9. Allow three injection percentage defaults to be stored

30 ° ELBOW

Five (5) TFT 30° swivel elbow adapter shall be provided. Four (4) shall be provided with 6" FNST x 6" Storz, and one (1) shall be provided with 5" FNST x 6" Storz. A 6" Storz blind cap and chain shall be provided for each adapter.

DRIVER SIDE REAR FOAM CAPABLE LARGE DIAMETER DISCHARGE

One (1) each, driver's side rear 6" gated discharges to be furnished, each one provided with: 6" stainless steel piping terminating at the rear of the apparatus with 6" NST male chrome plated brass outlet adapter, 3/4" bleeder valve with exterior remote control, 6" i.d. stainless steel pipe nipple, 6" Elkhart butterfly style 1/4-turn discharge valve with 12-volt electric actuator and wiring harness (located inside pump enclosure), Elkhart model UBEC-1 Valve Controller with Valve 10-Position Indicator Lights located on pump operator's control panel.

DRIVER SIDE 6" FOAM LINE CONTROLLERS AND ACCESSORIES

One (1) each, Foam Pro 1.50-inch diameter Line Controller Assemblies shall be provided, for the above specified foam capable 6" driver side rear gated discharge line.

Each Line Controller Assembly shall include one (1) ultra bright LED digital Line Control Display, one (1) Line Control Driver, one (1) Line Foam Flowmeter, one (1) Line Control Valve, one (1) Foam Inject Check Valve, and one (1) Calibrate Inject Valve with high pressure foam concentrate bypass return line to the foam concentrate reservoir.

In addition to the above accessories, each Line Controller Assembly shall be provided with a: Data Bus Cable, Foam Flowmeter Cable, Water Flowmeter Cable, and Power Cables to Line Control Valve and Flowmeters. The 1-1/4 inch diameter Foam Line Controller Assemblies shall have an operational range of foam concentrate flow ranging from 16 GPM (60.5L/min) to 150 GPM (567.6 L/min). Example: with 3% foam concentrate ratio: at a minimal foam concentrate flow of 16GPM, the Line Controller will service a water flow of 533GPM.

The Line Controller electronic display module shall allow the pump operator to perform the following control and operation functions for each discharge:

1. Choose between plain water or foam solution
2. Provide push-button control of foam proportioning rates

3. Display current flow-per-minute of water
4. Display total volume of water discharged during and after foam operations are completed
5. Display total amount of foam concentrate consumed
6. Display injection percentage
7. Simulate flow rates for manual operation
8. Perform setup and diagnostic functions for the computer control microprocessor
9. Allow three injection percentage defaults to be stored

AERIAL WATERWAY FOAM CAPABLE GATED DISCHARGE

AERIAL WATERWAY 8" DISCHARGE, FLOWS UP TO 4500-GPM

One each, Aerial Waterway 8" gated discharge is to be furnished, provided with: 3/4" bleeder valve with exterior remote control, 8" i.d. stainless steel pipe upstream and downstream of valve, 8" Elkhart butterfly style 1/4-turn discharge valve with 12-volt electric actuator and wiring harness (located inside pump enclosure), passenger side valve actuator over-ride control, and Elkhart model UBEC-3 Valve Controller with Valve 10-Position Indicator Lights, Digital Pressure Meter, and Digital Flow Meter. The stainless steel piping shall be braced for extreme reaction force loads.

AERIAL 8" AERIAL WATERWAY FOAM LINE CONTROLLER AND ACCESSORIES

One each, FoamPro 1.50-inch diameter Line Controller Assembly shall be provided, for the above specified foam capable 8" Aerial Waterway discharge line.

Line Controller Assembly shall include one (1) ultra bright LED digital Line Control Display, one (1) Line Control Driver, one (1) Line Foam Flowmeter, one (1) Line Control Valve, one (1) Foam Inject Check Valve, and one (1) Calibrate Inject Valve with high pressure foam concentrate bypass return line to the foam concentrate reservoir.

In addition to the above accessories, each Line Controller Assembly shall be provided with a: Data Bus Cable, Foam Flowmeter Cable, Water Flowmeter Cable, and Power Cables to Line Control Valve and Flowmeters. The 1-1/2 inch diameter Foam Line Controller Assemblies shall have an operational range of foam concentrate flow ranging from 16 GPM (60.5L/min) to 150 GPM (567.6 L/min). Example: with 3% foam concentrate ratio: at a minimal foam concentrate flow of 16GPM, the Line Controller will service a water flow of 533-GPM, or at maximum flow of 150 GPM will service a water flow of 5000-GPM.

The Line Controller electronic display module shall allow the pump operator to perform the following control and operation functions for each discharge:

1. Choose between plain water or foam solution
2. Provide push-button control of foam proportioning rates
3. Display current flow-per-minute of water
4. Display total volume of water discharged during and after foam operations are completed
5. Display total amount of foam concentrate consumed
6. Display injection percentage
7. Simulate flow rates for manual operation
8. Perform setup and diagnostic functions for the computer control microprocessor
9. Allow three injection percentage defaults to be stored

PUMP COMPARTMENT

PUMP ENCLOSURE, MID-SHIP S/S MODULAR - DRIVER SIDE CONTROLS

A pump compartment/module shall be furnished, located "mid-ship" of the vehicle, immediately to the rear of the aerial's turntable, designed for driver side pump controls and instrumentation. The pump compartment shall be "fully enclosed", using fabricated sheet metal panels on top, sides, front, and rear. The modular style pump enclosure shall be located no more than 1-inch ahead of the apparatus body, and 1-inches rear of the turntable.

The entire pump compartment module shall be separate from the turntable, outrigger assemblies, and apparatus body, rigidly mounted to the chassis frame rails, and designed to allow independent twisting "no-contact" movements of the aerial, pump module and apparatus body. The pump module shall remain rigid to the chassis frame rails, and fire pump itself shall have a flex-mount system as approved by the fire pump manufacturer.

STAINLESS STEEL CONSTRUCTION

Pump compartment shall be of all-bolted construction, fully enclosed, and constructed of 12-gauge, type 304 brushed stainless steel. Due to the entire pump house module being constructed of scuff-resistant non-painted brushed stainless steel, neither polished stainless steel nor aluminum treadplate overlays are required for scuff protection.

BLEEDER VALVE AND DRAIN VALVE CONTROL PANELS

The specified passenger side outlet and inlet bleeder valve controls shall be located immediately above the runningboard, installed on a brushed stainless steel horizontal full width bolt-on riser panel. The specified driver side outlet and inlet bleeder valve controls, and master pump drain control shall be located immediately above the runningboard, installed on a brushed stainless steel horizontal full width bolt-on riser panel.

REMOVABLE PASSENGER SIDE ACCESS PANEL

Passenger side of pump module shall incorporate brushed stainless steel removable mid-section panel, removal of which allows for pump inspection, service, and maintenance.

The removable passenger side panel shall located above and interlocking mated to the passenger side bleeder control panel. The panel shall be held in place by four (4) outboard corner mounted brite metal quick release trigger latches, and provided with two (2) chrome plated grab handles to aid in removal and re-installation of the panel.

Passenger side removable panel opening shall be full width of the pump compartment/module by at least 28" tall.

PERMANENT SIDE PANELS

Driver side mid-level control panel and the driver side and passenger side upper level side panels shall be permanent; however, bolted in position and removable for disassembly of the pump module.

OVERHEAD PUMP ENCLOSURE

The upper portion of the pump module shall be of adequate size to accommodate any optionally specified recessed dunnage area, or accessory equipment installations. This area shall be above the pump controls and plumbing, inboard of the instrument panel, ahead of the apparatus body and rear of aerial turntable.

RUNNINGBOARDS

Driver's and passenger's side pump panel runningboards to be furnished, extending the full length of the

pump module.

Runningboards shall be at least 10" deep, bolted to and easily removable from the lower pump compartment module. Runningboards shall be provided with non-slip grip-pattern top step surface.

1 3/4" CROSSLAY HOSEBEDS (2 ea.)

Two (2), recessed crosslay style hosebeds to be furnished, located at the front of the body, just behind the aerial turntable. Each hosebed shall accommodate 200 ft. of 1-3/4" double jacket fire hose, "flat-layed", with nozzle attached. Hosebeds to include: swirl finish smooth metal side walls, 1/4" plate swirl finish aluminum hosebed divider, perforated brush finish neutral metal floors or Turtle Tile removable floor gratings, vertical side and horizontal bottom polished stainless steel outboard corner liners (drivers and passengers sides), and the specified crosslay discharge swivel outlets located below hosebed floors.

CROSSLAY 2" DISCHARGE

Each 2" crosslay gated discharge shall be provided with: 1-1/2" NST male outlet x 2" inlet 90 degree bronze or stainless steel discharge swivel, hoseline bleeder valve, 2" i.d. stainless steel pipe or wire reinforced hose with 2" stainless end fittings, 2" Elkhart Uni-Body series ball style 1/4-turn full flow bronze bodied self-locking discharge valve (located inside pump compartment), and Elkhart model UBEC-1 Valve Controller with Valve Position Indicator Lights

CROSSLAY DISCHARGE(S) FOAM LINE CONTROLLERS AND ACCESSORIES

Two (2) each, FoamPro 1-inch diameter Line Controller Assemblies shall be provided, one (1) for each of the above specified foam capable gated crosslay hosebed preconnect discharge lines.

Each Line Controller Assembly shall include one (1) ultra bright LED digital Line Control Display, one (1) Line Control Driver, one (1) Line Foam Flowmeter, one (1) Line Control Valve, one (1) Foam Inject Check Valve, and one (1) Calibrate Inject Valve with high pressure foam concentrate bypass return line to the foam concentrate reservoir.

In addition to the above accessories, each Line Controller Assembly shall be provided with a: Data Bus Cable, Foam Flowmeter Cable, Water Flowmeter Cable, and Power Cables to Line Control Valve and Flowmeters. The 1-inch diameter Foam Line Controller Assemblies shall have an operational range of foam concentrate flow ranging from 1.8 GPM (6.8L/min) to 60 GPM (227.1 L/min). Example: with 3% foam concentrate ratio: at a minimal foam concentrate flow of 1.8GPM, the Line Controller will service a water flow of 60GPM.

The Line Controller electroinic display module shall allow the pump operator to perform the following control and operation functions for each discharge:

1. Choose between plain water or foam solution
2. Provide push-button control of foam proportioning rates
3. Display current flow-per-minute of water
4. Display total volume of water discharged during and after foam operations are completed
5. Display total amount of foam concentrate consumed
6. Display injection percentage
7. Simulate flow rates for manual operation
8. Perform setup and diagnostic functions for the computer control microprocessor
9. Allow three injection percentage defaults to be stored

CROSSLAY COVER

The crosslays shall be fitted with an .125" aluminum cover. The cover shall have a stainless steel hinge and flaps on the sides capable of being securely fastened.

DRIVER'S SIDE MIDSHIP DELUGE MONITOR 4" RISER, FLOWS TO 2000-GPM

One 4" gated riser is to be furnished, for use with a driver's side midship top of body monitor. The discharge shall be provided with: 4" i.d. stainless steel pipe upstream and downstream of the 4" Elkhart flat-ball style 1/4-turn Uni-Body discharge valve with 12-volt electric actuator and wiring harness, and Elkhart model UBEC-1 Valve Controller with 10-Position Indicator Lights. The stainless steel piping shall be braced for extreme reaction force loads.

OFFICER'S SIDE MIDSHIP DELUGE MONITOR 4" RISER, FLOWS TO 2000-GPM

One 4" gated riser is to be furnished, for use with an officer's side midship top of body monitor. The discharge shall be provided with: 4" i.d. stainless steel pipe upstream and downstream of the 4" Elkhart flat-ball style 1/4-turn Uni-Body discharge valve with 12-volt electric actuator and wiring harness, and Elkhart model UBEC-1 Valve Controller with 10-Position Indicator Lights. The stainless steel piping shall be braced for extreme reaction force loads.

MIDSHIP DELUGE MONITOR FOAM LINE CONTROLLERS AND ACCESSORIES

Two (2) each, FoamPro 1-inch diameter Line Controller Assemblies shall be provided, one (1) for each of the above specified foam capable gated crosslay hosebed preconnect discharge lines.

Each Line Controller Assembly shall include one (1) ultra bright LED digital Line Control Display, one (1) Line Control Driver, one (1) Line Foam Flowmeter, one (1) Line Control Valve, one (1) Foam Inject Check Valve, and one (1) Calibrate Inject Valve with high pressure foam concentrate bypass return line to the foam concentrate reservoir.

In addition to the above accessories, each Line Controller Assembly shall be provided with a: Data Bus Cable, Foam Flowmeter Cable, Water Flowmeter Cable, and Power Cables to Line Control Valve and Flowmeters. The 1-inch diameter Foam Line Controller Assemblies shall have an operational range of foam concentrate flow ranging from 1.8 GPM (6.8L/min) to 60 GPM (227.1 L/min). Example: with 3% foam concentrate ratio: at a minimal foam concentrate flow of 1.8GPM, the Line Controller will service a water flow of 60GPM.

The Line Controller electronic display module shall allow the pump operator to perform the following control and operation functions for each discharge:

1. Choose between plain water or foam solution
2. Provide push-button control of foam proportioning rates
3. Display current flow-per-minute of water
4. Display total volume of water discharged during and after foam operations are completed
5. Display total amount of foam concentrate consumed
6. Display injection percentage
7. Simulate flow rates for manual operation
8. Perform setup and diagnostic functions for the computer control microprocessor

9. Allow three injection percentage defaults to be stored

TASK FORCE TIPS MONSOON RC - REMOTE CONTROLLED REAR MONITOR(S)

Two (2) each, TFT model Y4-E11A, Monsoon RC electronically operated Monitor(s) to be provided, for use with the specified deluge discharge outlet(s). Each monitor to be equipped with: a model M-ERP2000-NN 2000-GPM Automatic Nozzle, and model Y4E-RP Panel Mount Remote Control.

The remote control(s) shall be located on the specified pump operator's panel, adjacent to its respective foam control.

TASK FORCE TIPS MONSOON RC – WIRELESS MONITOR OPERATOR STATION

Two (2) ea. TFT model YE-RF-900 Wireless Monitor Operator Station(s) shall be provided, in addition to the above specified Panel Mounted Operator Station. Operator Station is to be provided with a clamp style bracket for mounting to the apparatus.

ACCUMAX 300-GPM FOAM PROPORTIONING SYSTEM

The fire pump system shall be equipped with a "high-capacity" electronically controlled, direct discharge injection foam proportioning system. It shall be demand based, fully automatic and be compatible with all current foam concentrates. Electronics shall be EMI/RFI compliant. The foam proportioning operation shall be based on direct measurement of water flow, and remain consistent within the specified flows and pressures. System must be capable of delivering accuracy to within 5% of calibrated settings over the advertised operation range. Performance must not be affected by discharge hose length or size, discharge nozzle type or elevation, or incoming water pressure. The system shall be capable of controlling up to eight different foam capable discharges; number and sizes of which are specified above. Each foam capable discharge outlet shall allow the choice of plain water or foam solution at the percentage chosen by the pump system operator. Each foam capable discharge will be equipped with: one (1) Line Controller, one (1) Foam Flowmeter, one (1) Automatic Foam Control Valve, one (1) Foam Check Valve, one (1) Water Flowmeter and appropriate cables, fittings and hoses.

System Operation

Each foam capable discharge outlet's individual Line Controller (located adjacent to respective discharge gate valve control) manages the flow of foam concentrate, using information received from the waterway's Flow Meter. The Line Controller signals the Automatic Foam Control Valve which proportions the flow of foam concentrate, being injected directly into the water flow downstream of the outlet gate valve. The Line Controller also continuously monitors waterway performance and feeds the Master Control with information regarding foam concentrate requirements. The Master Control totals concentrate requirements from each flowing discharge outlet and directs the Edwards Rotary Gear Pump to perform accordingly. A diagnostic self-check of the Line Controller electronic control modules will be run each time the system is powered up. Water flow measurement of each foam capable discharge is accomplished by a non-restricting Flowmeter, located upstream of the discharge gate valve. Depending on piping size, flowmeter may be of paddlewheel or magnetic meter design. All system components are to be constructed of non-corrosive materials. To prevent waste of costly foam concentrate, the system allows calibration and performance testing without mixing concentrate with water.

Individual Line Controllers

One (1) microprocessor equipped individual Line Controller is to be provided for each foam capable

discharge. Each includes an ultra bright LED digital display for maximum viewing. The display shall enable the pump operator to perform the following control and operation functions for each discharge:

Chose between plain water or foam solution

Provide push-button control/adjustment of foam proportioning rates

Display current gallons-per-minute flow of water

Display total amount of water discharged during and after foam operations are completed

Display total amount of foam concentrate consumed after foam operations are completed

Display selected injection percentage

Simulate flow rates for manual operation

Perform setup and diagnostic functions for the computer control microprocessor

Allow three injection percentage defaults to be stored

Master Controller

A single microprocessor equipped Master Controller is to be provided for the proportioning system. It includes an ultra bright LED digital display for maximum viewing. The display shall enable the pump operator to perform the following control and operation functions for the total foam proportioning system:

Activate the proportioning system at the push of a button

Display total current flow-per-minute of water

Display total amount of water discharged during and after foam operations are completed

Show total amount of foam concentrate consumed

Perform setup and diagnostic functions for the computer control microprocessor

Flash a “low concentrate” warning when the foam concentrate tank runs low

Flash a “no concentrate” warning and shut the foam concentrate pump off, preventing damage to the pump, should the foam tank empty

Hydraulic System

The hydraulic system shall include a variable displacement piston pump, and the system must comply with all applicable SAE and DOT standards. The hydraulic system shall be provided with a hydraulic oil cooler and an appropriately sized hydraulic reservoir, both designed to maintain the temperature of the hydraulic oil at or below 200 F.

Concentrate Pump

A hydraulic motor driven positive displacement foam concentrate pump, rated at 300 gpm (567.8 L/min) minimum 10 gpm (22.7 L/min) with maximum operating pressure of 250 psi (13.8 BAR), shall be installed in a suitable and accessible location. An electronically-operated valve shall receive signals from the computer control display to control the flow of hydraulic oil to the hydraulic motor coupled to the concentrate pump. The concentrate pump turns at a variable speed to ensure that the correct proportion of concentrate selected by the pump operator is injected into the fire pump discharge stream.

The foam concentrate pump shall be an Edwards Manufacturing all bronze 300 gpm rotary gear pump. Construction features of pump are to include: ball style bearings (no bushings), timing gears (to prevent rotor contact), and solid stainless steel rotor shafts. Pump design and construction materials shall all allow the foam pump to run dry without damage.

FoamPro AccuMax Components:

Master Controller, one (1) each

Individual line controllers (one per foam capable discharge outlet)

Flowmeters, for foam concentrate (one per foam capable discharge outlet)

Foam Concentrates Control Valves (one per foam capable discharge outlet)

Check Valves (one per Foam Control Valve)

Flowmeters, foam capable outlet waterway (one per discharge, sized for discharge flow capability)

Edwards Manufacturing Foam Concentrate Pump with Hydraulic Motor drive

Variable displacement piston Hydraulic Pump
Strainer
Molded cables
Placards

OEM Supplied Components:

Hydraulic Hoses and Couplings
Hydraulic Pressure Gauge
Hydraulic Temperature Gauge
Hydraulic Filter Assembly
Foam concentrates Hoses and Piping
Oil Cooler Radiator with Fan
Oil Reservoir with Site Level Gauge
Hot Shift style Power-Take-Off (PTO)

An installation and operation manual is provided for the foam system, along with a one-year limited warranty by FoamPro/Hydro.

MANUAL OVERRIDE

A FoamPro Manual Override option shall be provided to provide operator manual control of foam concentrate pump.

LOW FLOW OPTION

A FoamPro Low-Flow option shall be provided to deliver precision proportioning for low flow applications as specified. Operation will be integrated into system microprocessor control and deliver seamless, automatic adjustments to flow conditions without operator interface.

FOAM PUMP GATED SUCTION, 3" NST MALE, 3" VALVE & PIPING

One (1) each, 3" inside diameter foam pump gated suction line shall be provided, equipped with the following accessories:

INLET & PIPING

The foam pump suction inlet shall be located at the driver side pump panel, and shall include: 3" NST chrome plated brass rocker lug cap with chain, 3" NST male chrome plated brass inlet adapter, removable strainer, 3" i.d. type 304 stainless steel pipe and smooth-sweep elbows.

FOAM PICK UP TUBE

Three (3) 3" x 10' foam pick up tubes with pvc stingers shall be provided, and shipped loose.

GATE VALVE & CONTROL

A matching brand bronze 3" ball style swing-out gate valve shall be provided, sandwich bolted between the specified foam pump suction port and foam concentrate inlet fitting. The valve shall include a manual actuator adjacent to the inlet.

ELKHART 3" FOAM TANK-TO-FOAM PUMP VALVE 300 GPM

A 3" full-flow Elkhart Uni-Body bronze foam tank-to-foam pump 1/4-turn valve is to be furnished. The suction line from foam tank suction sump to the tank suction valve shall be furnished with a banded flexible "hump hose" connection and at least 3" stainless steel piping within the fire pump module.

TANK-TO-PUMP OPERATION

Specified foam tank-to-foam pump suction valve is to be remote controlled with fast operating air cylinder valve actuator and pump control panel mounted guarded air toggle switch control console with "OPEN" indicator light.

FOAM CONCENTRATE DISCHARGE, 1-1/2" NST MALE OUTLET, CAPPED

One (1) each, foam pump gated concentrate discharge line shall be provided equipped with the following accessories:

One each electronically controlled Line Controller Assembly shall be provided, to include: one (1) ultra bright LED digital Line Control Display, one (1) Line Control Driver, one (1) Foam Line Flowmeter, and one (1) Foam Line Control Gate Valve.

In addition to the above accessories, each Line Controller Assembly shall be provided with a: Data Bus Cable, Foam Flowmeter Cable, and Power Cables to Line Control Valve and Flowmeter. The 2 inch diameter Foam Line Controller Assembly shall provide a variable foam concentrate flow ranging from 20 GPM to 150 GPM.

The Line Controller electronic display module shall allow the pump operator to perform the following control and operation functions for the foam concentrate discharge:

1. Provide push-button control of foam flow rates
2. Display total amount of foam concentrate consumed

OUTLET & PIPING

The foam pump discharge outlet shall be located at the driver side pump panel, and shall include: 1-1/2" NST chrome plated brass rocker lug cap with chain, 1-1/2" NST male chrome plated brass inlet adapter, 1-1/2" i.d. type 304 stainless steel piping and/or high pressure wire reinforced hose with stainless fittings.

PUMP MOUNTING, END SUCTION MID-SHIP PUMP WITH SPLIT-SHAFT

The specified Hale midship mounted "end suction" pump, with its integral split-shaft pump transmission, shall be independently mounted on a "pump house" subframe which itself is to be bolted to and easily removable from the chassis frame rails. The subframe shall consist of a two (2) each 5/16" steel plate fabricated Z-irons which rest on the top flange of the chassis frame rails; and are sandwich bolted to the outboard chassis frame webs. This design shall provide for a "rigid" mount of the pump house, and perfect horizontal and vertical alignment with the apparatus body, runningboards always remaining in alignment with apparatus body rub-rails. The pump house is to be located no more than one (1) inch forward of apparatus body, and two (2) inches rearward of the chassis cab.

The fire pump shall be mounted to the pump house subframe with brackets that are custom-machined and fabricated so as to bolt to the fire pump casting at the same relative angle as engine/transmission and the rear axle. The pump mounting brackets shall position the fire pump to be located centerline between the chassis frame rails. Pump bracket design shall also facilitate easy disassembly, allowing for removal of the split-shaft transmission from the pump volute.

Pump mounting brackets and pump house subframe shall be primer painted and urethane painted to match pump or chassis frame rails.

DRIVELINE, SPICER 1710 HIGH TORQUE CAPACITY

Spicer model 1710 extra heavy duty driveline components to be furnished to facilitate pump installation, components shall include: slip stub shafts, slip yokes, cross & bearings and flanged yokes to be compatible with pump companion flanges and chassis driveline. Modified drivelines shall be high speed balanced.

SIDE CONTROL PANEL

MIDSHIP PUMP DRIVER SIDE CONTROLS

The pump operator's control panel shall be located on driver's side "midship" of vehicle. All pump discharge and suction controls are to be mounted on this side pump operator's control panel, so as to permit operation of the pump from one central location. All side mechanical pump actuator rods, rotating and push-pull, will be heavily cadmium plated solid cold roll steel, equipped with adjustable clevis joints or swivel ball joints and chrome plated brass or black phenolic control handles/knobs. All electric remote discharge controls shall consist of individual consoles with rocker or push-button style switches and multiple position indicator lights.

The upper portion of the pump control panel shall accommodate the specified "opening" instrument panel, and lower portion shall accommodate the specified inlet/outlet/drain valve and pump controls. See following described removable pump panel access panel(s).

IDENTIFICATION TAGS

All discharge controls and outlets, suction controls and inlets, drain valve controls, bleeder valve controls, and all other pump related controls shall be properly identified with permanent engraved or cast nameplates describing function and operation of each control. Nameplates for discharge controls, discharge outlets, and respective pressure gauges will be color coded and indicate: numerical sequence, location of outlet, type of discharge, and size of hose to be used. The nameplates shall be recessed into the discharge control hand grips and discharge and suction drain and bleeder control handles.

Any specified air or electric toggle switch gated pump suction controls, with indicator lights, shall be grouped together on pump control console, for ease of identification, equipped with permanently engraved nameplates recessed into a single piece polished stainless steel surround bezel.

SIDE MOUNT PUMP INSTRUMENT PANEL - TILT OUT STYLE

The specified pump pressure gauges, discharge pressure gauges, and engine monitors/ instruments shall be installed on a brushed stainless steel hinged gauge panel, located in top portion of driver's side exterior pump control panel. The gauge panel is to be equipped with a polished stainless steel piano hinge on the bottom and two adjustable-grip chrome plated lift-and-turn latches, located in upper corners. Gauge panel to be of the "tilt-out" style, to allow access to back of gauges and interior fire pump compartment. Top integral light housing to be furnished with enclosed 12-volt light fixtures.

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INSTRUMENT PANEL LIGHTS, LED STRIP STYLE

The specified enclosed 12-volt light fixtures shall be Whelen or equivalent LED strip lights.

ENGINE INSTRUMENTATION

The engine instrumentation is to be included in the specified fire pump pressure control system "engine governor". Instrumentation shall be integral with the Governor Control.

MASTER GAUGES, VACUUM & DUPLEX FOAM & WATER PRESSURE

MASTER PUMP PRESSURE GAUGES, BRONZE NO-SHOK

Master pump intake and pump discharge pressure indicating devices shall be located within 8" of each other, edge to edge, with the intake (suction) pressure indicating device to the left of the pump discharge pressure indicating device. Gauges to be bronze construction (not plastic), with crystal lenses.

A 4" diameter No-Shok "Duplex" pressure gauge to be furnished, registering 0 x 400 psi, black numerals on white background. Duplex gauge to have two (2) needles, one (1) black needle that indicates pressure at the discharge volute of the fire (water) pump, and one (1) red needle that indicates pressure at the discharge outlet of the specified foam pump. Duplex gauge is to be equipped with a black permanently engraved identification nameplate installed below the gauge, to read: "WATER PUMP DISCHARGE. & FOAM PUMP DISCHARGE"

A 4" diameter No Shok compound style pressure gauge to be furnished, registering --30 x 400 psi, black numerals on white background. Gauge to be piped to suction volute of fire pump, equipped with a black permanently engraved identification nameplate installed below the gauge, to read: "SUCTION."

TEST GAUGE PANEL

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

INDIVIDUAL DISCHARGE GAUGES, 2-1/2" DIAMETER

A 2-1/2" diameter NoShok compound style discharge pressure gauges shall be furnished for each discharge, registering 0 x 400 psi, with black numerals on white background. Gauge needle shall have a "bright orange" tip for improved visibility. Gauges to be located in a uniform manner no more than 6" from its respective discharge valve control. Each gauge and respective discharge valve control to be equipped with color coded permanently engraved identification nameplate to describe numerical sequence, location, type and size of outlet.

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

PUMP COMPARTMENT LIGHTS

Two (2), Truck-Lite or equivalent 6" round chrome plated surface mount 12-volt pump compartment interior lights to be furnished, mounted ceiling of interior pump compartment drivers and passengers side. Lens to be 5" diameter, Clear. Lights to be activated by individual light lens mounted push-button switch.

PUMP PANEL STEP(S)

PULL-OUT PUMP PANEL PLATFORM, AT DRIVER SIDE PUMP PANEL

A pull-out underbody step/platform shall be furnished, located beneath the driver's side midship pump panel runningboard. Step/platform top surface is to be fabricated of .12-gauge #4/type 304 brushed stainless steel, and provided with a precision machined non-slip "puncture-grip" pattern. Front and rear fabricated stainless steel extendible slides shall be furnished, designed to hold the step assembly in the retracted and extended positions, without the need for mechanical latches. When extended, the step shall project at least 14-inches beyond the outboard flange of the pump panel runningboard. In order to resist underbody corrosion, the slide mechanism must be constructed entirely of stainless steel.

FOAM TANK GAUGE

A Class1 Intelli-Tank foam level gauge shall be provided. The gauge shall feature wide-angle viewing and four (4) ultra-bright LED's for high visibility even in direct sunlight. Foam level sensing shall be through a pressure transducer, and capable of indicating nine (9) accurate levels.

AERIAL BODY SUB-FRAME

The chassis shall be fitted with a sub-frame system consisting of a series of steel plate gusseted legs, extending down and out from the chassis frame rails on each side. This system will provide additional structural support to the running boards and side compartments. A heavy-duty rear platform shall be constructed of the same material to support the rear compartments. The entire assembly will be attached to the chassis frame by a series of heavy -duty U-bolts. Self-supporting bodies will not be acceptable.

NO EXCEPTIONS

The entire subframe assembly shall be painted to match the chassis frame color.

APPARATUS BODY

All side metal, compartments and compartment floors shall be of bolted stainless steel. The body shall be assembled with heavy-duty stainless steel channel sills with bracing for extreme rigidity and mounted on a steel subframe.

The compartment body, pump housing and the engine compartment shall be separate modules (segmented body design) that are not to be fastened together in any manner in order to provide "flex joints" to alleviate stress and cracking of body compartments and running boards.

Compartments shall extend from the front jacks to the tailgate of the apparatus and shall be recessed to the frame of the apparatus where possible.

Compartments shall have sweep-out flooring (no obstruction at the floor bottom).

Each compartment shall be properly vented with louvers.

COMPARTMENTATION LEFT SIDE

- L1- There shall be a compartment behind the rear wheels approximately 45-3/4" wide x 48-1/2" high x 26-1/2" deep.
- L2- There shall be a second compartment behind the rear wheels approximately 42-3/4" wide x 48-1/2" high x 26-1/2" deep.

COMPARTMENTATION RIGHT SIDE

- R1- Below the turntable there shall be a compartment approximately 33-1/2" wide x 34-3/4" high x 26-1/2" deep. Compartment height is 12" below the hydraulic controls.
- R2- There shall be a compartment behind the rear wheels approximately 45-3/4" wide x 28" high x 26-1/2" deep.
- R3- There shall be a second compartment behind the rear wheels approximately 42-3/4" wide x 28" high x 26-1/2" deep.

ROLL-UP COMPARTMENT DOORS

The apparatus body shall be equipped with R.O.M Robinson Shutter doors where not stated otherwise. The door slats shall be double wall box frame, manufactured from anodized aluminum with a satin finish. The doors shall have the following features:

- Manufactured wholly in the United States.
- Concave individual slat design to prevent loose equipment from hindering door operation.
- Co-Extruded stretch resistant inner seal between slats to prevent metal-to-metal contact and inhibit moisture and dust penetration.
- Interlocking swagged/dimpled end shoes shall be utilized to provide a tight fitting assembly and allow for easy removal in the event of damage.
- Effective counter balancing for ease of lifting and lowering the doors.
- One-piece side rail and track to provide an unobstructed slide area and reduce the risk of binding.
- Non-abrasive replaceable water and dust barrier to keep compartment equipment clean and dry.
- A magnetic type switch integral to the door shall be supplied for door ajar indication and compartment light activation.
- A full width positive latch bar shall be operable with one hand, even with heavy gloves.

A door open indicator light shall be provided in the cab.

SCBA CYLINDER COMPARTMENTS

There shall be seven (7) spare breathing air cylinder compartments recessed in the rear fender wells, three (3) left and four (4) right. The compartments shall have brushed stainless doors with equipped with a weather resistant flush fitting thumb latch. The interior of the door shall incorporate a rubber seal to keep the compartment free of road debris and moisture. The interior compartment shall be constructed of a high-density polyethylene plastic.

COMPARTMENT MATTING

Turtle Tile interlock matting material shall be provided in each compartment.

600# SLIDE-MASTER TRAY

There shall be a Slide-Master pullout drawer provided and installed. The drawer shall have a distributed load capacity of 600 lbs. and be capable of extending 70% of its depth. The tray shall be fabricated of .188" aluminum plate and have a formed lip that measures 2".

UNISTRUT

Each compartment shall come equipped with 1.625" x .875" x .125" aluminum Unistrut channel. The Unistrut shall be securely fastened to the interior walls of the compartment.

REAR HOSE BED

The rear hose beds shall be completely wide open to allow for quick and easy loading and unloading of hose, thus preventing hose and hose couplings from being caught or tangled.

The rear opening of the rear hose bed shall be a minimum of 26 1/2" wide x 20" high. Any rear hose bed opening(s) requiring hose chutes shall not be acceptable.

Hose bed flooring shall be removable slatted aluminum. The rear hose bed shall accommodate a minimum of 6" x 700' supply hose and 3" x 300'

A hose bed shall be provided on both sides, above the rear body compartments.

HOSE BED DIVIDER

The hose bed shall be divided by a 3/16" aluminum partition that is fully adjustable by sliding in tracks located at the front and rear of the hose bed. The divider shall be located as needed.

HOSE BED COVER

There shall be a red nylon/vinyl hose bed cover for the main hose bed. The cover shall be capable of being securely fastened at the front, sides and rear.

HANDRAILS

Handrails shall be constructed of 1-1/4" diameter knurled anodized aluminum 3/8" heavy wall extrusion. The handrail shall be mounted utilizing chrome stanchions, which shall provide sufficient space to allow for a gloved hand to grip the rail. The rails shall be located in the following areas: (Note: These are in addition to those previously mentioned in the chassis section)

There shall be one (1) handrail at the side of the pedestal. This handrail is covered with slip resistant ribbed rubber.

There shall be two (2) handrails, one (1) each side of access door to the platform.

STEPS

There shall be a fold-down access step to the platform, made of 1.5" square aluminum tubing. This step provides direct access to the platform with the ladder nested in cradle without having to climb down the ladder or having to place the platform on the ground.

There shall be a cast fold-down step mounted on each side of the front face of body to provide access to the top of the pump module and dunnage area.

The quantity and location of steps and handrails shall meet the Current NFPA 1901 pamphlet in effect at the time the apparatus is ordered.

A slide-out step with embossed treadplate shall be provided under the side compartment.

RUB RAILS

The body shall be equipped with anodized aluminum channel style rub rails at the sides. Rub rails shall be spaced away from the body by 1/2" polymer spacers. The rub rails shall be polished to a bright finish.

ALUMINUM TREADPLATE

All load bearing aluminum treadplate running boards shall be .155 thick bright annealed with a serrated embossed finish. Running boards and rear step edges shall be flanged down for added strength. Running boards shall also be flanged up to form kick plates. All non-load bearing aluminum shall be .125" thick bright annealed finish. In areas where aluminum treadplate shall function as a load-bearing surface, there shall be a heavy steel sub-structure. This structure shall consist of 3" channel and 1-1/2" angle welded support. This shall assure that there shall be no flexing or cracking of running boards. The aluminum shall be insulated from the steel by closed cell foam body barrier material.

Treadplate locations:

1. Skirting around front bumper.
2. The step at the cab entrance.
3. The jump seat steps.
4. The running boards.
5. The rear step.
6. The top of the compartments.

FOAM TANK

The tank shall have a capacity of 800 U.S. gallons.

The tank shall be constructed of 1/2" thick polypropylene sheet stock. This material shall be a non-corrosive stress relieved copolymer thermo-plastic. The foam tank shall be of a specific configuration and is so designed to be completely independent of the body and compartments. All joints and seams shall be welded and/or formed and tested for maximum strength and integrity. The top of the booster tank is fitted with removable lifting eyes designed with a 3 to 1 safety factor to facilitate easy removability. The transverse swash partitions shall be manufactured of 3/8" polypropylene and extend from approximately 4" off the floor to just under the cover. The longitudinal swash partitions shall be constructed of 3/8" polypropylene and extend from the floor of the tank through the cover to allow for positive welding and maximum integrity. All partitions shall be equipped with vent and air holes to permit movement of air and foam concentrate between compartments. The partitions shall be designed to provide maximum flow. All swash partitions interlock with one another and are welded to each other as well as to the walls of the tank.

The tank shall have a combination vent and manual fill tower. The fill tower shall be constructed of 1/2" polypropylene and shall be a minimum dimension of 8" x 8" outer perimeter. The tower shall be located in the left front corner of the tank. The tower shall have 1/4" thick removable polypropylene screen and a polypropylene hinged-type cover. The tank cover shall be constructed of 1/2" thick polypropylene to incorporate a multi three-piece locking design which allows for individual removal and inspection if necessary.

The sump shall be constructed of 1/2" polypropylene and be located in the left front quarter of the tank.

The sump shall have a minimum of 3" national pipe threaded outlet on the bottom for a drain plug. This shall be used as a combination clean-out and drain. All tanks shall have an anti-swirl plate located approximately 2" above the sump.

All tank fill couplings shall be backed with flow deflectors to break up the stream of water entering the tank.

The tank shall rest on the body cross members in conjunction with such additional cross members, spaced at a distance that would not allow for more than 530 square inches of unsupported area under the tank floor.

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

ELECTRIC SYSTEM

All electrical wiring in the chassis will be XLP cross link-insulated type. Wiring is to be color-coded and include function codes every three (3) inches. Wiring harnesses will be routed in protective, heat resistant loom, securely and neatly installed. Two power distribution centers will be provided in central locations for greater accessibility. The power distribution centers contain automatic thermal self-resetting breakers, power control relays, flashers, diode modules, daytime driving light module, and engine and transmission data links. All breakers and relays are utilized in circuits which amp loads are substantially lower than the respective component rating thus ensuring long component life. Power distribution centers will be composed of a system of interlocking plastic modules for ease in custom construction. The power distribution centers are function oriented. The first is to control major truck function and the second controls overhead switching and interior operations. Each module is single function coded and labeled to aid in troubleshooting. The centers also have accessory breakers and relays for future installations. All harnesses and power distribution centers will be electrically tested prior to installation to ensure the highest system reliability.

All external harness interfaces will be of a triple seal type connection to ensure a proper connection. The cab/chassis and the chassis/body connection points will be mounted in accessible locations. Complete chassis wiring schematics will be supplied with the apparatus.

The wiring harness contained on the chassis shall be designed to utilize wires of stranded copper or copper alloy of a gauge rated to carry 125% of maximum current for which the circuit is protected without exceeding 10% voltage drop across the circuit. The wiring shall be uniquely identified by color code or circuit function code, labeled at a minimum of every three (3) inches. The identification of the wiring shall be referenced on a wiring diagram. All wires conform to SAEJ1127 (Battery Cable), SAEJ1128 (Low Tension Primary Cable), SAEJ1560 (Low Tension Thin Wall Primary Cable).

All harnesses shall be covered with moisture resistant loom with a minimum rating of 300 Degrees Fahrenheit and a flammability rating of VW-1 as defined in UL62. The covering of jacketed cable has a minimum rating of 289 degree Fahrenheit.

All harnesses are securely installed in areas protected against heat, liquid contaminants and damage. The harness connections and terminations use a method that provides a positive mechanical and electrical connection and are in accordance to the device manufacturers instructions. No connections within the harness utilize wire nut, insulation displacement, or insulation piercing.

All circuits conform to SAE1292. All circuits are provided with low voltage over current protective devices. These devices are readily accessible and protected against heat in excess of component rating, mechanical damage, and water spray. Star washers are not used for ground connections.

BACK-UP ALARM

An Ecco model SA917 automatic self-adjusting electronic back-up alarm producing 87-112 db shall be installed at the rear between the frame rails. It shall operate whenever the transmission's reverse gear is selected.

COMPARTMENT LIGHTING

Each compartment shall be equipped with two (2) LED light strips which shall provide a consistent pattern to illuminate to entire compartment.

REAR VISION CAMERA SYSTEM

Provided and mounted on the apparatus shall be a Safety Vision SV-CLCD-64 camera kit. The system shall consist of one (1) cab mounted model SV-LCD68 6.8" LCD monitor, one (1) model SV-620 (Color) high resolution 1/3" CCD camera, one (1) SV-LCDCB Control Box, and one (1) SV-523 65' camera cable. The monitor shall be dash mounted in plain view of the driver. The kit is capable of having two (2) additional cameras installed for a total of three (3).

TAIL/STOP/TURN LIGHTS

The taillights are to be Whelen 600 LED style. The brake/tail lights to be red and exceed SAE requirements. The turn signal shall be populated in an arrow pattern, amber in color. The backup lights are to be halogen. One opening shall be open to accept a 600 series warning light.

LED ICC/MARKER LIGHTS

LED type ICC/marker lights shall be provided to meet D.O.T. requirements.

FLEXIBLE MARKER LIGHTS

A Britax L427.200.L12V LED flexible marker light shall be mounted on the rear lower corners of the body, one each side.

STEP LIGHTS

Whelen 2G Series LED 4" step lights shall be provided, one each side on the front compartment face at pump panels, one at turntable step, and one each side of rear step.

GROUND LIGHTING

The apparatus shall be equipped with lighting capable of illumination to meet NFPA requirements. Lighting shall be provided at areas under the driver and crew riding area exits and shall be automatically activated when the exit doors are opened. The ground lights shall be Truck-lite® LED model #44042C. Lighting required in other areas such as work areas, steps and walkways shall be activated when the parking brake is applied, provided the ICC lights are on.

OPTICAL WARNING SYSTEM

The optical warning system shall be capable of two separate signaling modes during emergency operations. One mode shall signal to drivers and pedestrians that the apparatus is responding to an

emergency and is calling for the right-of-way and the other mode shall signal that the apparatus is stopped and is blocking the right-of-way. Switching shall be provided that senses the position of the parking brake.

A master optical warning device switch shall be provided to energize all of the optical warning devices provided. All lights shall operate at not less than the minimum flash rate per minute as specified by NFPA.

UPPER LEVEL WARNING DEVICES

The upper level is divided into zones A, B, C and D and the approved lighting package to be provided shall be as follows:

Zone A (front) shall have one (1) Whelen Model FN72QLED 8 LED Freedom Series 72” Lightbar.

Zone B (right side) shall be covered by the module from the lightbar and the right rear stanchion beacon.

Zone C (rear) shall have two (2) Whelen Model RB6 rotating beacons, red, mounted on rear stanchions and two (2) Whelen Model 60A00FAA LED amber, mounted at upper rear of apparatus.

Zone D (left side) shall be covered by the module from the lightbar and the left rear stanchion beacon.

LOWER LEVEL WARNING DEVICES

The lower level is divided into zones A, B, C and D and the approved lighting package to be provided shall be as follows:

Zone A (front) shall have a stainless steel warning light housing each side with Two (2) Whelen 600 Super LED red lights mounted in the front of each housing. The inboard pair of lights is in addition to the minimum NFPA warning system and shall be wired through a load-shedding device.

Zone B (right side) shall have four (4) Whelen 600 Series Super LED red lights mounted one on the side of the headlight housing, one at the middle of the apparatus, one on the body side at rear of apparatus, and one on the side of the aerial device.

Zone C (rear) shall have two (2) Whelen 600 Series Super LED, red lights mounted one each side of the rear of the apparatus.

Zone D (left side) shall have four (4) Whelen 600 Series Super LED, red lights mounted one on the end of the headlight housing, one at the middle of the apparatus, one on the body side at rear of apparatus and one on the side of the aerial device.

SIREN

One (1) Whelen Model 295 SLSA1 electronic siren shall be installed at the cab instrument panel complete with noise canceling microphone. The horn button in the steering wheel, a switch on right hand side of cab floor and the control on the siren head shall actuate the siren. A selector switch shall be provided on the instrument panel for control of horn or siren by steering wheel button.

SIREN SPEAKER

One Cast Products SA4201-5-A weatherproof siren speaker shall be provided, mounted behind the

bumper.

WHELEN PIONEER PLUS LED BROW LIGHT

A Whelen model PFP2 LED brow light shall be provided. The light shall be mounted at the front of the cab.

The light shall be controlled from a switch in the cab.

WHELEN PIONEER PLUS LED SCENE LIGHT (cab)

Two (2) Whelen model PFP2 LED scene lights shall be provided with PBA203 flush mount brackets. The lights shall be flush mounted, one each side, in the raised roof portion of the cab.

The lights shall be individually controlled from a switch in the cab.

WHELEN PIONEER PLUS LED SCENE LIGHT (body)

Two (2) Whelen model PFP2 flush mounted LED scene light shall be provided. The light shall be flush mounted in a PBA203 housing, one (1) each side, on the body.

The light shall be individually controlled from a switch in the cab.

PAINTING

The apparatus shall undergo extensive pre-paint preparation. All cab and body trim parts are to be removed prior to painting. All appliance-mounting holes are to be drilled and de-burred prior to painting. This allows mounting holes to be primed and painted. Before prime and finish coats are applied, the complete apparatus shall be properly prepared and treated to permit the best possible adhesion of the primer and finish coats.

All materials used in the paint process shall be of the of the highest quality available. Modern methods shall be employed to assure the finest finish surface possible. All priming, surfacing and painting shall be done in a modern down draft or cross flow paint facility. Experienced personnel trained by the paint manufacturer shall perform all paint application in order to provide the highest quality and most enduring paint finish available. Both aluminum and steel surfaces to be painted shall be primed with a two (2)-component primer which is compatible with the finish coat. The apparatus shall be finish painted with a polyurethane base/clear system. "No Exception"

Utilizing the stainless steel body fabrication, the interior of all compartments, inside hose bed and surrounding areas adjacent to compartments doors shall remain a #4 brushed stainless steel finish. This practice shall eliminate the possibility of paint chipping, and electrolysis of aluminum, which can cause corrosive action between dissimilar metals. The chassis, compartment doors, front and rear jack doors, and rear fender panels shall be painted the color indicated.

A barrier gasket/washer of "High Density Closed Cell Urethane Foam" shall be used behind all lights, handrails, door hardware and any miscellaneous items such as stainless steel snaps, hooks, washers and acorn nuts. The gaskets/washers shall be coated with pressure sensitive acrylic adhesive. All screws used to penetrate painted surfaces shall be pre-treated/coated under the head with nylon and the threads shall have pre-coat #80. This procedure shall be strictly adhered to for corrosion prevention and damage to the finish painted surfaces.

The following paint process shall be utilized:

Surface Preparation:

1. Wash surface thoroughly with mild detergent.
2. Clean and de-grease with Prep-Sol 3812S.
3. Sand and feather edge using 400 grit or finer on a dual action sander.
4. Remove sanding dust with a cleaner compatible with polyurethane base coat/clear coat final finish.

Substrate treatment:

1. Use a Metal Conditioner followed with a Conversion Coating product.

Priming:

1. Use a priming 615S pretreatment.
2. Use a self etching primer applied to achieve a 1.5 mil dft minimum.
3. Use Prime N Seal sealer compatible with polyurethane base coat.

Color Coat:

1. Apply polyurethane base coat 1-2 mil dft minimum.

Clear coat:

1. Apply polyurethane clear coat 2 mil dft minimum.

AIR CONDITIONING CONDENSER

The air conditioning condenser shall be painted to match the cab roof.

UNDERCOATING

Ziebart, or equal, undercoating shall be applied to visible surfaces on the underside of the truck body and chassis to help reduce noise in the cab caused by tires, stones, sand and water spray. This thick, super-tough coating, being highly abrasion-resistant does not wear off. It also protects underbody components from moisture, mud and salt.

ZIEBART WARRANTY

The application will come with Ziebart's ten (10) year rust protection limited warranty.

CORROSION REDUCTION POLICY

The manufacturer shall have in place a formal corrosion reduction program and assembly procedures designed for reducing and eliminating the possibility of corrosion. It is understood that fire apparatus will operate in harsh environments. At the time of the bid the apparatus manufacturer shall show proof of a corrosion policy. Failure to submit this information could be grounds for rejection. If a formal policy is not in place explain in your bid how your firm will take the necessary steps for corrosion reduction. There will be no exception to this requirement.

In addition to a formal program the manufacture shall show proof of testing corrosion reduction processes to ASTM B117. A copy of recent test shall be included in the bid.

Frame Rails

The chassis frame rails shall be coated with a high performance, two component, reinforced inorganic

zinc rich primer with a proven cathodic protection makeup preferably Cathacoat 302HB. The surface shall be clean and free of all salts, chalk and oils prior to application. Were the primer has been broken during the frame assembly process the area shall be touch up to reestablish the seal. Prior to finish paint a second primer Devran 201 shall be applied. Once the assembly of the frame is complete and the second primer is applied the entire assembly shall be covered with high quality top coat paint preferably Imron 5000 or equal. The manufacturer shall submit with the bid a copy of the product brochure and or description of the primer to be used.

Electro Plating

Steel and Iron brackets such as the pump module bracket shall be Zinc plated to protect against corrosion. Plating shall be in accordance with ASTM B663. The apparatus manufacturer shall list all components with plating.

Fasteners

In any area that a stainless steel screw or bolt head is to come in contact with aluminum or steel, painted or non-painted, the fastener shall have the underside if the head pre-coated with nylon. The nylon coating shall act as a barrier between the fastener head and the metal or painted surface.

Screw or bolt taped into the metal shall be pre-coated with a Threadlocker type material pre-applied on the threads.

When bolting together stainless steel the manufacturer shall use a pan-head bolt with nylon coating under the head, a stainless washer with a rubber backing, and a Stover flange nut to secure the bolt.

When mounting aluminum components such as a step to the apparatus body. The manufacturer shall use stainless washers with rubber backing. All mounted components shall a barrier material between the two surfaces.

All rivet type fasteners shall be of the same material being secured.

Whenever possible, pre-drill and tap all holes for mounting components such as lights, steps and hand rails prior to the paint process to reduce the corrosion opportunity. If a hole must be drilled into a previously painted surface, re-establish the paint barrier around the hole and use a flange-type nutsert with a gasket under the flange.

Where possible, minimize the number of stainless trim screws in aluminum. Structural tape and or adhesive shall be used were possible for mounting trim to the body or cab.

If a pre-treated screw or bolt is not available, hand apply Dynatex Boltlocker or Theadlocker on the threads of the screw, bolt or nutsert. This will help seal threads from moisture and help prevent the fasteners from loosening.

If lubricant is used when tapping the hole, clean out the lubricant and the shavings before applying blue Threadlocker into the hole.

Barrier Tape

Barrier tape shall be used on the backsides of all lights, trim pieces, or other components when bolting them to the apparatus; also when attaching stainless steel over an aluminum surface or when attaching aluminum treadplate to the stainless steel. All instances of dis-similar metals contacting each other require the addition of barrier tape between the metals where contact is made.

Before applying the tape, be sure the metal surface is clean from oil or dirt by cleaning the surface with a

50/50 mix of alcohol and water pr similar solvent.

Gaskets

Gaskets shall be used under all snaps, loops and fasteners for such items as for hose bed covers. Reestablish paint seal around the mounting hole edges after drilling.

Mounting with Threadlocker coating shall be used.

Flat washers with rubber backing shall be used behind all lights that have stainless screws.

Rollup Doors

1 3/4" X 1/16" barrier tape shall be used on the frame opening to act as barrier between the aluminum door rail and the painted door opening surface.

Use a paint stick around the holes after drilling and tapping. In mounting the rails, use screws with the nylon under the head and Threadlocker on the threads for mounting the doorframes.

Install barrier tape to the painted surface where the trim is located on top of the door opening.

Hinged Doors

Barrier tape shall be applied to the painted surface of the body and on the painted hinge side of the door.

On the hinge side, mount tape out toward the edge to space over the barrel of the hinge, being sure to not touch the door.

Make sure the hinge fits into the extrusion frame with no corner weld beads interfering with the door fit. Do not put the hinge in a bind or cause the stainless steel hinge to touch the aluminum. Install the doors using a truss head bolt with the nylon coating under the head and Threadlocker on the threads.

Painting Steel

The manufacturer shall wipe any oil residue dry, remove any rust and remove weld slag or smoke. Clean the surface with solvent before painting. Prime with one even coat of black Color primer, and then spray a topcoat over the primer for the finish coat. After bolts are tightened to the proper torque, touch up the bolt area and ends of the bolts with primer or cold galvanizing coating.

Mounting Emergency Lights and Options

All emergency lights, accessory mountings, Kussmaul covers, and 110 outlet boxes mounted to the body should be mounted with pre-coated Threadlocker and nylon under the head screws or bolts to minimize corrosion between dissimilar metals.

Electrical Grounding

Grounding straps shall be installed consisting of a minimum 2-gauge strap bolted to the chassis frame.

A ground cable from the cab to the right side frame rail
From the alternator to the right side frame rail
From the pump module frame to the right side truck frame.
Aerials: from the hydraulic and pump module framework.
From the pump mount to the truck frame rail.
From the body module to the right side truck frame.

Proper grounding will help eliminate ground loop problems throughout the truck, reducing the possibility for electrolysis and corrosion to occur. Provide clean connection points on all ground connections,

(remove paint where applicable), and spray or brush on electrical sealer as necessary.

When installing foam system pump wiring the power must come from a dedicated breaker to a power solenoid, and then to the power terminal provided by FoamLogix or FoamPro. Pay particular attention to the grounding detail for wire size and good grounding practice, including removing the paint at the point of ground attachment to the chassis. Keep the length of ground wire as short as practically possible.

SALT SPRAY TESTING

Salt spray test shall be used to confirm the relative resistance to corrosion of coated and uncoated metallic specimens, when exposed to a salt spray climate at an elevated temperature. Test specimens shall be placed in an enclosed chamber and exposed to a continuous indirect spray of neutral (pH 6.5 to 7.2) salt water solution, which falls-out on to the specimens at a rate of 1.0 to 2.0 ml/80cm²/hour, in a chamber temperature of +35C. This climate shall be maintained under constant steady state conditions.

Method

Salt fog testing shall be performed by placing samples in a test cabinet that has been designed in accordance with Paragraph 4 (Apparatus) of ASTM B117 and operated in accordance with Paragraph 10 (Conditions) of ASTM B117.

A 5% salt solution, prepared by dissolving sodium chloride into water that meets the requirements of ASTM D1193 Specification for Reagent Water, Type IV is supplied to the chamber. At the time the samples are placed into test, the cabinet should be pre-conditioned to the operating temperature of 35°C and fogging a 5% salt solution at the specified rate. The fog collection rate is determined by placing a minimum of two 80 sq. cm. funnels inserted into measuring cylinders graduated in ml. inside the chamber. One collection device shall be located nearest the nozzle and one in the farthest corner.

Orientation

Unless otherwise agreed upon, the samples are placed at a 15-30 degree angle from vertical or tested in the "installed" position. This orientation allows the condensation to run down the specimens and minimizes condensation pooling. Overcrowding of samples within the cabinet should be avoided. An important aspect of the test is the utilization of a free-falling mist, which uniformly settles on the test samples. Samples should be placed in the chamber so that condensation does not drip from one to another.

Test durations

Test durations shall be 500 hours except for sample rotation and daily monitoring of collection rates, the cabinet should remain closed for the duration of the test.

LETTERING

Forty (40) 3" 22KT Gold laminate goldleaf letters, with left hand shading and right hand outline to equal 3-5/8" letter, shall be provided.

STRIPING

A 4" Scotchlite stripe shall be provided across the front of the cab and along each side of the apparatus.

The Scotchlite stripe shall be a mitered "Z" type on the cab sides and continuing straight along each side of the apparatus.

STRIPING, CHEVRON STYLE, REAR BODY, OUTBOARD

The apparatus shall have 6" red and yellow reflective DiamondGrade Chevron style striping affixed to the outboard right and left portion of the rear body and the aerial platform rear door(s). The striping will be set in a manner to have the effect of an inverted "V" shape. The stripe will travel low to high from the outside to the inside.

BOOM SIGN

A boom sign, approximately 115" x 12", shall be provided on each side of the boom. The background of the boom sign shall be painted primary truck color.

BOOM SIGN LETTERING

Up to twenty (20) 8" 22KT Gold laminated goldleaf letters, with left hand shading and right hand outline to equal 8-5/8" letter, shall be provided on each boom sign.

MISCELLANEOUS EQUIPMENT FURNISHED

1 pt. touch-up paint

Pike pole tubes shall be provided, three each side of the rear compartment.

WHEEL CHOCKS

Two (2) Ziamatic #SAC-44 folding wheel chocks with SQCH-44H holders shall be provided. The wheel chocks shall be located in a area close to the rear axles easily accessible from the side of the apparatus.

OUTRIGGER PADS

Four (4) jack pads made of black high-density polyethylene material shall be provided. The pads shall be mounted two under each running board.

AERIAL LOWER MAIN FRAME ASSEMBLY

The mainframe assembly shall be mounted mid-ship on the chassis, forward of the pump. This shall leave the rear hose bed open for use of large diameter and regular fire hose.

An open tube or angle substructure for the mainframe assembly shall not be acceptable.

The main frame assembly base plate, located at the top of the assembly which supports and holds the turntable rotation bearing, will be a minimum 1" steel measuring 50" x 50". There shall be a minimum of two steel tension and compression bars mounted underneath, fore and aft, of the main frame assembly which shall tie the aerial and chassis together. The bars shall function to withstand vertical torsional loads. The forward tension and compression bar shall be attached from the rear area of the front spring suspension hanger to the underside area of the mainframe assembly. The rear tension and compression bar shall be attached from the forward area of the rear spring suspension hanger to the under side area of the mainframe assembly.

TURNTABLE BEARING

The turntable bearing shall be constructed of steel. There shall be a minimum of 36 drilled and tapped

holes in the turntable bearing.

The diameter of the turntable bearing shall be a minimum of 47". The turntable bearing shall be able to rotate 360 degrees in either direction on a one inch thick steel plate. The turntable bearing shall be bolted to the top of the main frame assembly using a minimum of 36 Grade 8 bolts.

UPPER TURNTABLE

The turntable shall be a minimum of one-inch thick plate and ninety-six (96) inches in diameter. The side plates to which the main base section of the aerial ladder is connected shall have a minimum height of four feet and shall include I-beam gussets of approximately fifty inches in length that tolerate the side thrust and tremendous forces to which the unit would be subjected.

The turntable shall be bolted to the turntable bearing using a minimum of 36 Grade 8 bolts.

The turntable shall be equipped with two removable aluminum sections for access into the pump.

The turntable side plates shall be positioned at a 45-degree angle (opposite the angle of the raise/lower cylinders) to act as a partial counter balance weight on the opposite side of the truck from the ladder extension.

The turntable shall be equipped with a rotating mechanism with a steel balanced fly wheel connected at one end which shall rotate the turntable 360 degrees through a double reduction worm gear box that shall handle torque loads imposed by water hammer and hose breakage. The rotating mechanism shall give the turntable and boom built in coast as an added safety precaution to avoid lateral boom side-to-side deflection (reactionary whipping effect) caused by the boom being stopped suddenly.

Turntables using hydraulic clutch (disc) brake rotating mechanisms to hold the boom and turntable in a neutral position shall not be acceptable.

The power operated turntable shall provide continuous rotating of the aerial structure clockwise or counter clockwise, thus enabling the structure to be positioned in any segment through 360 degrees. The rotating mechanism shall also provide sufficient power to rotate the aerial sections in any direction at any angle, fully extended, while carrying the manufacturer's rated load capacity with the waterway in operation and discharging water at the tip of the aerial fly section.

Provisions shall be made for manual operation of the rotation system should loss of hydraulic power occur. This shall be done through manual rotation of the flywheel to rotate the platform and turntable.

There shall be one heavy-duty steel pivot shaft that shall attach the base section of the boom (at the top and very back) to the top portion of the turntable side plates. The minimum steel shaft measurement shall be 34" long, 4" diameter with 1" wall thickness. Turntables using two separate attachments to hold and position the ladder in place shall not be acceptable.

The complete rotation system shall have built in relief to prevent damage from rotating the boom into buildings or from overloaded water streams. Suitable indicators, clearly visible at all times, shall be provided to facilitate correct alignment of the turntable with the bed of the boom. An automatic light shall be used to show correct alignment for bedding of the ladder from the turntable control station and the platform station.

Wide access steps to the turntable shall be provided on the left side of the apparatus.

INTERLOCK

An interlock shall be provided that prevents operation of the aerial device until the chassis spring brakes have been set and the transmission has been placed in neutral or the transmission is in the drive position with the driveline to the rear axle disengaged.

An interlock shall be provided that allows operation of the engine speed control only after the chassis spring brakes have been set and the transmission is in neutral.

An interlock system shall be provided to prevent the lifting of the aerial device from the travel position until all the stabilizers are in a configuration to meet the stability requirements. The interlock system shall also prevent the moving of the stabilizers unless the aerial device is in the travel position.

ROTATION LIMITING SYSTEM

An aerial rotation limiting system shall be provided to notify and prevent the operator from rotating the aerial into a restricted position due to a "short-set" outrigger configuration. The system shall enable the operator to place the aerial in a 180-degree rotation to the opposite side of the apparatus than that of the "short-set" outriggers only.

The aerial shall automatically slow down when it approaches the limit of rotation travel.

The system shall be capable of rotating the aerial two degrees past the centerline of the apparatus on the "short-set" side to enable bedding of the aerial within the travel support structure without system cutout.

Indicator lights shall be provided to assist with set-up and troubleshooting of the system.

SMART BOOM WARNING SYSTEM

This system shall warn both audibly and visually of impending contact with either the cab or the body of the truck.

When in an area of impending contact, the system shall shift the aerial controls into a reduced speed "creep mode" but shall not limit travel of the aerial.

Both rotation interlock and the smart boom warning system shall display information on a visual LED information center mounted at the turntable control pedestal.

HYDRAULIC SYSTEM

A flange mounted 30 GPM hydraulic pump shall be driven by a power take off unit that is connected to the chassis transmission to provide the power required for operating the aerial. The hydraulic system shall have a minimum hydraulic reservoir for 65 gallons of special hydraulic fluid. The hydraulic reservoir shall be located directly behind the apparatus pump and shall be equipped with a tread plate cover for ease of accessibility and maintenance. The hydraulic fluid must be discharged through a fine mesh stainless steel strainer. Within the system, pilot operated check valves shall be incorporated so that all valves hold in their respective function(s). A ten (10) micron return filter of 40 gpm capacity, with replaceable cartridge, shall be provided.

The hydraulic system shall also incorporate automatic by-passes to compensate in the event the boom is forced into a building or the operator accidentally moving the control valve in the opposite direction while at full speed.

The hydraulic system shall provide coast in the lift cylinders to prevent the outrigger jack system from coming off the ground. This shall be accomplished through programmable platform controls that limit the acceleration and deceleration of the boom.

Intercooling of the hydraulic oil shall be accomplished through a built in heat exchanger to cool oil at all times when fire pump is in operation.

All hydraulic lines shall be of the double braided type, with synthetic cover, rated at 9,000-psi burst pressure or above. A PTO hour meter shall be provided to record the time when the aerial hydraulic system is engaged.

CONTROL PEDESTAL

There shall be an aerial control pedestal located on the left side of the turntable. The control station shall encompass three electric over hydraulic proportional lever type controllers for raising/lowering, extending/retracting, and rotating the aerial device.

The turntable pedestal controls shall have manual overrides within the console useable through an access door.

The pedestal shall have removable panels for access to the hydraulic lines, valves and electrical wiring. There shall also be a hinged cover at the top of the control station for additional access.

The following additional items shall be mounted at the top of the turntable pedestal control station:

- a] on/off control switch for light to display control station for night time operation and for boom lights (one light mounted on each side of the boom)
- b] on/off control switch for high speed foot control of the hydraulic system
- c] intercom communication system controls
- d] plaque displaying functions for each pedestal boom operation
- e] plaque displaying rated load capacity

A safety guardrail shall be provided at the turntable pedestal control station to prevent the operator from falling.

INCLINOMETER

An illuminated inclinometer shall be provided and mounted in plain view of the pedestal operator location.

BOOM TRACKING LIGHTS

Two (2) Collins FX-12 spot/flood lights shall be provided, one on each side of the boom base section to light the aerial device for nighttime operation.

AUXILIARY HYDRAULIC POWER

A 12-volt auxiliary pump shall be provided to supply emergency power to the hydraulic system. This system shall be operated off the truck batteries and provide limited but adequate power to operate the boom and outrigger jacks under emergency conditions.

OUTRIGGER GROUND JACKS

The outrigger control station shall be located in the compartment directly underneath the turntable behind the cab on the left side of the vehicle. The single outrigger control station shall control all outrigger operations allowing for a one-person operation and quick set-up.

Individual control valves shall be supplied for each mode of outrigger operation. There shall be a plaque located next to each control valve displaying the function.

A two position hydraulic transfer valve (diverter valve) shall be installed adjacent to the outrigger control station to direct hydraulic power to either the outrigger operations or the boom operations to prevent operation of both circuits at the same time.

Fluid capacity plate for all lubricants and filter part numbers shall be provided.

There shall be three other controls located at the outrigger control station:

- a) on/off switch for auxiliary hydraulic motor
- b) high speed control for hydraulic system
- c) on/off switch for electrical power to pedestal.

Each extendable outrigger jack shall be furnished with a holding valve and a manually positioned steel pin lock. The pin lock safety feature is designed to not let the outrigger jack retract should the holding valve bleed off slowly or suddenly.

The mid-ship mounted outrigger jack rams shall have a minimum bore and stroke of 5"x 23".

The extendable outrigger stabilizers, when fully extended, shall have a spread of 20 feet. The stabilizers shall be operated independently and simultaneously and may be positioned to accommodate obstructions such as curbs, pavement depressions, parked vehicles, or any other hindrance. The extendable portion of the outrigger stabilizers and the support in the mainframe shall be constructed of reinforced structural tubing, Type A500 Grade B or equivalent. Poly wear pads shall be installed between inner and outer tubes. The extendable portion of the outrigger shall ride on UHMW (ultra high molecular weight) slideblocks.

There shall be two rear jacks located directly behind the rear tandem axle area, one each side of the vehicle, designed to extend straight down to take the weight off the rear suspension system. This shall enable the vehicle to be set up in tight or confining spaces with cars, additional fire apparatus, or other obstructions nearby.

Any beam or contributing structural member, through which the jacks supports the weight of the boom (aerial sections), or any position of the apparatus plus the live loads peculiar to fire fighting operations, shall be of ample strength to carry these loads without evidence of stress, bending, twisting or other failure(s). Pilot operated check valves shall be incorporated on each jack cylinder and manual pin locks shall be provided for each main outrigger jack, for additional safety.

There shall be an audible alarm and warning light that are automatically activated when the outriggers are being deployed.

FRONT SUSPENSION LOCKING CYLINDERS

Two (2) hydraulic suspension-locking cylinders shall be provided. The cylinders shall be mounted to the chassis frame rails directly above the front axle. The cylinders shall be activated when the main outrigger system is deployed.

BOOM ASSEMBLY

An aerial device of the telescopic design consisting of a minimum of five sections shall be provided.

The five sections produce a compact retracted length, allowing the platform to be positioned in tight or confined spaces at lower degrees of elevation. All sections shall be of the lightweight open lattice, non-crossing enclosed box design of truss type construction to obtain optimal stability at full horizontal reach. The telescoping sections shall be constructed from heat-treated 6061-T6 aluminum alloy material fastened by Aircraft type Huck bolts. There shall be no welding on the boom so as not to lower the yield strength of the material and cause torsional fracture, grain distortions and unequal conductivity. There shall be a minimum of 500 Aircraft type Huck bolts per section of boom. The base section of the boom shall have a section modulus of 468 in.³ and a resisting bending moment of 16,000,000 in. lb. The base section shall also consist of two heavy-duty steel side plates; one mounted each side of the boom. The steel side plates shall be Huck bolted into place and shall function to tie the boom, turntable, and lift cylinders together. There shall be trailing beams attached to the side plates that shall function to position and anchor lift cylinders into place and to distribute shock loads imposed by water hammer or hose breakage.

The boom shall be left in a natural aluminum finish. Painting the boom shall not be acceptable.

The boom shall have the capability to shed ice build up during freezing conditions.

AERIAL LADDER DEVICE

An aerial device with a minimum 110-foot vertical reach shall be provided. The height dimension shall be calculated with the boom at 80 degrees. The horizontal reach of the device shall not be less than 98 feet. The overall height of the apparatus with the aerial device in the bedded positions shall be no more than 11 feet, 6 inches and the overall length of vehicle shall be not more than 47 feet, 2 inch.

CLIMBING LADDER

A NFPA compliant climbing ladder with high handrails shall be provided for a continuous escape way and accessibility to and from the tip of the aerial. Each section of the ladder shall be attached to a specific boom section allowing the ladder to extend automatically at the same rate as the boom.

The climbing area shall be free of cables, waterway, extension cylinders or “K” bracing. The ladder climbing area shall be a continuous escape way free of all obstacles.

The ladder shall be an attachment to the boom and shall have no effect on the aerial's structural integrity or stability.

LOAD CAPACITIES

The following load capacities shall be established with the stabilizers at full horizontal extension and placed in the down position. Capacities shall be based upon full extension and 360 degree rotation.

35 MPH WIND CONDITION (DRY)

The aerial shall have a rated capacity of 1000 pounds at any elevation or extension. This condition shall be with "NO WATER" flowing or in the waterway.

35 MPH WIND CONDITION (WET)

The aerial shall have a rated capacity of 500 pounds at any elevation or extension. This condition shall be "WITH WATER" flowing or in the waterway.

LIFTING CYLINDERS

The raising and lowering mechanism shall consist of two hydraulic cylinders approximately 7" in diameter. The cylinders shall be attached to the boom assembly in a manner that requires only 50% of the lifting force. The cylinders shall be capable of lifting the full rated load of 1000 lb. with the boom at full horizontal extension with less than 1500 psi. hydraulic pressure.

The power operated raising and lowering cylinders shall provide movement of the ladder rapidly and smoothly without undue sway or vibration. A positive locking device shall be provided so the desired angle of elevation can be maintained indefinitely without dependence upon engine power.

As a safeguard feature, the lifting system shall be structurally and hydraulically designed and mounted to prevent rapid descent (lowering) of the aerial unit in the event of detachment, failure or hydraulic hose break. In the event of failure of any raising mechanism during operation, the gravity descent of the ladder shall be kept at a speed, which shall prevent damage to the equipment or danger to personnel. Provisions shall be made to prevent damage at full raise and lowering. There shall be a pilot controlled check valve on each cylinder.

EXTENSION AND RETRACTION

The boom shall be extended by dual hydraulic rams mounted midway between the upper and lower main rails of the base section. The cylinders shall be mounted at the ends of the base section and supported through the middle to accommodate the load stress(s) of the boom.

The hydraulic cylinders shall extend the second section so that both cylinders hydraulically equalize and provide the additional safety feature of a double extension system. The extension/retraction cylinder shaft size shall be a minimum of 3" in diameter. Each cylinder rod shall have a tubular design to save weight.

The third, fourth, and fifth sections shall be connected to the second section of the boom by dual aircraft cables. This design feature shall eliminate the extra weight of hydraulic cylinders on the outer sections when extended to the side of the apparatus.

The design shall be such that the operating hydraulic pressures of the main system shall be 2,000 psi or less. Once again, as a safeguard feature, the system shall be structurally and hydraulically designed and mounted to prevent rapid descent (retraction) of the aerial unit should a detachment, failure or hydraulic

hose break.

All sections of the boom shall extend and retract (slide) on special polymer slide blocks. Each slide block shall be bolted into place and shall be removable for inspection and maintenance. There shall be minimum of 44 slide blocks throughout the five sections of the boom for proper alignment and stability.

OPERATIONAL TEST

After starting the engine, setting the jacks and transmitting power to the turntable a complete cycle of the aerial device operation shall be carried out as follows: With one person operating the machine from the control station, raise the aerial from horizontal, rotate through a 90 degree turn and extend to full specified height. This shall be completed in less than 150 seconds, smoothly and without vibration. The aerial device shall then be retracted and lowered to its starting position after which a thorough inspection shall be made of all moving parts.

This test shall be repeated employing the controls at the lower pedestal control station. The effectiveness of the lower control override shall be demonstrated.

HIGH FLOW WATER WAY 4000 GPM

Water shall be supplied through a machine honed and fitted telescopic waterway constructed of high tensile aluminum. The waterway sections shall be provided with special pack gland type seals for minimum maintenance and the seals shall be located on the inside of the telescoping waterway. Waterway seals located on the outside of the waterway shall not be acceptable due to the decreased life expectancy caused by foreign particles and bad weather conditions damaging seals.

The waterway shall be completely enclosed by the boom sections with supports for the end of each waterway section. This shall leave the bottom side of each boom section completely free of extension/retraction cylinders, waterway supply line and waterway supports, hydraulic lines (extension/retraction cables) and nozzle(s) from possible damage due to the boom accidentally hitting against roof cornice or other types of constructions. The water supply line shall come directly off the main pump discharge manifold and shall be piped through smooth high pressure piping without the use of 90 degree chicksan joints, to reduce friction loss. A full flow gate valve to eliminate any possibility of water hammer on the waterway shall control the water flow. The water shall be passed through a special 5" passage-rotating swivel designed to also provide hydraulic passages and electrical circuits to the turntable.

Waterway piping immediately above the hydraulic swivel shall have one 90 degree elbow connected to a straight pipe attached to a reinforced smooth bore hose. There shall be no chicksan swivels or multiple bends or twists of the waterway pipe immediately above the hydraulic swivel, which would increase friction loss. The waterway diameter at the base section of the boom shall have a minimum inside diameter of 5" and shall finish in the fifth section of the boom with a minimum inside diameter of 7". This shall be done in order to decrease the friction loss as much as possible while increasing the water flow.

The waterway shall have the capability of flowing a minimum of 3000 gallons per minute, from **draft**. The waterway is capable of much higher flows, however, engine horsepower is the limiting factor. An automatic relief valve shall be provided in the waterway to eliminate any damage to the waterway by pressure shock or retracting the boom with the drain valve closed. **NO EXCEPTIONS.** Higher water flows above 4000 GPM shall be possible, based on the capacity of the facilities water system.

120 VOLT CIRCUIT TO LADDER TIP

One (1) 20 amp electrical circuit utilizing 12 gauge 3 conductor electric cable shall be provided to the tip of the ladder. The circuit shall be wired from an enclosed terminal strip below the turntable through the collector ring assembly.

One (1) (NEMA-L5-20) female, three-prong, twist lock receptacle, with environmental cover, shall be located below the aerial platform controls.

INTERCOM

A Fire Research Model IC301 three way intercom system shall be provided between the aerial tip, the lower control station, and the pump panel. The platform station shall be a "hands free" model while the lower control station and the pump panel station shall utilize a noise canceling handheld microphone. The finish shall be black chrome powdercoat.

5000 GPM AERIAL MONITOR/NOZZLE

An Akron Renegade model 3580 electric remote monitor will be provided and installed at the aerial tip. The monitor will be capable of flows up to 5,000 GPM, and will have the following features:

Controls for the monitor will be provided at the pump operator's panel, and via wireless remote control.

Material: Pyrolite (hard coated aluminum)
Voltage: 12-volt
Amps: 3
Rotation Travel 45 degrees
Elevation Travel: 135 degrees
Friction Loss: 27 PSI @ 5,000 GPM

NOZZLE CONNECTION

The nozzle will be connected to the monitor via a 6" Storz connection. This will enable the user to quickly disconnect the nozzle and reconnect another fitting giving the aerial device the capability of being used as a "stand pipe"

Flow: 1,000 - 5,000 GPM
Pattern: Straight Stream - Fog

LIFTING EYE

A single lifting eye shall be attached to the fly section of the boom for the purpose of hoisting a stokes basket. Capacity of the eye shall be 800 lb. and any weight suspended from it shall be subtracted from the rated capacity of the aerial device.

OPERATION AND SERVICE MANUALS

Complete "Operation and Service" manuals shall be supplied with the completed apparatus, one (1) printed copy and one (1) CD. Service manual instructions shall include service, maintenance and

troubleshooting for major and minor components of the truck. The apparatus manufacturer shall supply part numbers for major components (i.e. Engine, Axles, Transmission, Pump, etc.). A table of contents, hydraulic, air brake and overall apparatus wiring schematics shall be included.

A video demonstration DVD on the operation of the truck shall be supplied with the manuals.

WARRANTIES

The following warranties shall be supplied:

1. The apparatus shall be warranted to be free from mechanical defects in workmanship for a period of one (1) year. The apparatus shall be covered for parts and labor costs associated with repairs for a period one (1) year.
2. Life-time warranty on the frame.
3. Seven (7) year warranty on paint.
4. Ten (10) body structural warranty
5. Ten (10) year cab structural warranty
6. Manufacturers Warranties for all major components.

DELIVERY

The custom built fire apparatus shall be driven from the manufacturing facility to the community by a factory trained delivery engineer who shall thoroughly demonstrate the complete apparatus operation and maintenance to the fire department designated personnel.

MANUFACTURING & LOCATIONS

The apparatus will be manufactured in facilities wholly owned and operated by the company. A complete stock of service parts, and service shall be provided on a 24 hours around the clock basis. The company shall maintain parts and service for a minimum period of twenty (20) years on each apparatus model manufactured.